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Comparison of students' opinions toward experiential learning in two undergraduate agricultural capstone courses designed with contrasting delivery techniques

by

Charles Russell Steiner

A dissertation submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Agricultural Education

Program of Study Committee:
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Iowa State University
Ames, Iowa
2004
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For the Major Program
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CHAPTER I. INTRODUCTION

The concept of experiential learning, education through experience, is an integral part of adult learning and adult education philosophies. In response to this, a multi-billion dollar enterprise has been developed. However, professional educators are just beginning to understand the importance of experiential learning and its relationship to collegiate students. Agricultural professional educators are beginning to research and implement experiential learning strategies within their teaching and delivery in formal classroom instruction and not just through non-formal settings. This has led to a growing need to research and explain the delivery methods that enhance student learning through experiential learning.

Four educational philosophers were involved in identifying the four pillars of experiential learning in adult education. John Dewey, Seaman Knapp, Rufus Stimson, and William Lancelot founded these four pillars of experiential learning: learning in real-life contexts, learning by doing, learning through projects, and learning by solving problems (Knobloch, 2003a). These four pillars of experiential learning have been common within the realm of non-formal adult education but also have opportunities for growth and development within formal education.

John Dewey postulates that all genuine education comes about through experiences (Dewey, 1938). Edward Lindeman, who is well known for his work in adult education, lists one of his major assumptions about adult education: the resource of highest value in adult education is the learner's experience (Lindeman, 1926). The importance of past experiences and their impacts on learning have been researched and documented, leading to a continuous need for application and delivery within post-secondary education.
The idea of experiential learning is not new but its acceptance within formal classroom education has been limited; it has focused more on programs that provide opportunities outside of the classroom and in non-formal adult education settings. The difficulty in planning and time necessary to develop effective experiential learning activities is a limiting factor, as is the motivation of the students to become involved within the learning processes.

The importance of education through the learner’s experience provides the basis for experiential learning at the adult education level. Adults have the previous experiences necessary to understand the problem-solving and decision making processes related to real life agricultural situations. For collegiate educators, an important consideration is when do children or students become adults? When do learners have enough previous experience to relate those experiences to current situations and real problems? Webster’s Dictionary (1993) defines an adult as a physically mature person. The legal definition states that a child becomes an adult at age eighteen. Eighteen is the typical age in which students enter college and can enlist in the armed forces. However, character and experience may provide a more accurate measure of the transition from child to adult from a professional educator’s perspective. Character building and learning from experience could be a focus of higher education and the college experience would help guide students towards learning in adulthood. If collegiate educators are educating students, shouldn’t they also provide them opportunities to learn like adults, especially as those students near graduation? The transformation process from child or student to adult should be enhanced and growing throughout college. This study assumes that senior-level agricultural students have the life
experiences, education, and agricultural background necessary to be considered adult learners.

College and university programs in agriculture and other fields have begun to adapt teaching and learning processes relative to experiential learning. Examples are experimental courses, capstone courses, independent studies, and internships which demand more from collegiate students and involve them directly in their own learning processes.

Experimental courses are being developed to discuss new topics and constantly changing agricultural issues. They are also being developed to integrate interdisciplinary educational opportunities with alternative teaching and delivery methods.

Capstone courses are another means for allowing students to bring meaningful closure to their academic experience. A capstone course is defined as: “a planned learning experience requiring students to synthesize previously learned subject matter content and to integrate new information into their knowledge base for solving simulated or real world problems” (Crunkilton, 1997a, p. 3). Capstone courses provide students with the opportunity to develop skills in problem-solving, decision-making, critical thinking, collaborative/professional relationships, oral and written communication (Crunkilton, 1997a). The learning activities that need to be an integral part of a capstone course are projects, case studies, issue analysis, small group work, oral communication, and intensive writing (Crunkilton, 1997a). Although all of these are not necessary to be considered a capstone course, either a project, case study or issue analysis must be utilized to ensure this type of learning. All of these planned learning activities are directly related to experiential learning.

Internships also provide an opportunity for students to gain experience outside the classroom; hence, they are typically considered a form of experiential learning. Classroom
instructors then can use these experiences in their teaching. Independent studies can also provide experiential learning opportunities through the use of long-term projects, case studies, and group projects. All of these teaching strategies move away from the classical textbook and lecture format and involve the facilitation approach to teaching. They tend to demand more from the students as they are expected to become more involved in their own learning and relate it to their experiences within the context of new situations. This type of teaching and program planning can be difficult to teach because many students are not accustomed to being involved in their own learning. They are passive and willing to learn solely from the teacher. Generally, this type of direct learning does not work well within the experiential learning philosophy.

Several colleges and universities have used experiential learning within their collegiate curricula. In 2001, the University of Wisconsin-River Falls was awarded a $100,000 higher education challenge grant (Butler, 2001). A series of courses was created to bring advanced students from two or more disciplines together with faculty from those disciplines to address and solve real problems faced by farms or agricultural related businesses in the River Falls, Wisconsin area. Experiential learning activities have even been researched as to their effectiveness in distance education courses (Westera, 2002).

At Iowa State University, there are currently two senior-level courses in the college of agriculture that are based on experiential learning for students. Both are farm management courses but differ in their teaching methods and delivery systems. In addition, both are considered to be capstone courses. These two farm management experiential learning courses are AGEDS 450, Farm Management and Operation and ECON 430, Advanced Farm Business Management. A copy of the syllabus for both courses can be found in Appendix B.
The Agricultural Education and Studies Department at Iowa State University has provided an unique experiential learning opportunity for its students for the past 60 years. The AGEDS 450 course was developed to teach young adults about farm management and operation using an actual farming situation; namely, the Ag450 farm. The farm serves as the student laboratory whereby students provide the management, problem-solving and decision making necessary to manage a self-sustaining farming operation.

Experiential learning in this course occurs by placing students in the managerial role, which involves solving problems through decision-making for the benefit of the farming operation. Accurate farm records, teamwork, and student-to-student communication provide some of the bases for this experiential learning course.

The Economics Department at Iowa State University offers a capstone experiential learning course, ECON 430, Advanced Farm Business Management. This course also teaches young adults about farm management through lectures, laboratory assignments, computer simulations of an actual farming situation, and a group project. Students must apply previously learned concepts about farm business management and then use and apply these concepts using a computer simulation of an actual farming situation which is already familiar to the students. Experiential learning is enhanced in this course through the laboratory, farm simulation, group project issue papers, and in class discussions.

Students' perceptions regarding experiential learning in these two capstone courses can provide information about the effectiveness of teaching farm management using two vastly different teaching and delivery methods. Several issues can be addressed. How do students learn differently from one class to another? Are experiential learning activities effectively taught to individuals or within the context of groups and/or committees? What
must the faculty and staff do to ensure that experiential learning is taking place and is effective? How do students perceive experiential courses taught using different strategies and what differences or similarities can be proven? Do capstone course enhance experiential learning?

**Statement of the Problem**

In nearly every academic discipline, research is continually conducted to evaluate teaching methods/strategies for subject matter or courses within that discipline. Experiential learning strategies are no different and have been a major part of this process, but little research has been done to understand the effectiveness of different types of delivery techniques within experiential learning. This is particularly true for farm business management at the collegiate level where a variety of teaching methods have been used. At the same time, there has been a growth in distance education and computer simulation as farm management teaching methods. Hence, there is a need to conduct research on the effectiveness of various teaching methods within experiential learning.

More capstone courses are being taught in agriculturally-related disciplines at the collegiate level. Many of these follow the Crunkilton model for capstone courses and are also taught using experiential learning. Therefore, research on delivery techniques for a capstone course taught using experiential learning would be highly beneficial.

There is a constant demand for accountability and validity in teaching, and farm business management is no exception. Therefore, there are many issues to be examined. Is there a means for teaching an experiential capstone course on farm management that enables adult learners to increase their ability to apply what they learn and utilize past course work
and experiences? How can learning be enhanced? How can student perceptions, towards learning and delivery, assist in the evaluation of these courses? The problem relates to the ever present need to understand how students learn effectively and the means by which experiential learning in capstone courses can be properly delivered within the classroom.

**Purpose**

The purpose of this study is to determine similarities and differences in students’ perceptions towards learning in two senior-level farm management experientially based capstone courses, similar in content, but vastly different in delivery and teaching methods. A secondary purpose is to determine if there is a favorable means for teaching farm business management concepts to young adult learners.

**Objectives**

Listed below are the objectives for this study:

1. To examine selected demographic characteristics of the students enrolled in these two experientially-based capstone courses.

2. To determine the effectiveness of these two capstone courses using Crunkilton’s criteria.

3. To identify the effectiveness of experiential learning, learning outcomes, and knowledge/skill enhancement as it occurs, using students’ perceptions towards these courses.

4. To compare students’ attitudes towards the effectiveness of various teaching and delivery methods used in each course and its impact upon their learning in an experiential setting.
Research Questions

To accomplish the purpose and objectives of this study, focus will be on these research questions:

1. What types of students are enrolled in these two courses?
2. How effective are these two courses at utilizing Crunkilton’s criteria for capstone courses?
3. What similarities and differences exist in the learning outcomes of these two courses as perceived by the students?
4. Which delivery techniques are most effective/ineffective for these two experiential learning courses?

Need for the Study

There is a continuous need to research the knowledge and understanding of students’ perceptions towards learning. For farm business management, a variety of teaching methods and techniques are being used. Additional research to examine similarities and differences in learning outcomes can add to the body of knowledge regarding appropriate teaching methods. Would fewer methods be a favorable option? Can experiential learning be taught using a variety of delivery methods and strategies or are certain components stronger than others?

Students and adult learners are constantly changing, especially within agriculture, and this validates a need for continual research on teaching methods and delivery to ensure that the perceived benefits are consistent with today’s learners’ needs at the collegiate level.

In a time of budget constraints and reduced resources, research that helps explain the need for teaching, using a variety of delivery methods for similar course content, can have a variety of implications. Such research may demonstrate the need for a variety of teaching
strategies in farm business management and/or it may demonstrate that certain strategies may be more effective than others. It may also help explain ways in which experiential education can be further incorporated into the classroom and curriculum.

Methods

A survey was developed to evaluate the AGEDS 450 and ECON 430 courses at Iowa State University. This survey was administered at the conclusion of the respective courses. The survey was piloted during the Summer Session in 2003 using AGEDS 450 students enrolled in the summer course. Since there was no summer ECON 430 course the survey was mailed to a sample of ECON 430 students that completed the course in the Fall of 2002. The pilot study information was used to validate the survey and to make necessary revisions. A copy of the final survey is included in the Appendix C.

The survey was administered at the end of the Fall 2003 semester to 61 students enrolled in ECON 430 and 37 students in AGEDS 450. Additionally, 31 students in the Spring 2004 AGEDS 450 course completed the survey. Therefore, responses were received from 61 ECON 430 students and 68 AGEDS 450 students. It should be noted, the ECON 430 course is currently offered only in the Fall semester each year.

The survey addresses the previous experiences of the students and the expected outcomes of each course. It also examines the students’ perceptions as to the effectiveness of each course related to capstone course requirements and includes a section that evaluates the students’ perceptions toward their experiential learning experience. The final survey section identifies different delivery techniques used within the two courses and asks the students to rate the effectiveness of these methods.
Benefits

Experiential learning philosophies and activities play a major role in adult education and the changing environment in agricultural education at the collegiate level. This study will provide some detailed research into that process and the effectiveness of experiential learning for senior-level learners in two similar capstone courses. Comparisons between different delivery and teaching techniques used in experiential learning, at a higher education level, will add to the body of knowledge related to experiential learning.

Experiential learning at the collegiate level is difficult for many instructors and professors to implement and use effectively because of the increased role of the student and the development of activities that are conducive to experiential learning. Many students are not ready to be responsible for their own learning or to play a larger role in what they are being taught. They are not prepared to be asked to apply what they already know to real life situations. This research will identify the strengths and weaknesses of this type of education and evaluate it in relation to different teaching and delivery methods. This study can benefit university faculty involved in experiential learning education in a variety of ways. Responses from the students will help identify strengths and weaknesses of the experiential learning process and how it relates to teaching. Similarities and differences in learning outcomes for two vastly different teaching methods; real life farming operation versus computer simulation, will benefit the faculty involved with these courses and others. Finally, it may aid in explaining the importance of experiential learning and its relationship with capstone courses developed for college students.
CHAPTER II. LITERATURE REVIEW

Introduction

This chapter discusses the literature related to experiential learning, adult education and capstone courses. It also provides information about the course content for the two courses being compared and how experiential learning is incorporated into these capstone courses. This chapter is divided into three sections. First, a theoretical and philosophical framework is established to explain experiential learning within the context of teaching. Models of experiential learning are explored to provide a theoretical basis for the two courses and their delivery methods. Second, the connection between experiential learning and adult education is examined, along with literature related to capstone courses and their function within experiential and adult education. Finally, the two courses and their specific objectives and educational outcomes are explained.

Discussion in the literature continues as to what is the most effective teaching and delivery style for students. That is, which teaching style(s) foster the ideal learning situation and increases retention and application by students? Understanding the differences in adult education philosophies is fundamental to understanding the differences in teaching styles and their impact upon student learning and retention.

Elias and Merriam (1980) describe several philosophies of adult education; namely, the traditional or liberal approach and the progressive or humanistic approach. The liberal adult education or traditional approach relates to a learner who seeks knowledge rather than just information. Teaching methods within this philosophy include dialectic, lecture, and study groups. The progressive or humanistic philosophy, as described by Elias and Merriam
(1980), focuses on learner’s needs and experience. Teaching methods include more experiential practices; namely, problem-solving, group discussion, team teaching, facilitation, and self-directed learning. Therefore, there are distinct philosophical differences between these philosophies of adult education. The two courses involved in this study are designed within the progressive or humanistic approaches.

Experiential learning is an outgrowth of the progressive and humanistic philosophies. Key concepts within these two philosophies are experiential learning, problem-solving, self-directed learning, and facilitative teaching. As stated by Boud and Miller (1996, p. 3), “Every day, we are confronted with problems and challenges which we address by drawing on our experience, and by using this experience we find ways of learning what to do in new circumstances.” Related to this, there is substantial information and literature researching teaching processes and instruction, but little has been done in the area of learning in context. Limited information is known about which delivery methods are suited for experiential learning and have a positive affect on students. Lave and Wenger (1991) have promoted the idea of situated learning, and the way in which adults learn through participation in real world tasks; this has a strong relationship to learning from experience. Meyers and Jones (1993) describe a growing body of research based on more active learning strategies in their book on promoting active learning. It involves students that talk, listen, read, write, and reflect as they become more involved in the instructional process. Again, these characteristics are similar to those described by experiential learning and focus on the ability of students to become involved in their learning and the importance of the teacher as a facilitator within these processes.
Experiential learning is a rapidly expanding area of literature with Kolb (1984) exploring the implications of experiential learning theory and experimenting with techniques of learning from experience. Kolb's theories provide the theoretical framework for this study whereby two capstone courses taught experientially using contrasting delivery methods are compared. The following segments of the literature review help explain the theoretical framework for this study.

**Experiential Learning**

"Learning experientially in authentic contexts has been a foundational model of teaching and learning in agricultural education" (Knobloch, 2003a, p. 22). Significant results have been noted in informal educational settings such as early field experience and internship opportunities. At the same time, the use of experiential learning continues the debate concerning the role of the teacher in education.

Experiential learning has several principles that influence this type of teaching and learning ranging from students' real experiences and the teacher as facilitator (Herbert, 1995) to concrete experience and abstract conceptualization (Kolb, 1984). The work of Kolb (1984) increased the awareness of experiential education as a way to revitalize the university curriculum and cope with changes facing higher education. His work and the work of others in experiential learning have been based on the framework of experiential learning originally developed by John Dewey. "I take it that the fundamental unity of the newer philosophy is found in the idea that there is an intimate and necessary relation between the processes of actual experience and education" (Dewey, 1938, p. 19-20). This growing acceptance of experiential learning and the connection between actual experience and education has led to
large amounts of research and study (Andreasen, 2004; Cheek et al., 1994; Hughes and Barrick, 1993; Westera, 2002).

Kolb defines experiential learning as a “framework for examining and strengthening the critical linkages among education, work, and personal development” (Kolb, 1984, p. 4). Kolb (1984) explains that experiential learning methods emphasize the critical linkages developed between the classroom and real world. There is clearly a renewed focus on the importance of application of previous experience within the context of higher education and student learning. At the same time, the ideal of improved student learning with the role of the teacher being a facilitator was being discussed. This concept was showcased in a recent issue of the Agricultural Education Magazine (2003) with the theme being “the role of the teacher in facilitation of learning.” Articles focused on issues related to facilitative learning and teaching with specific examples. Knobloch (2003b), as theme editor for the magazine, identified a common thread among the articles related to the role of the teacher as a facilitator; namely, the teacher’s role included being developmental, challenging, relational, flexible, adaptable, integrating, and reflective. Therefore, much of the work related to facilitation in experiential learning occurs outside the classroom, that is, planning the learning experience, providing the setting, gathering information, and providing the context necessary for experiential learning to occur.

It is critical to understand the principles and themes that define experiential learning and provide the framework for application in both teaching and learning. Kolb (1984) identifies seven themes that provide this theoretical framework (Figure 1). These seven theories are based upon the work of Kurt Lewin, John Dewey and Jean Piaget, who all viewed experiential learning as a lifelong process of development.
Dewey's philosophical stance is considered to be progressive within adult education. Progressive philosophies of adult education involve the societal and cultural structures in which learning takes place while providing the learner with the practical knowledge and problem-solving skills necessary (Elias, 1980). Progressive philosophies of teaching focus on learners' needs, interests, and experiences; the teachers are considered a guide through the
learning experiences (Elias, 1980). Lewin valued action research as a means of experiential learning and had similar beliefs to Dewey in the context of democratic values and the importance of cooperative leadership and dialogue. Piaget’s work related to the dialectics of learning from experience and the epistemological view of the relationship between knowledge and learning being constructed has led to constructivism as an approach to learning. Hence, the works of Lewin, Dewey, and Piaget have been a guiding factor for Kolb’s idea of using experience as the source of learning and development.

Conrad and Hedin (1995) and Kraft (1995) identified several movements that gave credibility to experiential learning and its place in higher education. The most recent of these was the School-to-Work initiative. This initiative focused on identifying what is “truly” experiential learning and not something else. Boud and Miller (1996, p. 8) stated that learning from experience involves “an act of becoming aware of experience, building upon it, extending it and in the process creating new experiences which become part of what we know.” Therefore, the true test of experiential learning is whether or not it involves these basic steps towards creating a new experience from what we currently know.

Kolb (1984) explains the experiential process as a continuous flow within personal development, work, and education. Learning rarely occurs “in splendid isolation from the world in which the learners lives; … it is intimately related to the world and affected by it” (Jarvis, 1987, p. 11). This explains the importance of not only teaching from a context related to a specific field, but to approach education from the standpoint of education based on the experiences and personal development of people in adult education.

Kolb’s model of experiential learning involves the connection and transitions between four key adaptive learning modes, as noted in Figure 2. The four adaptive learning modes
are: concrete experience, reflective observation, abstract conceptualization, and active experimentation.

Kolb’s model stresses the importance that the concrete experiences of learners will have on their ability to learn. The concrete experience provides apprehension for students through previous or new content being introduced through real life experiences. The transformation of learning begins to occur when the students use reflective observation throughout the experiential learning process to analyze what has happened and why. They reflect upon those concrete experiences and develop new ideas for use. This leads to abstract
conceptualization which allows students to use their experiences and apply them to different situations which in turn provides comprehension for the students as they create their own ideas and solutions. Active experimentation allows for transformation to students via extension of their concepts through decision, problems, and applications developed through the abstract conceptualization mode. The students are allowed the opportunity to put their ideas into practice. Throughout this learning process students' knowledge moves along a continuum from divergent knowledge, assimilative knowledge, convergent knowledge and accommodative knowledge. This is a continuous process that can occur at many different levels depending upon the student and the situation.

Other models have used similar approaches for explaining the experiential learning process. Laura Joplin (1981) developed a five stage model explaining the experiential learning cycle as shown in Figure 3.

Joplin’s model begins with the focus stage where students are explained the educational objective within a specific content related to the area of study. After the students are focused on the specific objective, they are placed in difficult situations where a problem(s) must be examined and explained. This situation then challenges the students to use their past experiences, relate them to a new situation, and create new knowledge. This new knowledge is presented as their decision or solution and they must explain their reasoning and defend their recommendations to all those involved in the discussion. This process is the debriefing stage which allows for the critical analysis by all those involved.
Figure 3. Joplin’s model of the experiential learning cycle

This may lead to further building of new experiences and applying information to new settings, while also providing the context for the process to start over with another experience and cycle. Throughout the process, the teacher and students involved are constantly providing feedback and support for the students or group. This can be demanding because support involves providing the correct information necessary to understand the issue and complete the process. Feedback is necessary throughout to ensure that students are on track and to allow for continuous learning throughout the cycle.

The United States Department of Agriculture’s Cooperative State, Research, Education and Extension Service (CSREES) has also developed a model for experiential
learning used within their 4-H program as shown in Figure 4. This model has a cyclical relationship similar to Kolb's model. It begins with an actual experience or activity and cycles through the process in which students share the results, process the information, generalize the experience to real world examples, and apply what they have learned to similar or different situations through application (CSREES, 1992).

Figure 4. Experiential learning model used by CSREES
This model has similar characteristics to the previous models. However, it contains a secondary stage diagramed as a basic triangle that discusses the need to “do, reflect, and apply” among each of the primary stages. This provides a more simplistic approach to the five stages of experiential learning explained in the model.

Following along the same lines as the cyclical approach to experiential learning examined by CSREES, Knowles, Cole and Presswood (1994), provide a more detailed model for the experiential learning cycle/spiral that is represented by a continuous upward spiraling movement. This model is shown in Figure 5. Knowles, Cole and Presswood’s (1994) model involves the cyclical relationships depicted in similar models but goes one step further in that it also examines a continuous spiraling affect from one experience to another. The model’s foundation (personal experience and practice, information gathering and documentation, reflection and analysis, and informed action) is similar to the models developed by Kolb, Joplin and CSREES. However, the major difference is that it goes beyond simply restarting the process and views the spiraling affect as students continue to develop, grow, and move on to new experiences. Experience remains the foundation, but new experiences are introduced throughout the experiential learning process forcing students to continue to use the four stages each time a new problem or situation arises. This view of continuous experiential learning from the application of one experience to another is critical to the success of any course being taught in this fashion. The continuous building of previous experiences on current experiences and into new experiences is the real mission of experiential learning.
Figure 5. Knowles, Cole, and Presswood’s experiential learning cycle/spiral model
All of these models continue to build upon similar principles or themes that are the foundation of experiential learning. All of them value the importance of the actual experience and demand student involvement, observation, reflection, and implementation of ideas into practice or action. As these stages are ongoing with students, they are continually developing concepts and ideas that in time can be applied to new situations. This process is the basis for experiential education and the primary focus of the two courses being studied.

Andreasen (1998) completed a study on the perceived benefits of experiential learning activities and instructional techniques in a capstone course. His study concluded that experiential learning activities and managerial areas of the capstone course were beneficial to students in their first professional position after college. He also validated the benefits of experiential learning activities and instructional techniques used in a capstone course. Andreasen (2004) identified a model for integrating experiential learning into capstone courses in agriculture, as shown in Figure 6. This dynamic model depicts the process in which experiential learning influences all of the required components of a capstone course. The diagram examines the role of the student and the teacher/facilitator as they utilize the capstone course components while continuing the experiential learning process. Andreasen’s model focuses on the fragmented knowledge of students as they become involved in the components of a capstone course and have real situations in which the experiential learning components can be integrated and synthesized within the subject matter being taught.
Figure 6. Integration of experiential learning into capstone courses (MIELCC) as developed by Andreasen

Experiential learning focuses on the importance of past experiences and their impact on the creation of new knowledge in new situations. All of the before mentioned models depicted similar characteristics related to building upon past experiences and providing young adults with the opportunity to reflect, analyze, synthesize, conceptualize, and, most
importantly, apply what they have learned to new situations. For experiential learning to occur, instructors or facilitators have many challenges they must face to ensure that students are provided the activities and situations in which they can apply these experiential principles of learning. Instructors must understand the importance of those contributing factors associated with experiential learning and be willing to spend the time and effort necessary to develop an experientially based program for learners, whether they are considered students, young adults, or adults.

**Adult Education**

Adult education has always seemed properly suited for experiential learning. The basic theories and principles that outline experiential learning demand a learner with previous experience(s) to reflect upon those experiences and be willing to learn and be challenged. Adults tend to have those previous experiences and have the characteristics necessary for this type of learning situation. That is why students in capstone courses, based on experiential learning, are commonly taught using adult education strategies.

Whitaker (1995) discusses the importance of the movement away from the restricted notions of pedagogy toward the newly produced andragogy; the art and science of helping people learn. This conceptual innovation has aided adult education in moving from a definition of education that is based on teaching to one that encourages and supports learning. This has provided a new framework for adult education; Boud, Cohen, and Walker (1993) have identified a set of basic propositions about adult learning from experience:

1. experience is the foundation of, and the stimulus for, learning
2. learners actively construct their experience
3. learning is a holistic process

4. learning is socially and culturally constructed

5. learning is influenced by the social and emotional context in which it occurs

These propositions provide a basis to understand the experiential learning process and how they can impact experiential learning within adult education.

Many writers have examined how we learn from experience; however, Merriam & Caffarella (1999) summarized the experience of learning in their book Learning in Adulthood as follows:

“Building primarily on the work of Dewey, Piaget, and Lewin, conceptualized that learning from experience requires four different kinds of abilities: (1) an openness and willingness to involve oneself in new experiences (concrete experience); (2) observational and reflective skills so these new experiences can be viewed from a variety of perspectives (reflective observation); (3) analytical abilities so integrative ideas and concepts can be created from their observations (abstract conceptualization); and (4) decision-making and problem-solving skills so these new ideas and concepts can be used in actual practice (active experimentation) (Merriam & Caffarella, 1999, p. 224).

These four abilities, as identified by Merriam and Caffarella, are interrelated with Kolb’s model of experiential learning. However, Barnett (1989) added a fifth component to the learning cycle; namely, “planning for implementation.” These five components help explain and identify the importance of learning through experience. The importance of allowing adult learners to reflect upon their own experiences and learn from them, while recognizing the contextual factors of those experiences, must be done effectively if experiential learning is to be utilized correctly.
According to Best Practice Resources (2003) as adapted from John Goodlad, there are six principles of adult learning for successful programs. They are:

1. practical and problem-centered approaches
2. promote positive self esteem
3. integrate new ideas with existing knowledge
4. show respect for the individual learner
5. capitalize on learner's experiences
6. allow choices and self-direction

These six principles have many similar attributes to the principal foundations of experiential learning. They are also closely related to Malcolm Knowles critical assumptions of andragogy and adult learning related to self concept, experience, readiness to learn, orientation to learning, and motivation to learn (Knowles, 1984). These are all principles that differentiate andragogy or adult education from pedagogy or the teaching of children.

Since these principles of adult education are so closely related to experiential learning, it could provide some basis for the difficulty students can have with experiential learning. The principles of experiential learning and adult education demand more from students than just passive learning directly from the teacher. Students find themselves dealing with difficult real-life situations within the context of their own experience. Consequently, many of them are unwilling, or have not had many opportunities to learn in this type of situation. This is why adult education and experiential learning have a distinct relationship – the more willing the student is to become involved in the learning process, the more significant learning will take place.
Capstone Courses

Capstone courses are becoming more prevalent in colleges and universities. Several examples can be found in agricultural disciplines. Hubbard and Keith (2002) designed a capstone course related to the development and instruction in international agriculture. Their focus was agricultural production on a global scale and the connections with society in terms of sociology, history, economics, government and culture. Crunkilton, Cepica, and Fluker (1997b) have identified a portfolio of agricultural capstone courses in agribusiness management, beef production, floriculture, agricultural issues and policies, and natural resources. This portfolio provides an excellent depiction of a variety of program areas in which capstone courses have effectively influenced student learning.

In 1997, Virginia Polytechnic Institute and State University, Texas Tech University, and Alcorn State University joined forces through a United States Department of Agriculture (USDA) challenge grant for a project entitled, “Capstone Courses – A Necessary Component for Agriculture Programs in the Future.” Outcomes from this grant included the defining of a capstone course, identification of six educational outcomes, identification of seven learning activities for successful capstone courses, and a list of contributing teaching practices and hindering elements.

From a literature review, survey analysis, and syllabi examination, the definition of a capstone course, as defined by Crunkilton, Cepica, and Fluker (1997a, p.3), is “a planned learning experience requiring students to synthesize previously learned subject matter content and to integrate new information into their knowledge base for solving simulated or real world problems.” Additionally, a capstone course should provide assistance to students in applying and completing their academic experiences. A capstone course should also aid
students to connect theory and practice. As the name implies, these courses should be taken by students nearing the end of their academic experience or completion of an undergraduate degree.

The six educational outcomes, as identified by Crunkilton, Cepica, and Fluker (1997a), are (a) problem-solving, (b) decision-making, (c) critical thinking, (d) collaborative/professional relationships, (e) oral communications, and (f) written communications. The seven required learning activities include: (a) projects, (b) cases studies, (c) issue analysis, (d) small group work, (e) oral communications, (f) intensive writing, and (g) industry involvement. These educational outcomes and learning activities have been commonly accepted and used by educators and instructors of capstone courses and provide the framework for capstone course development.

Crunkilton, Cepika, and Fluker (1997a) also reported the most commonly effective contributing teaching practices for capstone courses; namely, assigning large semester-long projects, case studies, or issue analysis, requiring intensive writing and speaking, including department faculty in course formation and teaching, focusing on group work and team cooperation, and using critical thinking to solve real-world problems. The most frequent hindering elements for capstone courses were the lack of student retention of materials from previous courses. Also, the necessity to review basic principles, formal lectures, varying levels of student experiences, and inadequate funds to support needed learning activities. These provided some guidelines to follow when developing, implementing, and teaching capstone courses.

Crunkilton, Cepika, and Fluker (1997a) identified some common characteristics of all capstone courses. These characteristics reinforce the student learning experience and ensure
that the desired learning outcomes will be achieved. The common characteristics identified are (a) expected course educational outcomes, (b) required learning activities, (c) optional learning activities, (d) guidelines for developing the course, and (e) essential components of a syllabus. These common characteristics will benefit both the students and instructors in understanding the framework of any particular capstone course and better prepare students for the working world.

Lastly, Crunkilton, Cepica, and Fluker (1997a) found that capstone courses are frequently taught using several different teaching and learning approaches, including classroom lecture/discussion, laboratory problems, case studies, internships, and other similar types of formal settings.

**AGEDS 450, Farm Management and Operation**

AGEDS 450, Farm Management and Operation, is a three semester credit course offered by the Department of Agricultural Education and Studies at Iowa State University. According to Trede (2003), the course objective is “to provide students an opportunity to participate in the actual management and operation of a typical Iowa farm.” Other objectives include providing students with the opportunity to “personally experience the challenges and satisfaction of managing an actual farming operation.” To accomplish these objectives, students participate in class committees, get involved in farm decision-making, and work together to accomplish the class goals and objectives.

The Iowa State University Catalog (http://www.iastate.edu/~catalog, p.125) describes the course as “Participation in the management and operation of a diversified Iowa farm.”
The class is responsible for the plans, records, and decisions for buying and selling the farm's livestock, crops, and equipment. Special speakers on current topics. May be taken for credit 3 times at different times of the year by permission of the instructor.” The prerequisites for this course are Economics 330, Economics 135, and a junior classification. Class contact hours are 1 hour of lecture and 5 hours of laboratory for 3 semester credits.

Trede (2003) has identified several learner outcomes for this course. Students learn to use the decision-making process and critical thinking skills to manage the Ag450 farm; the laboratory for the course. At the same time, students can enhance their group communication skills and interpersonal relationship skills by working together to achieve class objectives. Through this class, students must be aware of the farm's resources, learn about environmental constraints and governmental regulations, and then use this information to make farm management decisions. Lastly, students learn to apply principles learned in previous classes to the laboratory farm.

AGEDS 450 is offered during the fall, spring, and summer semesters. Major units taught during each semester will vary depending upon critical decisions affecting the management and operation of the farm; however, several teaching units are taught each semester. The units that tend to be the same each semester include: farm management and the decision-making process, farm financial statements and analysis, farm income statement and analysis, risk management, crop and livestock marketing strategies, swine production and marketing, crop production technologies, entrepreneurship in agriculture, and the top ten management factors affecting the profitability of the farm. Each of these units are updated each semester to include the most recent data records from the farm. Principles for each of these topics are discussed and then specific applications are made to the farm using the
farm’s records. Other teaching units are included in the course with topics being closely related to the production and financial decisions affecting the farm at that particular time due to external factors such as weather, commodity prices, government programs, environmental and/or safety concerns, and other externalities.

Grading for the course consists of exams (45%), strategic issue (30%), and participation/attendance (25%).

Several learning activities are included in the course which follow the Crunkilton model for capstone courses. Students are assigned to one of seven farm committees. The committees are responsible for the planning and implementation of decisions for a particular phase or enterprise on the farm. As part of their committee work, the students must work together to solve problems, present solutions, develop budgets, prepare oral and written reports, and interact with the other committees within the class structure. A major portion of the course deals with a “strategic issue” affecting the farm either in the short-run or long-run. Seven strategic issues are developed by the instructor(s) and are assigned to each farm committee. An outline for the strategic issue assignment can be found in Appendix D. The strategic issue assignment requires the committee to seek out information/data from a variety of sources, including the farm’s vendors. The students then use the “decision-making” process as part of their assignment. Strategic issues are presented, written and orally, to the class at the conclusion of the semester.

Experiential learning in this course occurs in several ways. The course begins with a discussion of the entire farming operation including the identification of strengths and weaknesses. This provides some concrete experience in which learning can occur. Students
then reflect upon what they have learned and develop short and long-term goals for the farm.

To do this, the students must critically analyze the current farming situation.

The Ag450 farm concept was developed by Dr. William G. Murray with the first class offered in 1943. His idea was to organize a teaching farm so that "before graduation a student expecting to operate a farm (would) have training in the farm practices of this area – the scientific principles of crops and animal production, including the use of power and equipment, the business principles of farming; and finally the making of management decisions.” (Murray, 1945, p. 186). The original farm was 187 acres and was located three miles south of the Iowa State University campus. The purchase price was $150.00 per acre. According to Honeyman (1983), crops on the original Ag450 farm were oats, corn, soybeans, hay, and pasture. A variety of animal enterprises have had a role on the farm including: poultry, dairy cattle, mules, draft horses, swine, beef cattle, and sheep.

Today, the farm consists of approximately 1400 acres of corn and soybeans and a 160-sow farrow-to-finish swine operation. Part of the land is currently custom farmed for other Iowa State University departments. Also, land is crop-share rented and cash rented. The farm is self-sustaining with profits and losses accruing the farm. Borrowed capital is also used as part of the farming operation.

Farm record data from the Ag450 farm is continually updated and included in a course packet prepared each semester for the student. The course packet contains the most recent farm record data, printed lecture material to be used for that semester, and reference material from the ISU Extension Service; namely, the Farm Decision Aid Manual.

In summary, the AGEDS 450 course closely parallels the Crunkilton criteria for capstone courses. It, also, integrates the principles of adult education and experiential
learning providing the students in the class a unique management experience for a real-life farming situation.

**ECON 430, Advanced Farm Business Management**

ECON 430, Advanced Farm Business Management, is a 4 semester credit course offered by the Department of Economics at Iowa State University. According to Kliebenstein (2002), the course objective is “to apply techniques available for planning and analyzing farm business decisions.” The course focuses on strategic planning, budgeting, cash flow analysis, records and business analysis, tax management, and whole farm planning. Computers are used extensively in the course to aid in these evaluations.

The Iowa State University Catalog (http://www.iastate.edu/~catalog, pg. 191) describes the course as “Effective use of strategic planning, decision methods, and computer assistance for solving farm problems. Applications of economic and management theory to analyze farm business decision using efficiency measures to assess current resource use and direct the farm business analysis, planning, and tax process. Computer as aids in the decision process.” The prerequisite for this course is Economics 330. Class contact hours include 3 hours of lecture and 2 hours of laboratory for 4 semester credits.

Kliebenstein (2002) has identified several learner outcomes for this course. Students learn techniques for evaluating the “health and weaknesses of a farm business” through record analysis. They also learn about income tax management techniques that help farmers maximize their effectiveness in tax management and planning. Lastly, using judgments and skills in budgeting procedures and planning techniques, student discuss and learn to
implement strategic business planning. Prior student experiences are utilized throughout the semester during the course.

Six major units are covered during the semester, according to Kliebenstein (2002). Unit I involves the strategic planning for the farm business which involves goal setting, the management role in agriculture, realities of getting started, and macro-issues in planning. Cash Flow Analysis/Enterprise Budgeting is the focus for Unit II. Emphasis is given to developing enterprise budgets/analysis, whole farm cash flows, and cash flow analysis. Students pull information together for determining the purchasing, production, marketing, and financing sequencing for a case study farm operation of their choice. Unit III focuses on monitoring the farm business through farm records and includes such topics as adopting a farm record system, interpretation of financial statements, business evaluation through ratio analysis and farm profitability vs. cash flow. Unit IV is devoted entirely to income tax management analysis while Unit V is designed to look at planning for the future. In Unit V, farm records are used for planning crop and livestock systems within a whole farm plan. Lastly, Unit VI is designed to cover other topics such as risk and uncertainty, land acquisition strategies, machinery acquisition, and capital acquisitions.

Grading for the course consists of exams (approximately 32% of final grade), laboratory assignments, quizzes, etc. (approximately 47% of final grade), and final written paper, oral presentation, and discussion (approximately 21% of final grade).

Several required learning activities are included in the course. These learning activities follow the Crunkilton model for capstone courses. A major project for the course for each student involves developing a whole farm plan for a farm familiar to the student. The student uses his/her past experiences and knowledge to develop a strategic plan for the
case study farm using a computerized farm simulation program; namely, FINPACK. Throughout this semester-long process, students discuss issues as a class and individually to develop the farm plan.

The term paper project also meets the Crunkilton criteria for capstone courses. (See Appendix E for assignment outline.) This project requires students to work in small groups and identify a “critical issue” currently affecting farm businesses today or likely to have a major impact upon farm business in the next five to ten years. Students work together to identify problems related to the issue they have identified, seek information and data, analyze changes needed, and discuss impacts and possible means of implementation. A written term paper is prepared followed by an oral presentation to the entire class.

As mentioned earlier, FINPACK is used as a major teaching tool for ECON 430. For farm producers, according to the FINPACK website (www.cffm.umn.edu/software/finpack) “FINPACK will help a farm manager evaluate his/her financial situation, explore alternatives, and make informed decisions about the future direction of his/her farm. It is not a record keeping system. Instead, FINPACK gives a farmer manager the tools he/she needs to effectively use his/her records in managing his/her farm or ranch.” Through the FINPACK software program, a farmer can develop balance sheets, long-range plans, cash flow plans, year-end analysis, and maintain historic financial and production records. FINPACK is currently maintained and available from the University of Minnesota.

In summary, ECON 430 follows closely the Crunkilton model for capstone courses. It also incorporates many of the principles of adult education and experiential learning. Students use critical thinking and problem-solving along with their prior educational training and experience to solve real-world farm management problems on a case study farm using a
computerized budgeting program. Additionally, the term project requires students to incorporate experiential learning into a class project.

**Capstone Course Comparisons – AGEDS 450 and ECON 430**

A critical component to understanding capstone course effectiveness is the different methods and activities used in these types of situations. Table 1 shows a comparison using the Crunkilton criteria for capstone courses between AGEDS 450 and ECON 430. Planned activities and assignments from each course are identified for the various capstone course criteria. From this table, it is apparent that both courses have specifically planned learning activities that incorporate all the features required of a capstone course. Related to these planned features are many of the principles underlying experiential learning.

<table>
<thead>
<tr>
<th>Learning Activity Criteria</th>
<th>AGEDS 450</th>
<th>ECON 430</th>
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<tbody>
<tr>
<td>Projects</td>
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<tr>
<td>Case studies/written analysis</td>
<td>Farm committee proposals to class</td>
<td>Weekly laboratory assignments</td>
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<td></td>
<td>Committee reports - “state of the farm,” and “final report”</td>
<td>“Home” farm FINPACK analysis</td>
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<td></td>
<td>Written “strategic issue” report</td>
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<td>Table 1. (continued)</td>
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<tr>
<td><strong>Small group work</strong></td>
<td>Farm committee written and oral assignments; namely, “state of farm report, goal/objective setting, and final report.</td>
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<td></td>
<td>Strategic issue assignment</td>
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<td></td>
<td>Hands-on committee projects related to farm production</td>
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<tr>
<td><strong>Oral communication</strong></td>
<td>Committee reports at business meetings</td>
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<td></td>
<td>“Current issue” reports by small groups</td>
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<tr>
<td></td>
<td>“State-of-farm reports”</td>
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<td></td>
<td>“Final reports”</td>
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<td>Class discussions</td>
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<td></td>
<td>Strategic issue presentations</td>
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<td><strong>Intensive writing</strong></td>
<td>Strategic issues</td>
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<tr>
<td></td>
<td>“Current issue” reports</td>
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<tr>
<td><strong>Industry involvement</strong></td>
<td>Enterprise business planning with farm vendors</td>
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<td></td>
<td>FINPACK case study farm</td>
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<td></td>
<td>Industry contacts for data and information related to “current issue” reports</td>
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<td></td>
<td>Outside speakers to class</td>
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<td></td>
<td>Vendor contacts for strategic issues</td>
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</table>
CHAPTER III. METHODS

The previous two chapters provided an introduction to this research project and a review of related literature. The problem, purpose, and objectives were outlined in Chapter I and Chapter II reviewed the theory and literature which provided the theoretical basis for this study. This chapter outlines the methods and procedures used to collect and analyze the data.

The purpose of this study was to determine similarities and differences in students' perceptions towards learning in two senior-level, experiential-learning capstone courses, similar in content, but vastly different in delivery and teaching methods. A secondary purpose was to determine if there was a favorable means of teaching farm management to young adults. In order to accomplish the purpose of the study the following research questions were examined:

1. What types of students are enrolled in these capstone type experiential courses?
2. How effective are these two courses at utilizing Crunkilton's characteristics of capstone courses?
3. What similarities and differences exist in learning outcomes of these two courses as perceived by the students?
4. Which delivery techniques are most effective/ineffective for these two experiential courses?

Research Design

A descriptive survey research design was used to identify student demographics, capstone course effectiveness, attitudes toward learning outcomes, and the effectiveness of delivery methods in the two experiential capstone courses. Descriptive survey research involved the need to describe and interpret information for the improvement and
understanding of educational delivery systems. The descriptive survey design for this study utilized the elements of the tailored design method (TDM) as established by Dillman (2000). According to Dillman (2000) the tailored design method seeks to reduce the four most common survey errors; namely, coverage, sampling, measurement, and nonresponse.

For this study, the four sources of survey error, as discussed by Dillman (2000), were all addressed during the development and completion of the survey. Sampling error was handled within the target population for the study. The target population consisted of students enrolled in ECON 430, Advanced Farm Business Management during the Fall 2003 semester at Iowa State University, and the students enrolled in the AGEDS 450, Farm Management and Operations course during the Fall 2003 and Spring 2004 semesters. Of the 67 students enrolled in the ECON 430 course, 61 students completed the survey for a 91% response rate. Of the 37 students enrolled in the Fall 2003 AGEDS 450 course, all 37 completed the survey for a 100% response rate. For the Spring 2004 AGEDS 450 class, 36 students were enrolled and 31 completed the survey for an 86% response rate. However, it should be noted that the five students who did not complete the survey in the Spring 2004, had been enrolled in the AGEDS 450 course in the Fall 2004 and had completed the survey at that time. Since students are allowed to take AGEDS 450 up to three times, once in the Fall, Spring, and Summer semesters, those students who had enrolled for more than one semester were only surveyed once. This would mean that the actual response rate for students enrolled once during the year would be 100%. The high response rate of 91% for ECON 430 and 100% for AGEDS 450 (combined courses) provides little room for sampling error. There was also a group of four students who completed the survey for ECON 430 in the Fall of 2003 and AGEDS 450 in the Spring 2004. Since the surveys were being
numerically coded there was no means for connecting the student surveys for those responding in both courses.

Coverage error was not an issue in this study because all students enrolled in each of the courses were provided the opportunity to participate in the survey. The only students not completing the survey were those who did not attend the ECON 430 course on the day the survey was conducted. Because of the high response rate (91%) for ECON 430, the remaining students were not given a follow-up survey.

Measurement error results from poor wording of questions or asking of questions in such a way that inaccurate or uninterruptible answers were obtained (Dillman, 2000). The survey was developed by the researcher, reviewed by the two course instructors, reviewed by a panel of graduate students, and other professors in Agricultural Education and Studies and Economics to ensure face validity. The comments and suggestions from this review were used to revise the survey instrument.

The last source of survey error, as noted by Dillman, was non-response error, which results from respondent data being different than data obtained from a sample of non-respondents. The high response rate for this study led the researcher to assume that nonresponse error would be minimal.

**Survey Instrument**

The survey instrument included four major sections. Questions in section one asked for demographic and background data pertaining to the respondent’s academic and professional experiences prior to completing AGEDS 450 or ECON 430. Section two contained questions related to the criteria of effective capstone courses as described by
Crunkilton (1997). The third section contained questions related to student’s attitudes toward learning and the learning outcomes associated with the two courses. The final section of the survey asked students to rate the effectiveness of a variety of delivery methods that were used to stimulate learning within the two courses. The complete survey can be found in Appendix C.

In section one, respondents were asked to circle or check the most appropriate answer. Sections two and three used a five point Likert-type scale (1 = “strongly disagree”, 2 = “disagree”, 3 = “neither agree or disagree”, 4 = “agree”, to 5 = “strongly agree”) to measure the responses. Section four used a six-point Likert-type scale for identifying the effectiveness of various delivery techniques (1 = “does not apply”, 2 = “very ineffective”, 3 = “somewhat ineffective”, 4 = “neutral”, 5 = “somewhat effective”, and 6 = “very effective”). Since the same survey was used for both courses, the 1 = does not apply response in section four was used because of the differences in delivery methods used in both courses.

The survey instrument was pre-tested using Dillman’s (2000, p. 140-148) four stage approach to pre-testing which includes:

Stage 1: Review by knowledgeable colleagues and analysis

Stage 2: Interviews to evaluate cognitive and motivational qualities

Stage 3: A small pilot study

Stage 4: A final check

As discussed earlier, the survey was reviewed by knowledgeable colleagues in the profession. They each completed a survey and were informally interviewed to ensure that the questions were understood and could be interpreted accurately. Motivational qualities were not addressed because of the captive nature of the survey respondents.
A small pilot study was conducted to emulate procedures proposed for the main study. The summer section of the AGEDS 450 course was used to pilot test the survey. This group consisted of 17 students. Since there was not a summer section of ECON 430, a mail survey was conducted using the Fall 2002 enrollment list. The survey was mailed to 52 students with 24 students responding. Data from the pilot test was analyzed using some descriptive statistics and a Cronbach’s alpha reliability test was completed. The descriptive statistics provided information relating to the similarities and differences of students in the two courses, capstone course characteristics, learning outcomes, and delivery techniques being used. The Cronbach Alpha test for reliability, revealed significantly high reliability among questions as shown in Table 2.

Table 2. Cronbach’s alpha reliability testing results

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<td>Econ 430 (n=24)</td>
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<td>AgEds 450 (n=17)</td>
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<td>Part 3: Learning/Learning Outcomes (n=41)</td>
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<tr>
<td>Part 4: Delivery Techniques (n=41)</td>
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</tbody>
</table>

The final step in pre-testing, according to Dillman (2000), is to ask a few people who have had nothing to do with the development or revision of the questionnaire and related materials to answer all questions on the survey. Since the survey questions were directly related to the two courses, the researcher identified a small group of five students who had completed one or both of the courses, and had not been involved in the development of the study. This ensured that nothing basic was missing in the survey format and/or outline.
The final draft of the survey was approved by the Iowa State University Committee on the use of Human Subjects in Research (see Appendix A).

**Data Collection**

The data were collected from the Fall 2003 ECON 430 and AGEDS 450 classes and the Spring 2004 AGEDS 450 class at the end of each semester. Regular class time was used to administer the survey by the researcher.

**Analysis of Data**

The surveys were coded for analysis purposes. Responses were imported into SPSS from an Excel spreadsheet for further data analysis.

There were five students who completed the survey for AGEDS 450 during the Fall 2003 semester and were enrolled in the Spring 2004 course. These five students were only surveyed during the Fall 2003 semester to ensure that dual responses would not occur from these respondents.

The significance level used for this study was .01 rather than .05. The significance level was reduced from .05 to .01 to strengthen the ability to report significant differences in mean scores between AGEDS 450 and ECON 430. With many outside factors being different between the two courses, namely; instructors, delivery methods, student characteristics, and slight differences in teaching units, it was decided that the lower significance level of .01 would more accurately represent true differences in means. The two sections of AGEDS 450 were combined for analysis purposes. Analysis of variance (ANOVA) was used to compare means between a random sample of questions from the
survey instrument. Twelve of the sixty questions were randomly selected. The ANOVA found only one question where there was a significant difference in mean scores between the Fall and Spring AGEDS 450 courses. The one statement was in Section 3 of the survey and was a question that referred to the course’s ability to help students learn how to manage a farming operation. The F-ratio was 12.931 and the significance level was .001. With this being the only significant difference in mean scores reported from the random sample, the assumption was made to combine the two AGEDS 450 courses for analysis with the ECON 430 course.

Demographic data were analyzed using frequency tables reporting the frequency and percentage response rate to each statement. Mean and standard deviation descriptive statistics were used to compare ECON 430 and AGEDS 450 throughout the rest of the survey. The mean scores for all responses were then ranked and compared between AGEDS 450, ECON 430 and all respondents. ANOVA was then used to identify statistically significant differences in mean scores for responses in the two sections at a significance level of .01.

The final data analysis completed was a means comparison related to the demographic information. This was used to analyze the affect that cumulative grade point average (GPA), grade level, and age may have on certain statements with significant differences in means scores between AGEDS 450 and ECON 430.
CHAPTER IV. FINDINGS, DATA ANALYSIS, AND DISCUSSION

This chapter contains the data analyses, findings, and a discussion of those findings. The data analyses and findings focus on the similarities and differences of experiential learning outcomes, capstone courses, and delivery methods as perceived by students in the two comparison courses. The specific objectives included:

1. To examine selected demographic characteristics of the students enrolled in these two experientially based capstone courses.

2. To determine the effectiveness of these two capstone courses using Crunkilton's criteria for capstone courses.

3. To identify the effectiveness of experiential learning, learning outcomes, and knowledge/skill enhancement as it occurs, using students' perceptions towards these two courses.

4. To compare students' attitudes towards the effectiveness of various teaching and delivery methods used in each course and its impact upon their learning in experiential settings.

Major sections in this chapter relate to the student demographic characteristics, capstone course effectiveness, learning outcomes, knowledge/skills, and delivery methods for AGEDS 450 and ECON 430. Means, standard deviations, and rankings that examine the similarities and differences between the two courses are reported.

Demographic Information

Survey respondents were asked to provide some basic demographic characteristics related to their education and previous experiences. This data is reported in Table 3.
Students were asked to identify their current enrollment status during the semester in which the survey was administered. Students were predominately seniors in both AGEDS 450 (92.6%) and ECON 430 (65.6%). However, on average students tended to be closer to graduation when enrolled in AGEDS 450 than ECON 430. Graduating seniors in AGEDS 450 made up 48.5% of the total compared to 19.7% in ECON 430. This meant that a higher percentage of juniors were enrolled in ECON 430 (32.8%) than AGEDS 450 (7.4%).

Cumulative grade point average (GPA) was also analyzed between the two courses. The majority of students in AGEDS 450 had a cumulative GPA between 2.50 and 2.99 (39.7%); whereas, ECON 430 students tended to have higher cumulative GPA than AGEDS 450 students. Those students with a cumulative GPA over 3.00 comprised 32.3% of AGEDS 450 students and 50.8% of ECON 430 students.

The current major of students enrolled in AGEDS 450 was primarily Agricultural Studies (94.1%) due to the fact that Agricultural Studies students are required to complete AGEDS 450 as part of their program of study. Agricultural Business majors made up the majority of students enrolled in ECON 430 (67.2%); however some Agricultural Studies students were enrolled in the course (19.7%). Approximately, eleven percent of students in ECON 430 indicated “other” as their current major; namely, Agronomy, Animal Science, or Agricultural Systems Technology.

Over the past few years, there has been a continual discussion about the increasing number of non-farm students in undergraduate agricultural programs. This was not evident within this sample as a significant number of students reported that they were raised on a farm in both AGEDS 450 (85.3%) and ECON 430 (90.2%). The high level of students in
<table>
<thead>
<tr>
<th>Item</th>
<th>AGEDS 450 Frequency</th>
<th>AGEDS 450 Percent</th>
<th>ECON 430 Frequency</th>
<th>ECON 430 Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrollment Status:</td>
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<td></td>
<td></td>
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<tr>
<td>Junior</td>
<td>1</td>
<td>1.5</td>
<td>10</td>
<td>16.4</td>
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<tr>
<td>Junior/Senior</td>
<td>4</td>
<td>5.9</td>
<td>10</td>
<td>16.4</td>
</tr>
<tr>
<td>Senior</td>
<td>30</td>
<td>44.1</td>
<td>28</td>
<td>45.9</td>
</tr>
<tr>
<td>Graduating Senior</td>
<td>33</td>
<td>48.5</td>
<td>12</td>
<td>19.7</td>
</tr>
<tr>
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<td>0</td>
<td>1</td>
<td>1.6</td>
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<tr>
<td>Cumulative GPA:</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1.99 or below</td>
<td>1</td>
<td>1.5</td>
<td>0</td>
<td>0</td>
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<td>2.00 - 2.49</td>
<td>17</td>
<td>25</td>
<td>7</td>
<td>11.5</td>
</tr>
<tr>
<td>2.50 - 2.99</td>
<td>27</td>
<td>39.7</td>
<td>23</td>
<td>37.7</td>
</tr>
<tr>
<td>3.00 - 3.49</td>
<td>16</td>
<td>23.5</td>
<td>23</td>
<td>37.7</td>
</tr>
<tr>
<td>3.5 or higher</td>
<td>6</td>
<td>8.8</td>
<td>8</td>
<td>13.1</td>
</tr>
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<td>Current Major:</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>0</td>
</tr>
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<td>94.1</td>
<td>12</td>
<td>19.7</td>
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<tr>
<td>Ag. Business</td>
<td>1</td>
<td>1.5</td>
<td>41</td>
<td>67.2</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>1.5</td>
<td>7</td>
<td>11.5</td>
</tr>
<tr>
<td>Farm background:</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Yes</td>
<td>58</td>
<td>85.3</td>
<td>55</td>
<td>90.2</td>
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<tr>
<td>No</td>
<td>10</td>
<td>14.7</td>
<td>5</td>
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</tr>
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<td></td>
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</tr>
<tr>
<td>Male</td>
<td>58</td>
<td>85.3</td>
<td>47</td>
<td>77</td>
</tr>
<tr>
<td>Female</td>
<td>10</td>
<td>14.7</td>
<td>14</td>
<td>23</td>
</tr>
<tr>
<td>Age:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 and under</td>
<td>9</td>
<td>13.2</td>
<td>25</td>
<td>41</td>
</tr>
<tr>
<td>22</td>
<td>31</td>
<td>45.6</td>
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<td>23</td>
<td>19</td>
<td>27.9</td>
<td>15</td>
<td>24.6</td>
</tr>
<tr>
<td>24</td>
<td>5</td>
<td>7.4</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>25 and over</td>
<td>3</td>
<td>4.5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Courses completed or currently enrolled in:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agronomy 154</td>
<td>66</td>
<td>97.1</td>
<td>36</td>
<td>59</td>
</tr>
<tr>
<td>Agronomy 206</td>
<td>24</td>
<td>35.3</td>
<td>20</td>
<td>32.8</td>
</tr>
</tbody>
</table>
Table 3. (continued)

<table>
<thead>
<tr>
<th>Item</th>
<th>AGEDS 450</th>
<th>ECON 430</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>Agronomy 212</td>
<td>63</td>
<td>92.6</td>
</tr>
<tr>
<td>Agronomy 354</td>
<td>41</td>
<td>60.3</td>
</tr>
<tr>
<td>Animal Science 319</td>
<td>7</td>
<td>10.3</td>
</tr>
<tr>
<td>Animal Science 425</td>
<td>12</td>
<td>17.6</td>
</tr>
<tr>
<td>Animal Science 426</td>
<td>12</td>
<td>17.6</td>
</tr>
<tr>
<td>Economics 335</td>
<td>7</td>
<td>10.3</td>
</tr>
<tr>
<td>Economics 338</td>
<td>9</td>
<td>13.2</td>
</tr>
<tr>
<td>AST 330</td>
<td>7</td>
<td>10.3</td>
</tr>
<tr>
<td>AST 333</td>
<td>15</td>
<td>22.1</td>
</tr>
<tr>
<td>Accounting 284</td>
<td>63</td>
<td>92.6</td>
</tr>
<tr>
<td>Accounting 285</td>
<td>9</td>
<td>13.2</td>
</tr>
<tr>
<td>Management 310</td>
<td>9</td>
<td>13.2</td>
</tr>
<tr>
<td>Economics 135</td>
<td>57</td>
<td>83.8</td>
</tr>
<tr>
<td>Economics 451</td>
<td>8</td>
<td>11.8</td>
</tr>
<tr>
<td>Economics 466</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Economics 331</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Economics 432</td>
<td>1</td>
<td>1.5</td>
</tr>
</tbody>
</table>

these two courses who reported being raised on a farm can possibly be explained by the focus of both courses on production agriculture and more specifically farm management.

AGEDS 450 and ECON 430 students tended to be male, 85.3% and 77% respectively. This parallels the fact that both undergraduate major programs tend to have more male than female students. Students varied in age from 20 to 31 years old, with AGEDS 450 students, on average, being older than students enrolled in ECON 430. The majority of students in ECON 430 were 21 or under (41%) as contrasted to the majority of students in AGEDS 450 being 22 years old (45.6%). The older age of students in AGEDS 450 may be explained by the fact that this is a required course for Agricultural Studies majors and course enrollment is limited to 35 students. Therefore, students usually have to enroll during their senior year. A similar pattern was found in the enrollment status of students in both courses. Nearly half
(48.5%) of the students in AGEDS 450 were graduating seniors compared to 19.7% for ECON 430; however, nearly half (45.9%) of the students in ECON 430 were classified as seniors. Twenty students (33.8%) in ECON 430 were either juniors or junior/seniors as compared to five students (7.4%) in AGEDS 450.

The final student characteristic gathered was a list of undergraduate courses that students were currently enrolled in or had successfully completed. The purpose was to identify the similarities and differences in courses taken prior to enrolling in AGEDS 450 or ECON 430 which may have impacted upon students' responses to the survey questions. AGEDS 450 students tended to take more Agronomy, Animal Science, and Agricultural Systems Technology courses than ECON 430 students. This may be explained by the fact that Agricultural Studies students have more electives than Economics students. At the same time, ECON 430 students were enrolled in more Economics courses. Accounting 284 and Economics 135 were the only two courses that were taken by more than 80% of ECON 430 and AGEDS 450 students.

**Capstone Course Effectiveness**

One of the critical objectives of this study was to determine the effectiveness and use of capstone course principles and learning outcomes in both courses. Table 4 provides descriptive statistics for student responses to 21 capstone course statements, and Table 5 ranks them from highest to lowest.

Students in AGEDS 450 rated eight of the 21 statements above 4.0 while ten of the 21 statements were rated above 4.0 by the ECON 430 students. For both courses, students tended to agree with all of the statements related to capstone course effectiveness. For 20 of
Table 4. Means and standard deviations related to capstone course effectiveness in AGEDS 450, ECON 430, and from all respondents

<table>
<thead>
<tr>
<th>Course Statements</th>
<th>AGEDS 450 Mean/SD</th>
<th>ECON 430 Mean/SD</th>
<th>All Respondents Mean/SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required me to apply previously learned subject matter and content</td>
<td>4.01/.819</td>
<td>4.18/.533</td>
<td>4.09/.701</td>
</tr>
<tr>
<td>Incorporate new knowledge for solving real or simulated farming situations</td>
<td>3.96/.854</td>
<td>4.34/.544</td>
<td>4.14/.747</td>
</tr>
<tr>
<td>Culminating educational experience</td>
<td>3.72/.928</td>
<td>3.82/.619</td>
<td>3.77/.796</td>
</tr>
<tr>
<td>Required groups to gather and interpret data relative to a specific problem</td>
<td>4.19/.758</td>
<td>4.08/.690</td>
<td>4.14/.726</td>
</tr>
<tr>
<td>Requiring groups to participate in real or hypothetical problem situations</td>
<td>4.29/.734</td>
<td>4.18/.676</td>
<td>4.24/.707</td>
</tr>
<tr>
<td>Used issue analysis requiring groups to address problems, issues and concerns</td>
<td>4.28/.730</td>
<td>4.18/.563</td>
<td>4.23/.656</td>
</tr>
<tr>
<td>Used small group work to collectively address a project, case study, or issue</td>
<td>4.40/.715</td>
<td>4.13/.670</td>
<td>4.27/.704</td>
</tr>
<tr>
<td>Used verbal presentations to class/instructor</td>
<td>3.93/.654</td>
<td>4.39/.525</td>
<td>4.15/.639</td>
</tr>
<tr>
<td>Used written assignments based on course materials</td>
<td>3.56/.817</td>
<td>4.23/.767</td>
<td>3.87/.860</td>
</tr>
<tr>
<td>Used industry representatives for learning</td>
<td>3.74/.891</td>
<td>3.54/.697</td>
<td>3.64/.808</td>
</tr>
<tr>
<td>Used problem-solving approaches</td>
<td>3.97/.712</td>
<td>3.89/.608</td>
<td>3.93/.664</td>
</tr>
<tr>
<td>Used individual or group decision-making</td>
<td>4.06/.751</td>
<td>4.08/.614</td>
<td>4.07/.687</td>
</tr>
<tr>
<td>Forced students to use critical thinking</td>
<td>3.87/.771</td>
<td>4.10/.706</td>
<td>3.98/.747</td>
</tr>
<tr>
<td>More in-class lectures than other senior level courses</td>
<td>2.55/.926</td>
<td>2.98/.676</td>
<td>2.76/.842</td>
</tr>
<tr>
<td>More student-to-student interaction than other senior level courses</td>
<td>4.21/.821</td>
<td>3.57/.784</td>
<td>3.91/.861</td>
</tr>
<tr>
<td>More in-class discussions than other senior level courses</td>
<td>3.86/.943</td>
<td>3.54/.647</td>
<td>3.71/.827</td>
</tr>
<tr>
<td>More instructor-student interaction than other senior level courses</td>
<td>3.88/.907</td>
<td>3.72/.733</td>
<td>3.81/.830</td>
</tr>
<tr>
<td>More hands-on experience/activities than other senior level courses</td>
<td>4.47/.819</td>
<td>3.75/.809</td>
<td>4.13/.887</td>
</tr>
<tr>
<td>Required use of other class materials more than other senior level courses</td>
<td>3.51/.872</td>
<td>3.51/.868</td>
<td>3.51/.867</td>
</tr>
<tr>
<td>More effective than other senior courses in allowing students to learn from each other</td>
<td>3.87/.983</td>
<td>3.70/.760</td>
<td>3.79/.884</td>
</tr>
<tr>
<td>More effective than other senior courses in allowing students to learn from the instructor</td>
<td>3.04/.999</td>
<td>3.51/.868</td>
<td>3.26/.964</td>
</tr>
<tr>
<td>Overall mean/standard deviation</td>
<td>3.87/.829</td>
<td>3.88/.684</td>
<td>3.88/.781</td>
</tr>
</tbody>
</table>
Table 5. Capstone course statement rankings (High to Low) for all respondents

<table>
<thead>
<tr>
<th>Course Statements</th>
<th>AGEDS 450 Rank order</th>
<th>ECON 430 Rank order</th>
<th>All Respondents Rank order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Used small group work to collectively address a project, case study, or issue</td>
<td>2</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Requiring groups to participate in real or hypothetical problem situations</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Used issue analysis requiring groups to address problems, issues and concerns</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Used verbal presentations to class/instructor</td>
<td>11</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Incorporate new knowledge for solving real or simulated farming situations</td>
<td>10</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Required groups to gather and interpret data relative to a specific problem</td>
<td>6</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>More hands-on experience/activities than other senior level courses</td>
<td>1</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td>Required me to apply previously learned subject matter and content</td>
<td>8</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Used individual or group decision-making</td>
<td>7</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Forced students to use critical thinking</td>
<td>13</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Used problem-solving approaches</td>
<td>9</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>More student-to-student interaction than other senior level courses</td>
<td>5</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>Used written assignments based on course materials</td>
<td>18</td>
<td>3</td>
<td>13</td>
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<tr>
<td>More instructor-student interaction than other senior level courses</td>
<td>12</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>More effective than other senior courses in allowing students to learn from each other</td>
<td>13</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Culminating educational experience</td>
<td>17</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>More in-class discussions than other senior level courses</td>
<td>15</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>Used industry representatives for learning</td>
<td>16</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>Required use of other class materials more than other senior level courses</td>
<td>19</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>More effective than other senior courses in allowing students to learn from the instructor</td>
<td>20</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>More in-class lectures than other senior level courses</td>
<td>21</td>
<td>21</td>
<td>21</td>
</tr>
</tbody>
</table>
the 21 statements, the mean score for the responses was above 3.0, which corresponds to “neither agree or disagree.”

For both courses the only statement below 3.0 related to the “use of more in-class lectures than other senior-level undergraduate courses.” This is not surprising since both courses place significant emphasis on experiential learning and laboratory time within the course rather than strictly lectures.

On average, there tended to be a higher standard deviation for mean scores related to the capstone course statements for AGEDS 450 student responses (.829) than ECON 430 student responses (.684). The higher standard deviations in AGEDS 450 may be due to the fact that the AGEDS 450 course structure is quite different from typical classroom and laboratory instruction, and consequently, was uncommon to undergraduate students from a delivery standpoint.

Table 4 shows the combined response for both courses related to capstone course effectiveness. The nine statements where the combined responses were greater than 4.0 were “required me to apply previously learning subject matter and content,” “incorporate new knowledge for solving real or simulated farming situations,” “required groups to gather and interpret data relative to a specific problem,” “requiring groups to participate in real or hypothetical problem situations,” “used issue analysis requiring groups to address problems, issues, and concerns,” “used small group work to collectively address a project, case study, or issue,” “used verbal presentations to class/instructor,” “used individual or group decision-making,” and “more hands-on experience/activities than other senior level courses.” The lowest mean scores for all respondents related to the “required use of other class materials.”
“effectiveness in learning directly from the instructor,” and “more in-class lectures than other senior-level courses.” Again, these low scores can be attributed to the experiential learning emphasis and the amount of in-class time spent on problem-solving and decision-making rather than lecturing.

As mentioned earlier, several similarities were found in students’ responses between both courses. In fact, the means for six statements were above 4.0 for both groups. Those six statements were as follows: “apply previously learned subject matter content,” “required groups to gather and interpret data,” “requiring groups to participate in real or hypothetical problem situations,” “used issue analysis,” “used small groups,” and “used individual or group decision-making.” These same six statements are consistent with Crunkilton’s criteria for capstone courses.

While the mean scores for both courses were well above average in terms of capstone course effectiveness, there were some differences between the two courses. Table 5 shows the rank order of statements for each course and all respondents. The data revealed some differences between the two courses. The use of verbal presentations to the class/instructor ranked the highest for ECON 430 compared to eleventh in AGEDS 450. The means were 4.39 and 3.93, respectively.

Analysis of variance (ANOVA) was used to identify significant differences in mean scores for students’ responses relative to capstone course effectiveness. The results are shown in Table 6.

The means for ECON 430 regarding statements relative to “incorporate new knowledge,” “verbal presentations,” and “learning from the instructor” were significantly higher (p<.01) than AGEDS 450. The means for AGEDS 450 regarding statements relative
to “student-to-student interaction,” and “hands-on experience/activities” were significantly higher (p<.01) for AGEDS 450 compared to ECON 430. Additionally, the mean score for AGEDS 450 regarding the statement “more in-class lectures” was significantly lower than ECON 430. The mean score for “use of written assignments based on course material” ranked third among ECON 430 responses (mean = 4.23), while ranking eighteenth among AGEDS 450 students (mean = 3.56). These two statements highlight the use of verbal presentations and written assignments in ECON 430 in terms of capstone course effectiveness.

Table 6. ANOVA test for significant differences in mean scores for capstone course effectiveness in AGEDS 450 and ECON 430

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean Square Between/Within</th>
<th>F-stat</th>
<th>Sig. (.01)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorporate new knowledge for solving real or simulated farming situations</td>
<td>4.850/.525</td>
<td>9.244</td>
<td>.003</td>
</tr>
<tr>
<td>Used verbal presentations to class/instructor</td>
<td>7.012/.356</td>
<td>19.706</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Used written assignments based on course materials</td>
<td>14.502/.631</td>
<td>22.985</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>More in-class lectures than other senior level courses</td>
<td>5.883/.668</td>
<td>8.801</td>
<td>.004</td>
</tr>
<tr>
<td>More student-to-student interaction than other senior level courses</td>
<td>12.848/.646</td>
<td>19.890</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>More hands-on experience/activities than other senior level courses</td>
<td>16.507/.663</td>
<td>24.882</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>More effective than other senior courses in allowing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>students to learn from the instructor</td>
<td>6.925/.883</td>
<td>7.845</td>
<td>.006</td>
</tr>
</tbody>
</table>

AGEDS 450 students responded to “more hands-on experience/activities than other senior level courses,” the mean score (4.47) ranked number one, while ranking thirteenth (mean = 3.75) for ECON 430. AGEDS 450 ranked “small group work” second and “requiring groups to participate in real or hypothetical problem situations” third compared to seventh and fourth, respectively, for ECON 430. These three rankings for AGEDS 450 are also consistent with the Crunkilton criteria and highlight the capstone course effectiveness for AGEDS 450.
Other differences in the mean ranking of the capstone course effectiveness were found. The mean score for "incorporate new knowledge" ranked second for ECON 430 compared to tenth for AGEDS 450. Likewise, the mean score for "more student-to-student interaction" ranked fifth for AGEDS 450 compared to sixteenth for ECON 430. The mean score for "forced students to use critical thinking" ranked eighth for ECON 430 and thirteenth for AGEDS 450.

ANOVA was used to analyze any differences in means that may have related to the cumulative GPA and year in school of students. This was analyzed for the seven statements in Table 6, which had statistically significant differences in means between the two courses. This test showed no significant differences related to cumulative GPA and year in school for those capstone course statements with statistically different means between the two courses.

However, the mean scores for responses that were significantly different between AGEDS 450 and ECON 430 were analyzed providing some patterns among cumulative grade point average (GPA) and year in school. When analyzing the capstone course effectiveness statement, "during this course I was able to incorporate new knowledge for solving real or simulated farming situations," the mean scores for respondents continued to increase as cumulative GPA increased. As students cumulative GPA increases so does their ability to incorporate new knowledge for solving real or simulated farming situations. This was also the case for "using verbal presentations to the class/instructor", as cumulative GPA increased the two capstone courses were rated more effective in using verbal presentations to the class/instructor. The opposite occurred for the capstone course effectiveness statement related to "allowing students to learn directly from the course instructor." In this instance as cumulative GPA increased the students rated the courses ability to allow students to learn
directly from the course instructor lower. The higher the cumulative GPA the less likely students felt they were able to learn from the course instructor(s). The mean scores for capstone course statements with significant differences were also compared using year in school. The same pattern was identified here as students cumulative GPA got higher the less likely they felt they were able to effectively learn from the course instructor. For the statement concerning the courses having more student-student interaction than other senior-level courses, the opposite trend was shown. As the students year in school increased so did the mean score for student-student interaction. These examples, although not statistically significant, did show continuous increases or decreases in mean scores for each of the categories related to cumulative GPA and year in school.

While both courses appeared to be very effective in terms of capstone course principles and learning activities, it seemed that ECON 430 students appeared to favor the effectiveness of verbal presentations and written assignments based upon the course materials in ECON 430. At the same time, ECON 430 students appeared to be more effective in incorporating new knowledge for solving farming situations than AGEDS 450 students.

Students in AGEDS 450 favored the effectiveness of hands-on experiences/activities, student-to-student interaction, and fewer in-class lectures as compared to ECON 430 students. This is consistent with the mission and objectives of AGEDS 450.

In summary, the ANOVA analysis reinforces the strengths and weaknesses of each course when comparing the two courses. It also showed no significant differences related to cumulative GPA and year in school. At the same time, the means for the 21 statements
clearly indicated that both courses were effective in terms of the major principles and learning activities related to capstone courses.

**Opinions Towards Learning/Learning Outcomes**

Another objective of the study was to determine the students' opinions towards learning and the learning outcomes associated with the two courses. To examine the students' opinions towards learning and learning outcomes, descriptive statistics and the ranking of responses were completed for AGEDS 450, ECON 430, and all respondents. These data are reported in Tables 7 and 8. For both courses, the overall mean for all 19 statements was 3.79 and 4.06 for AGEDS 450 and ECON 430, respectively. The overall mean for all respondents was 3.92. These means would indicate that students had a favorable opinion about the learning/learning outcomes for both courses. However, the responses were slightly more favorable for ECON 430.

The standard deviation for most statements for the AGEDS 450 responses was much higher than those for ECON 430. This increased variation could be due to several factors; namely, a higher percentage of graduating seniors, variation in grade point average, and/or the fact that the teaching methods used are drastically different from what students are accustomed to in other experiential learning courses. There is more student-to-student interaction, hands-on activities, and small group activities in AGEDS 450 as compared to lecture/discussion and small group problem-solving activities in a laboratory situation in ECON 430.

Table 7 also shows the combined mean scores for both groups. Seven of the 19 statements were rated above 4.0 when all responses were combined together. The highest
rated statement was “required me to apply techniques for planning and analyzing farm business decisions” (mean = 4.28) followed by “stimulated my thinking about farm management (mean = 4.25) and “engaged me in the process of management and decision making relative to farm management” (mean = 4.23).

Students in ECON 430 rated 10 of the 19 statements above 4.0 while 5 of the 19 statements were rated above 4.0 by students in AGEDS 450 (Table 8). All 19 statements for ECON 430 were rated above 3.5 while only one statement of the 19 was rated below 3.5 by the AGEDS 450 students.

The highest rated statement by the ECON 430 students was “required me to apply techniques for planning and analyzing a business,” (mean = 4.47) followed by “stimulated my thinking about farm management,” (mean = 4.45) and “engaged me in the process of management and decision-making” (mean = 4.42). The highest rated statement by the AGEDS 450 students was “provided me opportunities to learn from fellow class members,” (mean = 4.16) followed by “increased my awareness of current farm management issues,” (mean = 4.12) and “required me to apply techniques for planning and analyzing farm business decisions” (mean = 4.12).

The lowest rated statement for both groups was “improved my oral and written communication skills.” AGEDS 450 students rated this statement at 3.07 compared to 3.58 for the ECON 430 students. Two other statements were rated low by both groups. These two statements were “improved my ability to make decisions” and “will benefit me if I were to pursue a career outside of agriculture.” The mean scores for “improved my ability to
Table 7. Means and standard deviations related to opinions towards learning/learning outcomes in AGEDS 450, ECON 430, and from all respondents

<table>
<thead>
<tr>
<th>Course Statements</th>
<th>AGEDS 450 Mean/SD</th>
<th>ECON 430 Mean/SD</th>
<th>All Respondents Mean/SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required me to apply techniques for planning and analyzing farm business decisions</td>
<td>4.12/.561</td>
<td>4.47/.596</td>
<td>4.28/.601</td>
</tr>
<tr>
<td>Engaged me in the process of management and decision-making relative to farm management</td>
<td>4.06/.644</td>
<td>4.42/.700</td>
<td>4.23/.692</td>
</tr>
<tr>
<td>Stimulated my thinking about farm management</td>
<td>4.07/.886</td>
<td>4.45/.534</td>
<td>4.25/.763</td>
</tr>
<tr>
<td>Stimulated me to go beyond classroom learning and use problem-solving and decision-making skills</td>
<td>3.91/.866</td>
<td>4.18/.651</td>
<td>4.04/.781</td>
</tr>
<tr>
<td>Caused me to use decision-making skills in other situations outside of class</td>
<td>3.60/.813</td>
<td>3.97/.688</td>
<td>3.77/.776</td>
</tr>
<tr>
<td>Caused me to search out more information about farm management issues outside of class</td>
<td>3.61/.904</td>
<td>3.97/.736</td>
<td>3.78/.844</td>
</tr>
<tr>
<td>Increased my awareness of current farm management issues</td>
<td>4.12/.744</td>
<td>4.22/.640</td>
<td>4.16/.696</td>
</tr>
<tr>
<td>Caused me to think more critically and improved my ability to analyze problems</td>
<td>3.72/.789</td>
<td>3.88/.691</td>
<td>3.80/.746</td>
</tr>
<tr>
<td>Improved my ability to make decisions</td>
<td>3.50/.922</td>
<td>3.65/.840</td>
<td>3.57/.885</td>
</tr>
<tr>
<td>Improved my oral and written communication skills</td>
<td>3.07/.951</td>
<td>3.58/.850</td>
<td>3.31/.937</td>
</tr>
<tr>
<td>Improved my ability to work in groups to solve problems</td>
<td>3.94/.826</td>
<td>3.75/.728</td>
<td>3.85/.785</td>
</tr>
<tr>
<td>Caused me to reflect upon my past experiences when solving problems</td>
<td>3.93/.759</td>
<td>3.97/.736</td>
<td>3.95/.746</td>
</tr>
<tr>
<td>Will benefit me if I were to pursue a career in farming or production agriculture</td>
<td>3.84/1.141</td>
<td>4.40/.558</td>
<td>4.10/.954</td>
</tr>
<tr>
<td>Will benefit me if I were to pursue a career in any agriculturally related occupation</td>
<td>3.76/1.108</td>
<td>4.12/.691</td>
<td>3.93/.949</td>
</tr>
<tr>
<td>Will benefit me if I were to pursue a career outside of agriculture</td>
<td>3.38/1.185</td>
<td>3.72/.885</td>
<td>3.54/1.064</td>
</tr>
<tr>
<td>Caused me to look at several sources of information when solving problems</td>
<td>3.74/924</td>
<td>4.08/.591</td>
<td>3.90/.802</td>
</tr>
<tr>
<td>Helped me to learn how to manage a farming operation</td>
<td>3.68/.953</td>
<td>4.18/.567</td>
<td>3.91/.833</td>
</tr>
<tr>
<td>Provided me opportunities to learn from fellow class members</td>
<td>4.16/745</td>
<td>3.93/.634</td>
<td>4.05/.702</td>
</tr>
<tr>
<td>Strengthened my understanding of how a farm is managed and operated</td>
<td>3.79/1.001</td>
<td>4.20/.610</td>
<td>3.98/.864</td>
</tr>
<tr>
<td>Overall mean/standard deviation</td>
<td>3.79/.880</td>
<td>4.06/.680</td>
<td>3.92/.812</td>
</tr>
<tr>
<td>Course Statements</td>
<td>AGEDS 450 Rank order</td>
<td>ECON 430 Rank order</td>
<td>All Respondents Rank order</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------------</td>
<td>----------------------</td>
<td>---------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>Required me to apply techniques for planning and analyzing farm business decisions</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Stimulated my thinking about farm management</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Engaged me in the process of management and decision-making relative to farm management</td>
<td>5</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Increased my awareness of current farm management issues</td>
<td>2</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Will benefit me if I were to pursue a career in farming or production agriculture</td>
<td>9</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Provided me opportunities to learn from fellow class members</td>
<td>1</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>Stimulated me to go beyond classroom learning and use problem-solving and decision-making skills</td>
<td>8</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Strengthened my understanding of how a farm is managed and operated</td>
<td>10</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Caused me to reflect upon my past experiences when solving problems</td>
<td>7</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Will benefit me if I were to pursue a career in any agriculturally related occupation</td>
<td>11</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Helped me to learn how to manage a farming operation</td>
<td>14</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Caused me to look at several sources of information when solving problems</td>
<td>12</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Improved my ability to work in groups to solve problems</td>
<td>6</td>
<td>16</td>
<td>13</td>
</tr>
<tr>
<td>Caused me to think more critically and improved my ability to analyze problems</td>
<td>13</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>Caused me to search out more information about farm management issues outside of class</td>
<td>15</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td>Caused me to use decision-making skills in other situations outside of class</td>
<td>16</td>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td>Improved my ability to make decisions</td>
<td>17</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td>Will benefit me if I were to pursue a career outside of agriculture</td>
<td>18</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>Improved my oral and written communication skills</td>
<td>19</td>
<td>19</td>
<td>19</td>
</tr>
</tbody>
</table>
The response to these statements was lowest in both courses, however, it should be noted that all three statements were still above average. These responses, being the lowest, may indicate that students do not feel that learning within the context of farm management can be beneficial to other settings. The decision-making process is a critical component of both courses and ranked high in terms of capstone course effectiveness, but students did not rank the improved ability to make decisions high in either course. The same can be said for the benefit, “if pursuing a career outside of agriculture.” It appears that students have difficulty identifying the relationship between the learning process as it relates to farm management and its appropriate uses within other settings. The low mean scores and rank of the improved oral and written communication is somewhat troubling. This may mean that both courses are not providing enough time on oral and written communication, or students feel that they have already mastered these skills and thus have not seen improvement within either of the courses.

Table 8 shows the rank order of the 19 statements on students’ opinions towards learning/learning outcomes. Several similarities and differences were found between the two courses.

Four of the 19 statements ranked in the top five for both groups. Likewise, the three lowest ranked statements were the same for both groups. The four high-ranking statements for both groups were: “apply techniques for planning and analyzing,” “stimulated my
thinking," "engaged in the process of management and decision-making," and "increased my awareness of current farm management issues."

At the same time, several differences were found in the rankings. AGEDS 450 students ranked the ability for the course to provide opportunities to learn from fellow class members the highest whereas this same statement ranked thirteenth among ECON 430 students. The large amount of committee work and opportunities for student-to-student learning in AGEDS 450 explains the large difference in the ranking between the two courses. Similarly, the improved ability to work in groups to solve problems ranked sixth in AGEDS 450 and sixteenth in ECON 430. Also, the statement, "caused me to reflect upon my past experiences" was ranked seventh by the AGEDS 450 students and eleventh by the ECON 430 students. Surprisingly, the ECON 430 students ranked the statement, "helped me to learn how to manage a farm" seventh compared to fourteenth for the AGEDS 450 students.

In summary, the data on learning/learning outcomes shows that both courses were having a positive impact upon the learning process and learning outcomes on the students enrolled.

There were, however, some significant differences in the means for the two courses. In this case all of the significant differences (p<.01) were positively correlated with ECON 430, indicating the mean scores for ECON 430 were significantly higher than AGEDS 450 for eight statements. The results are shown in Table 9.

For the remaining eleven statements there were no significant differences in means for either of the courses. Although both courses ranked above average in all categories, ECON 430 students tended to rate the courses’ ability to allow for planning, analyzing and decision-making relative to farm business management higher than those in AGEDS 450.
Table 9. ANOVA test for significant differences in mean scores for opinions towards learning/learning outcomes in AGEDS 450 and ECON 430

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean Square Between/Within</th>
<th>F-stat</th>
<th>Sig. (.01)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required me to apply techniques for planning and analyzing farm business decisions</td>
<td>3.883/.333</td>
<td>11.651</td>
<td>.001</td>
</tr>
<tr>
<td>Engaged me in the process of management and decision-making relative to farm management</td>
<td>4.206/.449</td>
<td>9.361</td>
<td>.003</td>
</tr>
<tr>
<td>Stimulated my thinking about farm management</td>
<td>4.518/.551</td>
<td>8.192</td>
<td>.005</td>
</tr>
<tr>
<td>Caused me to use decision-making skills in other situations outside of class</td>
<td>4.217/.573</td>
<td>7.358</td>
<td>.008</td>
</tr>
<tr>
<td>Improved my oral and written communication skills</td>
<td>8.284/.819</td>
<td>10.113</td>
<td>.002</td>
</tr>
<tr>
<td>Will benefit me if I were to pursue a career in farming or production agriculture</td>
<td>10.059/.838</td>
<td>12.0</td>
<td>.001</td>
</tr>
<tr>
<td>Helped me to learn how to manage a farming operation</td>
<td>8.189/.634</td>
<td>12.919</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Strengthened my understanding of how a farm is managed and operated</td>
<td>5.292/.709</td>
<td>7.459</td>
<td>.007</td>
</tr>
</tbody>
</table>

ECON 430 students also rated their ability to learn how to manage a farming operation and their understanding of how a farm is managed and operated significantly higher than students in AGEDS 450. This is a major focus of the AGEDS 450 course and the Ag 450 farm, so there is some concern that students rated these statements significantly lower than those in ECON 430.

ANOVA was again used to test the impact that cumulative GPA and year in school may have had on the eight statements in Table 9, with statistically significant differences in mean scores between the courses. The test revealed no significant differences in means between cumulative GPA and the eight statements. However, when the test was run on the eight statements in relation to the year in school one statement did show significant differences in the mean scores. The statement "helped me learn how to manage a farming operation" did show a significant difference in mean scores in relation to the year in school (p = .011). For the statement "helped me learn how to manage a farming operation" juniors
with three or more semesters had a mean score of 4.45, junior/senior with two semesters 4.14, senior with one semester 4.00 and graduating senior 3.60. There was one graduate student who rated the statement at 4.00. This one statement did show a statistically significance difference in means in relation to the year in school which identified that as students get closer to graduation they tend to rate “helped me learn how to manage a farming operation” lower than students further from graduating.

While there was no significant difference between the classes and cumulative GPA with respect to the statement “strengthened my understanding of how a farm is managed,” it is interesting to note that a definite trend was found. Students with a lower GPA rated this statement higher than students with a higher GPA.

Also, when grouping the students by their year in school, a trend was found for the statement “stimulated my thinking about farm management.” Seniors with one semester remaining and graduating seniors rated this statement lower than juniors. A similar trend was noted for the two statements, “helped my to learn how to manage a farm” and “strengthened by understanding of how a farm is managed and operated.

Enhancement of Knowledge/Skills

The ability of the experiential capstone courses to enhance the knowledge/skills of students was another objective of the study. Descriptive statistics and rankings were used to analyze the data in relation to AGEDS 450, ECON 430, and all respondents, as shown in Tables 10 and 11.

In this section of the survey, students were asked to rate the ability of the courses to enhance their farm management knowledge/skills. Students in both courses felt that their
knowledge/skills were being enhanced since there was no mean score on any statement below 3.0. The highest mean was 4.52 for record keeping and analysis in ECON 430 and the lowest was 3.12 for the use of computer decisions aids in AGEDS 450. These two responses are consistent because ECON 430 uses a financial software program as a major component of the course and with an actual farming operation serving as the AGEDS 450 laboratory, computer decisions aids are not as common.

The overall mean score for all the statements in AGEDS 450 were 3.72 and 4.20 in ECON 430. The standard deviation for mean scores in AGEDS 450 continued to show more variation than those in ECON 430. As the data in Table 10 showed, it is apparent that ECON 430 students rated the enhancement of knowledge/skills higher than AGEDS 450.

Table 10. Means and standard deviations related to enhanced knowledge/skills in AGEDS 450, ECON 430, and from all respondents

<table>
<thead>
<tr>
<th>Course Area</th>
<th>AGEDS 450 Mean/SD</th>
<th>ECON 430 Mean/SD</th>
<th>All Respondents Mean/SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production agriculture</td>
<td>3.81/.833</td>
<td>4.00/.713</td>
<td>3.90/.782</td>
</tr>
<tr>
<td>Enterprise budgets</td>
<td>3.94/.689</td>
<td>4.47/.536</td>
<td>4.19/.673</td>
</tr>
<tr>
<td>Agriculture technology</td>
<td>3.37/.960</td>
<td>3.48/.873</td>
<td>3.42/.919</td>
</tr>
<tr>
<td>Agricultural environmental concerns</td>
<td>3.24/.866</td>
<td>3.73/.778</td>
<td>3.47/.860</td>
</tr>
<tr>
<td>Record keeping and analysis</td>
<td>3.90/.866</td>
<td>4.52/.504</td>
<td>4.19/.781</td>
</tr>
<tr>
<td>Farm strategic planning</td>
<td>4.01/.685</td>
<td>4.47/.566</td>
<td>4.23/.669</td>
</tr>
<tr>
<td>Farm resource management</td>
<td>3.75/.799</td>
<td>4.22/.666</td>
<td>3.97/.773</td>
</tr>
<tr>
<td>Farm marketing issues</td>
<td>4.09/.859</td>
<td>3.97/.843</td>
<td>4.03/.851</td>
</tr>
<tr>
<td>Cash flow analysis</td>
<td>4.06/.600</td>
<td>4.53/.503</td>
<td>4.28/.603</td>
</tr>
<tr>
<td>Farm financial management</td>
<td>3.90/.672</td>
<td>4.43/.533</td>
<td>4.15/.665</td>
</tr>
<tr>
<td>Federal farm programs</td>
<td>3.29/.978</td>
<td>3.70/.908</td>
<td>3.48/.964</td>
</tr>
<tr>
<td>Whole farm planning</td>
<td>3.85/.885</td>
<td>4.42/.591</td>
<td>4.12/.810</td>
</tr>
<tr>
<td>Crop share development</td>
<td>3.43/.967</td>
<td>4.25/.628</td>
<td>3.81/.920</td>
</tr>
<tr>
<td>Use of computer decision aids</td>
<td>3.12/1.015</td>
<td>4.40/.741</td>
<td>3.72/1.101</td>
</tr>
<tr>
<td>Overall mean/standard deviation</td>
<td>3.72/.825</td>
<td>4.20/.663</td>
<td>3.94/.803</td>
</tr>
</tbody>
</table>
students. The only instance where the mean score was higher for AGEDS 450 was farm marketing issues (4.09 vs. 3.97). This statement was ranked the highest in AGEDS 450 and twelfth in ECON 430 out of fifteen course areas. For the other fourteen statements, ECON 430 students rated the enhancement of knowledge/skills higher than AGEDS 450 students.

Table 11. Enhancement of knowledge/skills in the following areas ranked (High to Low) for all respondents

<table>
<thead>
<tr>
<th>Course Area</th>
<th>AGEDS 450 Rank order</th>
<th>ECON 430 Rank order</th>
<th>All Respondents Rank order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash flow analysis</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Farm strategic planning</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Farm management decision-making</td>
<td>4</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Enterprise budgets</td>
<td>5</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Record keeping and analysis</td>
<td>6</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Farm financial management</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Whole farm planning</td>
<td>8</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Farm marketing issues</td>
<td>1</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Farm resource management</td>
<td>10</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Production agriculture</td>
<td>9</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Crop share development</td>
<td>11</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Use of computer decision aids</td>
<td>15</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>Federal farm programs</td>
<td>13</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>Agricultural environmental concerns</td>
<td>14</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>Agriculture technology</td>
<td>12</td>
<td>15</td>
<td>15</td>
</tr>
</tbody>
</table>

ECON 430 students ranked the enhancement of record keeping and analysis second and the use of computer decision aids eighth, much higher than AGEDS 450 students who rated them sixth and fifteenth, respectively. This can be attributed to the fact that ECON 430 uses computer financial software for record keeping and analysis while AGEDS 450 uses the records from an operating farm in making decisions. Both courses ranked cash flow analysis, farm strategic planning, farm management decision-making, and enterprise budgeting in the top five responses. Mean scores for AGEDS 450 ranged from 3.94 to 4.06 as compared to
4.45 to 4.52 for ECON 430. The lowest rankings were similar in both courses and were related to federal farm programs, agricultural environmental concerns, and agriculture technology. These subject matter areas were not emphasized in the curriculum and content of either course.

It should be noted that many of the statements regarding course content as listed in Tables 10 and 11 closely parallel the course syllabus in ECON 430. This may have caused some survey bias in favor of ECON 430 because the phrasing and wording of those statements were quite similar to the ECON 430 syllabus. At the same time, it should be noted that most of the course content and syllabus topics for AGEDS 450 vary from semester to semester and closely parallel the agriculture production cycle and the current situation at the farm. While some topics do not change, for example, risk management, financial business analysis, cash flow budgeting; many others such as farm marketing strategies, farm production technologies and practices do change from semester to semester. For this reason, the ANOVA test showed significant differences in means for eleven of the fifteen course area and are not being reported. The previous table did, however, show the ECON 430 students tended to view the enhancement of knowledge/skills in several areas of farm management more favorably than AGEDS 450 students.

Effectiveness of Delivery Techniques

The final objective of the study was to compare students’ attitudes towards the effectiveness of various teaching and delivery methods used in each course and their impact upon students’ learning in experiential settings. Descriptive statistics were used to examine
the effectiveness of delivery methods in AGEDS 450, ECON 430 and among all respondents, as shown in Tables 12 and 13.

Students' responses to the statements in this section showed the most significant variation between the two courses. This was expected due to the distinctly different delivery techniques being used. Some statements were directly applicable to only one of the two courses and not the other while other statements were common to both courses. Therefore, a Likert type scale that included a "NA" or "does not apply" response was included; however, it was infrequently used by the respondents but instead they tended to rate the statement very low. There was one question that related specifically to AGEDS 450 and another to ECON 430 in which the students were asked to circle "NA" or "does not apply" when the survey was administered to ensure reporting accuracy.

Table 12 shows the means and standard deviations for twenty statements related to the effectiveness of the delivery methods used in both courses and for all respondents. The standard deviations among the responses were extremely variable for both courses and all respondents. The standard deviations for these responses were more variable than the standard deviations found for the statements related to capstone course effectiveness and the learning/learning outcomes related to experiential learning. It seemed to show that the students differed greatly among their views of the effectiveness of delivery methods used in both courses.

There were a few statements in this section where the mean score fell below neutral (3.0). For both courses, the statement "using outside reading assignments" was below 3.0. This was expected because both courses emphasized and were heavily graded on laboratory
Table 12. Means and standard deviations related to the effectiveness of delivery techniques used in AGEDS 450, ECON 430 and from all respondents

<table>
<thead>
<tr>
<th>Course Statements</th>
<th>AGEDS 450 Mean/SD</th>
<th>ECON 430 Mean/SD</th>
<th>All Respondents Mean/SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures by the course instructor(s)</td>
<td>3.81/.833</td>
<td>4.18/.563</td>
<td>3.98/.739</td>
</tr>
<tr>
<td>Whole class discussions</td>
<td>4.21/.826</td>
<td>3.90/.870</td>
<td>4.06/.858</td>
</tr>
<tr>
<td>Individual class written assignments</td>
<td>3.18/1.119</td>
<td>3.82/.847</td>
<td>3.48/1.047</td>
</tr>
<tr>
<td>Individual work problems for discussion</td>
<td>3.59/1.096</td>
<td>3.75/.960</td>
<td>3.67/1.033</td>
</tr>
<tr>
<td>Group/committee assignments</td>
<td>3.97/1.079</td>
<td>3.92/802</td>
<td>3.95/955</td>
</tr>
<tr>
<td>Group/committee discussions</td>
<td>4.21/.744</td>
<td>3.74/1.079</td>
<td>3.98/944</td>
</tr>
<tr>
<td>Hands-on experience/student activities</td>
<td>4.29/.915</td>
<td>4.05/1.217</td>
<td>4.18/1.071</td>
</tr>
<tr>
<td>Using computers to solve problems</td>
<td>3.13/1.171</td>
<td>4.44/.671</td>
<td>3.75/1.166</td>
</tr>
<tr>
<td>Using computer simulation software (FINPACK)</td>
<td>1.91/1.793</td>
<td>4.43/.805</td>
<td>3.10/1.891</td>
</tr>
<tr>
<td>Using Ag. Decision Maker as a resource</td>
<td>2.16/1.629</td>
<td>4.03/.991</td>
<td>3.05/1.652</td>
</tr>
<tr>
<td>Using outside reading assignments</td>
<td>2.22/1.545</td>
<td>2.98/1.258</td>
<td>2.59/1.461</td>
</tr>
<tr>
<td>Studying/analyzing strategic or relevant issues</td>
<td>3.75/1.013</td>
<td>3.80/.872</td>
<td>3.78/946</td>
</tr>
<tr>
<td>Doing outside reading/studying on my own</td>
<td>2.79/1.560</td>
<td>3.31/1.232</td>
<td>3.04/1.433</td>
</tr>
<tr>
<td>Having a structured weekly laboratory activity</td>
<td>3.06/1.402</td>
<td>3.77/.824</td>
<td>3.40/1.215</td>
</tr>
<tr>
<td>Using an actual farm unfamiliar to me, prior to starting the course, in a laboratory setting (AGEDS 450)</td>
<td>3.94/1.071</td>
<td></td>
<td>3.94/1.071</td>
</tr>
<tr>
<td>Using a “home” farm or one of familiarity to me in laboratory setting (ECON 430)</td>
<td></td>
<td>4.34/.873</td>
<td>4.34/873</td>
</tr>
<tr>
<td>Using the internet as a resource for information and to solve problems</td>
<td>3.62/1.270</td>
<td>3.92/.822</td>
<td>3.76/1.088</td>
</tr>
<tr>
<td>Being “actively engaged” with other class members in using the decision-making process to solve problems</td>
<td>4.29/.648</td>
<td>3.92/.714</td>
<td>4.12/703</td>
</tr>
<tr>
<td>Gathering information from industry representatives or ISU faculty/staff to solve problems</td>
<td>3.88/.873</td>
<td>3.52/1.134</td>
<td>3.71/1.017</td>
</tr>
<tr>
<td>Understanding that the decisions you make will have an impact upon a farming operation</td>
<td>4.29/.811</td>
<td>4.43/784</td>
<td>4.36/798</td>
</tr>
</tbody>
</table>

assignments and in-class projects. The amount of outside reading assignments was limited in both courses. Although capstone courses typically emphasize outside reading to fulfill the requirements of a project, the survey statement was related to outside reading assignments and not simply outside readings.
Table 13. Effectiveness of delivery techniques statements ranked (High to Low) for all respondents

<table>
<thead>
<tr>
<th>Course Statements</th>
<th>AGEDS 450 Rank order</th>
<th>ECON 430 Rank order</th>
<th>All Respondents Rank order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understanding that the decisions you make will have an impact upon a farming operation</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Using a &quot;home&quot; farm or one of familiarity to me in laboratory setting (ECON 430)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hands-on experience/student activities</td>
<td>1</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Being &quot;actively engaged&quot; with other class members in using the decision-making process to solve problems</td>
<td>1</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Whole class discussions</td>
<td>4</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>Lectures by the course instructor(s)</td>
<td>9</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Group/committee discussions</td>
<td>4</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td>Group/committee assignments</td>
<td>6</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Using an actual farm unfamiliar to me, prior to starting the course, in a laboratory setting (AGEDS 450)</td>
<td>7</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Studying/analyzing strategic or relevant issues</td>
<td>10</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>Using the internet as a resource for information and to solve problems</td>
<td>11</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Using computers to solve problems</td>
<td>14</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Gathering information from industry representatives or ISU faculty/staff to solve problems</td>
<td>8</td>
<td>17</td>
<td>13</td>
</tr>
<tr>
<td>Individual work problems for discussion</td>
<td>12</td>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>Individual class written assignments</td>
<td>13</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>Having a structured weekly laboratory activity</td>
<td>15</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>Using computer simulation software (FINPACK)</td>
<td>19</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>Using Ag. Decision Maker as a resource</td>
<td>18</td>
<td>7</td>
<td>18</td>
</tr>
<tr>
<td>Doing outside reading/studying on my own</td>
<td>16</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>Using outside reading assignments</td>
<td>17</td>
<td>19</td>
<td>20</td>
</tr>
</tbody>
</table>

The mean score for two other statements related to delivery techniques in AGEDS 450 rated below 3.0. The statement “using computer simulation software (FINPACK)” and “using Ag Decision Maker as a resource” rated 1.91 and 2.16 for AGEDS 450, respectively.
This can be explained by the fact that FINPACK is not used in AGEDS 450 and there is very limited information found in Ag Decision Maker in the AGEDS 450 course manual. Rather than responding “NA” or “does not apply,” many AGEDS 450 respondents rated this statement very low. Conversely, these two statements were rated very high by students in ECON 430. The statement “using computer simulation software (FINPACK)” rated 4.43 and the statement “using Ag Decision Maker” rated 4.03. This was expected because Ag Decision Maker is required for ECON 430 students and FINPACK is extensively used in the course.

Table 13 shows the rank order of the means for the statements related to the delivery methods used in each course. For AGEDS 450, seven statements ranked very high with three being the highest ranked with equal means, followed by two being ranked four with equal means, and two being ranked sixth and seventh with means slightly under 4.0. The three statements that were ranked the highest had a mean score of 4.29. These statements were “understanding that the decisions you make will have an impact upon a farming operation,” “hands-on experience/student activities,” and “being ‘actively engaged’ with other class members.” The next two statements that were ranked fourth with means of 4.21 were “whole class discussions” and “group/committee discussions.” The sixth and seventh ranked statements and their means were “group/committee assignments” (mean = 3.97) and “using an actual farm unfamiliar to me” (mean = 3.94).

For ECON 430, the seven highest ranking statements all had means over 4.0. The three highest ranked statements had means of 4.44, 4.43, and 4.43; they were “using computers to solve problems,” “using computer simulation software (FINPACK),” and “understanding that the decisions you make will have an impact upon a farming operation,”
respectively. In ECON 430, students used a “home” farm or one of familiarity to them for their laboratory assignments using FINPACK. This statement was ranked fourth with a mean of 4.34 followed by “lectures by the course instructor(s)” (mean = 4.18). The sixth and seventh ranked statements related to hands-on experience and the use of Ag Decision Maker.

Getting students actively engaged and involved in their education and their course work is an important prerequisite for an experiential learning undergraduate course. Both courses use similar and different delivery methods to accomplish this objective. The discussion that follows looks at the similarities and differences and the students’ perceptions regarding the effectiveness of these delivery methods.

Students in AGEDS 450 use the Ag450 farm as the laboratory farm for their course while students in ECON 430 are expected to use a “home” farm or one familiar to them for their FINPACK laboratory assignments. For data analysis purposes, there was one question in the survey unique to each class. That statement asked students to rate the effectiveness of using an actual farm (Ag450 farm for AGEDS 450) and a farm of familiarity (“home” farm for ECON 430). Students in both classes rated this statement well above average (AGEDS 450 mean = 3.97; ECON 430 mean = 4.34); however, the mean for ECON 430 ranked fourth compared to seventh for AGEDS 450 among the twenty statements related to delivery methods.

Computers are used in both courses. In AGEDS 450, computers are used for record-keeping, data collection and analysis, spreadsheet problem-solving, finding information off the internet, and presentation preparation and delivery. Computer use in ECON 430 focuses on the use of FINPACK for farm simulation, spreadsheet problem-solving and application, and other uses. There were markedly different rankings in the means between the two
courses on the use of computers. For ECON 430, the ranking for computer use to solve problems ranked first compared to fourteenth for AGEDS 450. Apparently, students in ECON 430 view the class as one that focused on the use of computers to solve problems whereas AGEDS 450 students did not.

Both courses emphasize studying and analyzing strategic or relevant issues as part of the course curriculum and delivery. In AGEDS 450, each farm committee was assigned a “strategic issue” related to a short-run or long-run issue facing the Ag450 farm. Students studied the problem, gathered data, and developed a solution and/or recommendation for the problem. A similar effort is part of the ECON 430 course, where students form committees around their particular interest regarding a relevant or “current issue” in agriculture. They, in turn, studied the problem or situation, gathered information, developed an analysis, and presented solutions to the issue identified. The ranking for this statement was similar for both courses. It ranked tenth for AGEDS 450 (mean = 3.75) and thirteenth for ECON 430 (3.80).

Both courses used the internet as a resource for gathering information for problem-solving and other class activities. The mean ranking for this statement was slightly higher for ECON 430 (rank = 8th) compared to AGEDS 450 (rank = 11th). However, there was a slight difference in the ratings with ECON 430 students rating it 3.92 compared to 3.62 for AGEDS 450 students.

Gathering information from industry representatives or ISU faculty/staff to solve problems is a common delivery method for both courses. In AGEDS 450, industry representatives are called upon to provide information regarding commercial products, product performance, research information, and the like. Ag450 farm vendors are frequently
contacted and meet with students in the farms' committees. In ECON 430, ISU faculty are
used as resource professionals to provide information regarding “current issues” being
studied by class members. The ranking for this statement was considerably higher for
AGEDS 450 (rank = 8th; mean = 3.88) compared to ECON 430 (rank = 17th; mean = 3.52).

Both courses used lecture and class discussions as a means of getting students
involved and accomplishing course objectives at the same time. In AGEDS 450, lectures
were designed primarily to acquaint students with subject matter related to problems, issues
and important factors related to the current situation facing the Ag450 farm without actually
presenting solutions to these problems. Lectures were also designed to stimulate critical
thinking and force students to study and analyze current and potential problems and
solutions. In ECON 430, lectures were designed to also focus on problem-solving processes;
however, ECON 430 lectures also focused on the processes, procedures, and computer
techniques used to solve these problems. Student ratings and mean rank for lectures in both
courses were high; however, the ranking for the statement on lectures by the course
instructor(s) was higher for ECON 430 (rank = 5th; mean = 4.18) compared to AGEDS 450
(rank = 8th; mean = 3.81).

Class discussions are also used in both courses. In AGEDS 450, class discussions
focus on solutions to problems facing the Ag450 farm, strategic issues, and lecture material
presented within class discussions. In ECON 430, the class discussions primarily focused on
lecture material presented, laboratory assignments, and current issue presentations. Students
rated class discussions well above average in both courses (AGEDS 450, mean = 4.21;
ECON 430, mean = 3.90). However, the mean ranking for AGEDS 450 was fourth
compared to eleventh for ECON 430. Students in AGEDS 450 apparently placed a higher value on class discussions than students in ECON 430.

A major difference in the delivery methods used in both courses related to the use of small groups or committees for problem-solving and decision-making. As stated earlier, AGEDS 450 students were placed on one of seven “farm committees” based upon committee interest forms completed earlier in the semester. These committees were charged with the responsibility of managing and operating one enterprise or phase of the Ag450 farming operation. Committees met every class period and worked together on farming activities, strategic issues, solving problems, and making recommendations to the entire class. Committees in AGEDS 450 were extensively involved in “hands-on” experience and activities. Committee work in ECON 430 was not nearly as extensive with student committees used primarily for the “current issue” assignment and occasional weekly laboratory assignments. Class committees for the “current issue” must work together to identify an issue, analyze alternatives, develop solutions, and prepare a written and oral report of their findings. Several statements regarding the use of committees were included in the survey to determine the effectiveness of these types of delivery methods. There was a large difference in the ranking of several of these statements. With regard to group/committee discussions, AGEDS 450 students rated it much higher (rank = 4th; mean = 4.21) compared to ECON 430 (rank = 16th; mean = 3.74). However, both classes rated the effectiveness of group/committee assignments relatively the same. The ranking for group/committee assignments in AGEDS 450 was sixth (mean = 3.97) compared to a rank of eighth (mean = 3.92) for ECON 430.
Both courses consider "hands-on" experience an important student activity; however, it was a major focus in AGEDS 450. In ECON 430, "hands-on" experiences were acquired through the use of FINPACK, student "current issue" groups, and laboratory assignments. In AGEDS 450, "hands-on" experience was accomplished through the strategic issues, committee discussions, and on-going farm projects by committees. "Hands-on" experiences rated the highest of all the delivery methods used in AGEDS 450 (mean = 4.29) compared to a mean rank of sixth (mean = 4.05) for ECON 430. Obviously, students in both courses rate the "hands-on" experience quite favorably.

The last major difference in delivery methods between the two courses related to the students being "actively engaged" with other class members in using the decision-making process to solve problems. AGEDS 450 students rated this statement much higher (mean = 4.29; rank = 1st) than ECON 430 students (mean = 3.92; rank = 8th).

The means and rank order for many of the other statements related to the effectiveness of delivery methods used in both courses were similar. Students rated individual work problems for discussion, individual class assignments, structured weekly laboratory activities, outside reading assignments, and outside reading/studying on their own nearly the same for both courses.

ANOVA was again used to identify any significant differences in means between the two courses as shown in Table 14. As expected, significant differences were found in those means related to the delivery techniques that were critical components of the two courses. ECON 430 showed significantly positive differences in means related to lectures by the course instructor(s), individual class written assignments, use of computers, and outside reading assignments with a significance level well below .01. AGEDS 450 showed favorable
differences in means related to group/committee discussions and being "actively engaged" with other class members in using decision-making processes to solve problems.

These significant differences in means proved that there were differences in delivery techniques being used within the two courses. The highly positive response rate for these delivery techniques also seems to show that both courses were highly effective in using those delivery techniques.

The fact that throughout all sections of the survey the responses and mean scores tended to be above average show that both AGEDS 450 and ECON 430 seemed to be effective means for teaching students in an experientially based capstone course related to farm management.

### Table 14. ANOVA test for significant differences in mean scores related to the effectiveness of delivery techniques used in AGEDS 450 and ECON 430

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean Square</th>
<th>F-stat</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures by the course instructor(s)</td>
<td>4.438/.516</td>
<td>8.601</td>
<td>.004</td>
</tr>
<tr>
<td>Individual class written assignments</td>
<td>13.303/.999</td>
<td>13.313</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Group/committee discussions</td>
<td>7.048/.842</td>
<td>8.372</td>
<td>.004</td>
</tr>
<tr>
<td>Using computers to solve problems</td>
<td>55.204/936</td>
<td>58.986</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Using computer simulation software (FINPACK)</td>
<td>203.301/2.003</td>
<td>101.495</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Using Ag. Decision Maker as a resource</td>
<td>110.589/1.865</td>
<td>59.297</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Using outside reading assignments</td>
<td>18.429/2.005</td>
<td>9.192</td>
<td>.003</td>
</tr>
<tr>
<td>Having a structured weekly laboratory activity</td>
<td>16.286/1.359</td>
<td>11.986</td>
<td>.001</td>
</tr>
<tr>
<td>Being &quot;actively engaged&quot; with other class members in using the decision-making process to solve problems</td>
<td>4.548/.462</td>
<td>9.838</td>
<td>.002</td>
</tr>
</tbody>
</table>

AGEDS 450 and ECON 430 Comparisons

Table 15 shows the ranking and mean scores for capstone course effectiveness, learning/learning outcomes, and the delivery method(s) used. The seven highest rated
Statements are shown for each category. Some similarities were found for each course in terms of capstone course effectiveness and learning outcomes; however, as expected, differences were found in the effectiveness of delivery methods used. The following table and discussion will summarize the strengths, as perceived by the students of each course that make it effective as an experientially based capstone course.

Table 15. Ranking and mean scores for a comparison of capstone course effectiveness, learning/learning outcomes, and delivery techniques for AGEDS 450 and ECON 430.*

<table>
<thead>
<tr>
<th>Capstone Course Effectiveness</th>
<th>AGEDS 450</th>
<th>ECON 430</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) More hands-on experience activities than other senior level courses (4.47)</td>
<td>(1) Used verbal presentations to class/instructor (4.39)</td>
<td></td>
</tr>
<tr>
<td>(2) Used small group work to collectively address a project, case study, or issue (4.40)</td>
<td>(2) Incorporate new knowledge for solving real or simulated farming situations (4.34)</td>
<td></td>
</tr>
<tr>
<td>(3) Requiring small groups to participate in real or hypothetical problem situations (4.29)</td>
<td>(3) Used written assignments based upon course materials (4.23)</td>
<td></td>
</tr>
<tr>
<td>(4) Used issue analysis requiring groups to address problems, issues, and concerns (4.28)</td>
<td>(4) Required me to apply previously learned subject matter and content (4.18)</td>
<td></td>
</tr>
<tr>
<td>(5) More student-to-student interaction than other senior level courses (4.21)</td>
<td>(4) Requiring groups to participate in real or hypothetical problem situations (4.18)</td>
<td></td>
</tr>
<tr>
<td>(6) Required groups to gather and interpret data relative to specific problems (4.19)</td>
<td>(4) Used issue analysis requiring groups to address problems, issues, and concerns (4.18)</td>
<td></td>
</tr>
<tr>
<td>(7) Used individual or group decision-making (4.06)</td>
<td>(7) Used small group work to collectively address a project, case study, or issue (4.13)</td>
<td></td>
</tr>
<tr>
<td>Learning/ Learning Outcomes</td>
<td>Top seven statements for each course and criteria; means are shown in parentheses.</td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>(1) Opportunity to learn from fellow class members (4.16)</td>
<td>(1) Apply techniques for planning and analyzing farm business decisions (4.47)</td>
<td></td>
</tr>
<tr>
<td>(2) Apply techniques for planning and analyzing farm business decisions (4.12)</td>
<td>(2) Stimulated my thinking about farm management (4.45)</td>
<td></td>
</tr>
<tr>
<td>(2) Increased my awareness of current farm management issues (4.12)</td>
<td>(3) Engaged me in the process of management and decision-making (4.42)</td>
<td></td>
</tr>
<tr>
<td>(4) Stimulated my thinking about farm management (4.07)</td>
<td>(4) Will benefit me if I were to pursue a career in farming or production agriculture (4.40)</td>
<td></td>
</tr>
<tr>
<td>(5) Engaged me in the process of management and decision-making (4.06)</td>
<td>(5) Increased my awareness of current farm management issues (4.22)</td>
<td></td>
</tr>
<tr>
<td>(6) Improved my ability to work in groups to solve problems (3.94)</td>
<td>(6) Strengthened my understanding of how a farm is managed and operated (4.20)</td>
<td></td>
</tr>
<tr>
<td>(7) Caused me to reflect upon my past experiences when solving problems (3.93)</td>
<td>(7) Stimulated me to go beyond classroom learning (4.18)</td>
<td></td>
</tr>
<tr>
<td>Delivery Methods</td>
<td>(1) Using computers to solve problems (4.44)</td>
<td></td>
</tr>
<tr>
<td>(1) Understanding that decisions made will impact upon a farming operation (4.29)</td>
<td>(2) Using computer simulation software (FINPACK) (4.43)</td>
<td></td>
</tr>
<tr>
<td>(1) Hands-on experience/student activities (4.29)</td>
<td>(2) Understanding that decisions made will impact upon a farming operation (4.43)</td>
<td></td>
</tr>
<tr>
<td>(1) Being “actively engaged” with other class members to solve problems (4.29)</td>
<td>(4) Using a “home” farm or one of familiarity in a laboratory setting (4.34)</td>
<td></td>
</tr>
<tr>
<td>(4) Whole class discussions (4.21)</td>
<td>(4) Lectures by instructor(s) (4.18)</td>
<td></td>
</tr>
<tr>
<td>(4) Group/committee discussions (4.21)</td>
<td>(6) Hands-on experience/activities (4.05)</td>
<td></td>
</tr>
<tr>
<td>(6) Group/committee assignments (3.97)</td>
<td>(7) Using Ag Decision Maker (4.03)</td>
<td></td>
</tr>
<tr>
<td>(7) Using an actual farm unfamiliar to me, prior to starting the course, in a laboratory setting (3.94)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
It is crucial to identify those strengths within AGEDS 450 and ECON 430 that align with the principles surrounding capstone courses, adult education, experiential learning, and learning outcomes. Table 15 and the following discussion help explain how the learning outcomes for both courses were impacted by the delivery methods. It also provided a connection between favorable factors from all components of the survey to summarize the major strengths.

Table 15 identifies both similarities and differences among the highest ranking statements related to capstone course effectiveness, learning/learning outcomes, and delivery methods. These highest ranking statements have been used to summarize three significant strengths that seem to explain both the AGEDS 450 and ECON 430 courses from the data and information provided. The following statements combine wording from each of the three major sections of the survey and explain the significant strengths of each course as perceived by the students.

The three greatest strengths of AGEDS 450 are:

1. provides hands-on experience (capstone course effectiveness) that applies techniques for farm planning and decision-making (learning outcome) and engages students in the process of management (learning outcome) that impacts decisions made (delivery method) on an actual farm laboratory (delivery method).

2. uses small groups to address problems (capstone course effectiveness) causing more student-to-student interaction (capstone course effectiveness); improving their ability to work in groups and learn from each other (learning outcomes) through group discussion (delivery method) and assignments that impact decisions made on an actual laboratory farm (delivery method).

3. uses issue analysis (capstone course effectiveness) to stimulate student thinking (learning outcome) and to cause students to reflect upon their past experiences (learning outcome) whereby students must apply techniques for planning and analyzing a farm (learning outcome) that ultimately impacts the
decisions made (delivery method) on an actual laboratory farm (delivery method).

The three greatest strengths of ECON 430 are:

1. uses verbal presentations (capstone course effectiveness) and written assignments based upon course material (capstone course effectiveness) that require the application of previously learned material (capstone course effectiveness) with these assignments and presentations stimulating student thinking about farm management (learning outcome) and strengthening student understanding of how a farm is managed (learning outcome) through the use of computers (delivery method) and a “home” farming situation (delivery method).

2. uses issue analysis (capstone course effectiveness) that incorporates new knowledge (capstone course effectiveness) to stimulate thinking (learning outcome) in the classroom and beyond (learning outcome) through the use of computer (delivery method) and computer simulation software (delivery method).

3. requires students to apply previously learn subject matter and content (capstone course effectiveness) relating to a real or hypothetical problem (capstone course effectiveness) or technique for planning and analyzing a farm (learning outcome) through the use of computers (delivery method) on a “home” farming situation (delivery method).

These three statements for AGEDS 450 and ECON 430 attempt to incorporate all three major components of the survey and explain the strengths associated with each course in the areas of capstone course effectiveness, learning/learning outcomes, and delivery methods.

**Summary**

This chapter presented the findings and data analysis of this study related to the specific objectives. Demographic characteristics were presented along with descriptive statistics and overall ranking of the responses in both courses. Comparison of mean scores was conducted using ANOVA to identify significant differences among the two courses and
further analysis was completed to evaluate the impact of cumulative GPA and year in school on those results.

This chapter also provided a discussion of the major similarities, differences and strengths related to the AGEDS 450 and ECON 430 experiential learning courses. These similarities, differences and strengths were examined in relation to the major components of the survey data, namely, capstone course effectiveness, learning/learning outcomes, and delivery methods.
CHAPTER V. CONCLUSIONS, RECOMMENDATIONS, AND IMPLICATIONS

This chapter contains the conclusions based on the findings and discussion, and offers recommendations from the study. Implications to experiential learning, agriculture and the profession are included.

The purpose of this study was to determine similarities and differences in students' perceptions towards learning in two senior-level farm management experientially based capstone courses, similar in content, but vastly different in delivery and teaching methods. A secondary purpose was to determine if there was a favorable means for teaching farm business management concepts to young adult learners.

The specific objectives of this study were to:

1. To examine selected demographic characteristics of the students enrolled in these two experientially-based capstone courses.

2. To determine the effectiveness of these two capstone courses using Crunkilton's criteria.

3. To identify the effectiveness of experiential learning, learning outcomes, and knowledge/skill enhancement as it occurs, using students' perceptions towards these courses.

4. To compare students' attitudes towards the effectiveness of various teaching and delivery methods used in each course and its impact upon their learning in an experiential setting.

To accomplish the purpose and objectives of this study, the following research questions were defined:

1. What types of students are enrolled in these two courses?

2. How effective are these two courses at utilizing Crunkilton's criteria for capstone courses?

3. What similarities and differences exist in the learning outcomes of these two courses as perceived by the students?
4. Which delivery techniques are most effective/ineffective for these two experiential learning courses?

Conclusions

Based on the findings of this study and the combined discussion in the previous chapter, the following conclusions can be made:

1. AGEDS 450 students tended to be older and further along in college than students in ECON 430, who tended to have higher cumulative grade point averages. A majority of the students in both courses had some type of farming background and had enrolled in similar and different agricultural courses throughout their academic careers.

2. Both courses were designed using several of Crunkilton’s principles and criteria for capstone courses. Both courses incorporated written and oral communication, intensive writing, issue analysis, and industry involvement. Therefore, both courses met Crunkilton’s criteria for capstone course design and delivery.

3. The effectiveness of capstone courses was having a positive impact on student learning in both courses. AGEDS 450 and ECON 430 students rated the effectiveness of capstone courses above average for all 21 statements related to capstone courses.

4. ECON 430 students were more favorable towards the use of verbal presentations, written assignments based on course materials, and incorporating new knowledge for solving real or simulated situations than AGEDS 450 students. The overall
use of verbal presentations and written assignments in ECON 430 seemed to be more effective than those used in AGEDS 450.

5. AGEDS 450 students were more favorable towards hands-on experience/activities, use of small group work to collectively address a project, case study, or issue, and student-to-student interaction than ECON 430 students. The design of the AGEDS 450 course favors hands-on experience, group work and student-to-student interaction and in all cases the students found these areas more effective than ECON 430 students.

6. This study demonstrated that capstone courses can be an effective means of teaching and delivery for teaching farm management and operation to agricultural undergraduate students.

7. The unique learning environment provided by the AGEDS 450 course and Ag450 farm resulted in greater variability in the responses by the students. AGEDS 450 was designed to involve students more directly in their own learning through their responsibility as managers of the Ag450 farm. ECON 430 has a lecture and laboratory design that is generally more familiar to students; consequently, less variability in their responses was found.

8. Students' opinions towards learning/learning outcomes were highly favorable for both courses, with all 19 statements being rated above average. Therefore, this strengthens the argument that experiential learning in capstone courses positively enhances learning/learning outcomes achieved by students.
9. Both courses enhance the learning outcomes related to planning, analyzing, problem-solving, and decision-making with the context of farm business decisions and overall management.

10. ECON 430 students tended have more favorable opinions towards learning/learning outcomes achieved than AGEDS 450 students. ECON 430 students felt that the course will benefit them if they pursue a career in farming or production agriculture and strengthened their understanding of how a farm is managed and operated more than AGEDS 450 students. However, AGEDS 450 students felt that they were provided more opportunities to learn from their fellow class members and were able to improve their ability to work in groups to solve problems more than ECON 430 students.

11. Students’ responses in both courses ranked the ability to improve their oral and written communication skills and their ability to make decisions relatively low as compared to other statements regarding learning/learning outcomes. The ability of the course to benefit them if they were to pursue a degree outside of agriculture was also ranked lower in relation to other statements. In each case the mean scores were still above average.

12. The positive responses related to learning outcomes in these two experientially-based capstone courses supported the experiential learning model designed by Knowles, Cole, and Presswood (1994). Students in these two courses were involved in both a cyclical and spherical approach, as proposed by Knowles, Cole, and Presswood (1994). Students were in a continuous process of
experiential learning where experience was the foundation and each project or assignment built upon previous experiences.

13. Both courses enhanced the learning outcomes related to planning, analyzing, problem-solving, and decision-making with the context of farm business decisions and overall management.

14. Both courses were designed using specific delivery methods. Some of these delivery methods were similar while many others were greatly different. All of the delivery methods were supported by the literature related to capstone courses, experiential learning, and adult education. For each course, delivery methods unique to that course were highly rated by the students. Both courses used “issue analysis” involving small groups and students in both courses rated these about equally. Both courses used industry involvement and/or ISU faculty as resources for students. AGEDS 450 students rated these criteria much higher than ECON 430 students. Hands-on experience, being actively engaged, in-class discussion, and group/committee work were all effective delivery methods for AGEDS 450, while less utilized and less beneficial in ECON 430. Lectures, computer use, and computer simulation software were all effective delivery methods for ECON 430, while less utilized and less beneficial in AGEDS 450.

15. This study supports the notion that experiential learning can be effective using a variety of delivery methods. Furthermore, it supports the notion that capstone courses taught experientially using a variety of delivery methods can be effective and can enhance student learning.
16. This study reinforces the concept that adult education principles can be effectively used in undergraduate agricultural education; however, as more adult education principles are incorporated into a course/curriculum, it is likely that the variability in student responses towards effectiveness will change. Furthermore, upper level (Junior/Senior standing) student learning can be enhanced, if placed in the correct learning environment, by combining experiential learning and adult learning theories.

17. Experientially-based capstone courses have highly positive results on student learning in courses delivered both individually and within groups/committees (ECON 430/AGEDS 450). Computer software simulation and actual management responsibilities both provide a significant learning experience for students related to farm management.

18. Undergraduate agricultural students, with the proper curriculum development and planning, can be involved in courses with experiential and adult learning theories as a foundation. The planning and design of these courses demands time and resources and for this reason the number of courses meeting this criteria is limited, even though the impact on student learning is extremely significant. The time and resources necessary to develop experientially-based capstone course is justified by the significant learning experiences being achieved by students in both courses.

19. Uncontrolled factors relating to different instructors and students backgrounds had an impact on the responses given in both courses. The importance of experiential learning in capstone courses remained evident, but the teaching styles
of the instructor(s) and the means by which they design the courses weighed heavily upon student perceptions. AGEDS 450 and ECON 430 had been developed and taught by the same faculty and staff for several years and students' opinions of each course were extremely positive and well known by incoming students.

20. This study clearly showed that capstone course, experiential learning, and adult learning principles were successfully incorporated into two farm management and operation courses similar in content, but vastly different in delivery methods. This provided justification for further development within both of these courses and other upper level undergraduate agricultural courses. The data provided favorable ratings in the areas of capstone course effectiveness, learning/learning outcomes, knowledge/skills enhancement, and delivery methods. For these reasons experientially-based capstone courses should continue to integrate adult learning theory with undergraduate agricultural courses to promote student learning.

Recommendations

The findings and conclusions of this study have resulted in recommendations related to education and further study. Agricultural education has always had experiential learning as a foundation, but has been limited in its use with formal educational settings. The positive impacts associated with experiential learning in these two courses provide justification for further development of these courses and other agricultural courses despite the increased time and resources needed.
Other studies similar to this should be conducted in other agricultural departments to ensure that these results can be extrapolated throughout agricultural disciplines. The learning environment provided in the two courses studied can be applied to exterior programming for teaching farm management through extension and education using short course, workshops, and departmental training strategies.

The role of internships as a means for students to learn and remain involved in the two courses of study was not examined by the survey or within the study. The research and progression of the study identified many instances where internships may have enhanced the ability of students to learning in these situations. The impact of internships on experiential learning in formal college instruction of undergraduates needs to be examined in detail. Also, the willingness of those students enrolled in these courses needs to be evaluated. Experiential learning and adult learning theories demand a motivated learner and there was a large amount of variation witnessed related to the motivation towards learning by students in both courses.

This study was designed to assess two different courses, with different students enrolled in each course. Further study on the same students enrolled in two experiential capstone courses taught using different delivery methods, may further prove the strengths, weaknesses, similarities, and differences perceived by a similar group of students.

Experiential learning provides students with increased involvement in their own learning and the opportunity to incorporate their own experiences and knowledge into the learning environment. Capstone course principles had a significant impact on student learning in both courses and adult learning principles were well received be senior level agricultural students. Therefore, other agricultural courses and programs should re-evaluate
the current teaching and learning processes and experimental courses should be designed to provide more experiential capstone course opportunities for undergraduate agricultural students to learn and be taught similar to adults.

Implications

Implications of this study can be drawn relating to experiential learning and agricultural education. Experiential learning has a strong relationship to agriculture and the use of experiential learning strategies within formal collegiate instruction is increasing. This study provided examples of two courses that were quite similar in farm management content; vastly different in delivery, and yet both had positive impact upon student learning. The different course designs provided validation for teaching and learning process related to experiential learning, capstone courses, and adult education with agricultural education in formal educational settings.

Experiential learning can provide a significant learning experience for undergraduate agricultural students while using a variety of delivery methods related to hands-on experience, group/committee work, individual projects, and computer simulation. The critical factor is the time and resources necessary, along with the need to motivate learners and gain their commitment to become involved in the learning process. This study is related to teaching farm management to students, but may also have implications to educators in other agricultural departments and outside of agriculture as well. It is critical to ensure that the principles surrounding capstone courses and experiential learning are being met in order to design these types of courses. It also provided reasoning and justification for providing undergraduate agricultural students with more opportunities to learn in adult education.
settings, which are uncommon in many courses. The experiential learning process seemed to be a continuous process and senior level students had the ability and experiences necessary to learn in those types of situations. Therefore, it is our discipline’s responsibility to provide these significant learning experiences and situations for students, so for them it becomes common and not the exception.
TO: Charles R. Steiner  
FROM: Ginny Austin, IRB Coordinator  
RE: IRB ID # 03-848  
DATE REVIEWED: November 18 2003

The project, "Comparison of Student's Perceptions Toward Learning and Delivery Techniques in Two Farm Management Capstone Courses Taught using Differing Teaching Methods" regulations as described in 45 CFR 46.101(b)(2).

(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

To be in compliance with ISU's Federal Wide Assurance through the Office of Human Research Protections (OHRP) all projects involving human subjects, must be reviewed by the Institutional Review Board (IRB). Only the IRB may determine if the project must follow the requirements of 45 CFR 46 or is exempt from the requirements specified in this law. Therefore, all human subject projects must be submitted and reviewed by the IRB.

Because this project is exempt it does not require further IRB review and is exempt from the Department of Health and Human Service (DHHS) regulations for the protection of human subjects.

We do, however, urge you to protect the rights of your participants in the same ways that you would if IRB approval were required. This includes providing relevant information about the research to the participants. Although this project is exempt, you must carry out the research as proposed in the IRB application, including obtaining and documenting (signed) informed consent, if applicable to your project.

Any modification of this research should be submitted to the IRB on a Continuation and/or Modification form to determine if the project still meets the Federal criteria for exemption. If it is determined that exemption is no longer warranted, then an IRB proposal will need to be submitted and approved before proceeding with data collection.
APPENDIX B. AGEDS 450 COURSE SYLLABUS
AND ECON 430 COURSE SYLLABUS
Description: Farm Management and Operation
Credit: 3 semester hours
Prerequisites: Economics 135, Economics 330, Junior Classification
Repeatability: May be taken 3 times for credit, but only once in each semester (fall, spring, and summer)
Content: Participation in the management and operation of a diversified Iowa farm. The class is responsible for the plans, records, and decisions for buying and selling the farm's livestock, crops, and equipment. Special speakers on current topics affecting the farm and agriculture.

Objectives:
1. To provide an opportunity to participate in the actual management of a typical Iowa farm. Students must be aware of the farm's resources including the sustainability of those resources and environmental and governmental regulations that affect those resources
2. To provide students the opportunity to personally experience the challenges and satisfaction of an actual farm operation
3. To encourage student participation in an effective committee structure
4. To promote the decision-making process
5. To promote group communication and working relationships

Faculty/Staff:
Professor-in-Charge: Dr. Larry D. Trede
Instructor: Mr. Charles Steiner
206 Curtiss Hall
206 Curtiss Hall
(office) 515-294-4076
(office): 515-294-0047

Farm Manager: Mr. Greg Vogel
Animal Caretaker: Mr. Roger Leininger
Ag Studies 450 Farm
Ag Studies 450 Farm
(farm) 515-292-0742
(farm) 515-292-0742
(home) 515-292-9734

Text: None required. Handout materials from various sources including ISU Extension
Extra Fees: None

Schedule: On-Farm Lecture/Discussion, and On-Farm Laboratory: Tuesday 1:10 p.m. - 5:00 p.m. and Thursday 2:10 p.m. - 5:00 p.m. Provides an opportunity for the instructors to provide information on developing skills related to farm management and operation. Principles learned in previous classes will be applied to the Ag450 Farm. Class time is used for lecture, class discussion, committee work/reports, business meetings, outside speakers, and individual reports. The on-farm laboratory provides an opportunity to practice farm operation and management skills. The
emphasis will be on planning, problem solving, decision-making, and carrying out the decisions of the class.

University Policies:
The Professor-in-Charge is responsible for reviewing all decisions and recommendations made by the class with the express purpose of making sure that University policies and interests are satisfied and that the farm will meet its profit objectives. This rule is not intended to prevent the class from managing the farm but rather ensures continuity, legal requirements, and University guidelines unique to this farm.

Activities:
Lecture/Discussion:
Provides an opportunity for the instructor to present skills and issues related to farm management and farm operation in today’s agricultural situation. Additionally, provides for group discussions on topics affecting agriculture and the farm.

Laboratory:
Provides an opportunity for the students to obtain information, observe operations, learn skills, and function as committees. Also, gives students the opportunity have hands-on experiences with a actual Iowa farm.

Committee Meetings:
Provides an opportunity for students to work in farm committees and use problem-solving and decision-making skills in evaluation, discussion, and planning farming operations.

Business Meetings:
A student conducted business meeting to decide and implement decisions related to the current and future operation of the farm. (Students, instructors, and farm operator will be present.) A business meeting will be scheduled as needed by the Class Coordinator, Professor-in-Charge, or Instructor.

4-Hour Experiential Learning Experience
Each student will participate in a 4-hour work experience related to the farming operation. Work experiences will be coordinated and approved by the Farm Manager.

Attendance: Attendance and participation is expected. If you must be absent, please notify Mr. Chuck Steiner before your absence. Absences may be excused for sickness, job interviews, family matters, and University business. Participation in class activities includes all of the time scheduled for class and lab. Unexcused absences or lack of participation will be deducted from points allocated to the course. Also, additional work or hard-working habits may be rewarded with extra points.

Faculty/Staff Responsibilities:
Professor-in-Charge. Administers the Ag450 Farm for the Agricultural Education and Studies Department. Teaches the class according to the listed purpose and objective of the course and farm. Makes sure that administrative work is done and
submitted to the proper authorities. Makes sure that University rules and regulations are followed. Develops other educational opportunities that make use of the Ag450 farm. Administers the Ag450 farm employees. Makes sure that the farm is operated on a sound business-like basis. Reports to AGEDS Department Head.

_Instructor:_ Teaches the course during the summer semester and assists the Professor-in-Charge during the other semesters. Assists in the coordination of the farm and the educational programs. Gives educational tours when requested. Is responsible for the computerized record keeping and financial analysis of the farm. Works with the farm committees. Reports to the Professor-in-Charge.

_Farm Manager:_ Operates the farm on day-to-day basis in a safe manner utilize the resources provided by the Department. Operates the farm within the guidelines of the University and the director of the class. Works with students to provide information about the farm and assists students in gaining new experiences. Supervises the 4-hour experiential learning experience. Coordinates the work schedules of all employees and provides needed supervision reports to the Professor-in-Charge

_Animal Caretaker:_ Similar duties of the Farm Manager. Has major responsibility for the swine enterprise. Assists the Farm Manager as needed. Works with students to provide information about the farm and assists students in gaining new experiences. Reports to the Farm Manager.

_Hourly Employees:_ Follows the direction and instructions given to them by the Farm Manager. Report to the Farm Manager.

**Assignments:**

<table>
<thead>
<tr>
<th>Item</th>
<th>Who</th>
<th>% Grade</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Committee Interest/Resume</td>
<td>Individual</td>
<td>R</td>
<td>1/13/04</td>
</tr>
<tr>
<td>State of Farm Report/Goals</td>
<td>Committee</td>
<td>R</td>
<td>2/10/04</td>
</tr>
<tr>
<td>Exam 1</td>
<td>Individual</td>
<td>15%</td>
<td>2/26/04</td>
</tr>
<tr>
<td>Exam 2</td>
<td>Individual</td>
<td>15%</td>
<td>4/6/04</td>
</tr>
<tr>
<td>Strategic Issue</td>
<td>Committee</td>
<td>30%</td>
<td>4/20/04</td>
</tr>
<tr>
<td>Experiential Learning Report</td>
<td>Individual</td>
<td>R</td>
<td>4/29/04</td>
</tr>
<tr>
<td>Committee Notebooks</td>
<td>Committee</td>
<td>R</td>
<td>4/29/04</td>
</tr>
<tr>
<td>Exam 3</td>
<td>Individual</td>
<td>15%</td>
<td>4/29/04</td>
</tr>
<tr>
<td>Final Reports</td>
<td>Committee</td>
<td>R</td>
<td>4/29/04</td>
</tr>
<tr>
<td>Class Assignments</td>
<td>Individual</td>
<td>R</td>
<td>Various</td>
</tr>
<tr>
<td>Participation/Attendance</td>
<td>Individual</td>
<td>25%</td>
<td>Continuous</td>
</tr>
</tbody>
</table>
OBJECTIVE: The course objective is to apply techniques available for planning and analyzing farm business decisions. The primary focus will be on strategic planning, budgeting, cash flow analysis, records and business analysis, tax management, and whole farm planning. Analysis will be based on past performance as well as future goals. Computers will be relied on heavily as aids in these evaluations. Sub-objectives are to:

a) Utilize the experiences of class members.

b) Discuss and implement strategic business planning.

c) Discuss problems and options for the beginning or low-equity farmer.

d) Develop cash flow analysis as a business analysis tool.

e) Acquire judgment and skill in using budgeting procedures and planning techniques to analyze alternative farming strategies.

f) Learn techniques for evaluating the health and weaknesses of a farm business through record analysis.

g) Learn about income tax management techniques that help farmers maximize their effectiveness in tax management and planning.

h) Explore some alternative means to gaining control of farm production assets and evaluate their economic feasibility.

INSTRUCTORS:

Lecture – 118 Horticulture
Dr. James Kliebenstein
178B Heady Hall
Phone: 294-7111

Teaching Assistant
Arathi Bhaskar
B12 Curtiss
Phone: 294-8107

Office Hours
TR 2-4
W 9-12

Lab
68 Heady
111 East Hall
MATERIALS: A packet of information has been prepared and is available at Copyworks on Welch Ave. in Campus Town. In addition, you will need to provide your own 3.5 inch computer disks. Always bring your computer disks to lab.

Computer software for use in lab assignments will be available in the computer lab in Heady Hall (68 Heady). Spreadsheet software used will be Excel. The spreadsheet (software) Excel is available in other IBM compatible computer labs around campus. However, the specific templates are not available in other labs. We will also be using FINPACK, a budgeting package (cashflow, whole farm planning, etc.). This package should be available to place on your own computer. It will be date inactivated. Other software packages will be available as well. Due to licensing agreements, these are only available in 68 Heady Hall. Other publications, etc., will be provided as needed for different sections of the course.

UNIT I: STRATEGIC PLANNING AND THE FARM BUSINESS

Establishing goals and strategic planning.
Management role in agriculture.
Realities of getting started.
Macro-economic issues in planning

Assignment: Developing an inventory of resources available, personnel capabilities, family and business goals, etc., that impact business decisions. Developing a strategic plan for a case study business of your choice.

UNIT II: CASH FLOW ANALYSIS/ENTERPRISE BUDGETING

Developing enterprise budgets.
Enterprise analysis.
Developing cash flows.
Cash flow analysis.

Assignment: Develop a monthly and annual cash flow using FINPACK. Students will need to pull the information together and determine purchasing, production, marketing, and financing sequencing for a case study farm operation of their choice. Developing enterprise budgets for FINPACK use. There will be other shorter assignments on pig finishing, crop share development, and beef feeding completed prior to the cash flow assignment.
UNIT III: MONITORING THE BUSINESS THROUGH RECORDS

Adopting a record system -- what's in them?
Consistency in record keeping.
Special record problems.
Interpretation of financial statements.
Business evaluation through consistent ratios.
Enterprise evaluation and analysis.
Use of cash flow as a record tool.
Computerized records.
Analysis of a farm with few (if any) records.
Farm profitability vs. cash flow feasibility.

Assignment: A complete farm record system for an example farm will be used for business analysis. There will be other assignments to supplement the record assignment.

UNIT IV: TAX MANAGEMENT AND ANALYSIS

Relationship of farm business profit to farm taxable income.
How to influence level of taxes paid.
Impacts of new tax law on farm decisions.

Assignment: Complete taxes for example farm operation.

UNIT V: PLANNING FOR THE FUTURE

Use of records in farm planning.
Planning cropping systems.
Planning livestock systems.
Partial budgeting.
Whole farm plan.
Cash demands (cash flow).
Strategies for low equity farmers.
Options for growth.

Assignment: Completion of a whole farm plan for the case study you established at the beginning of the semester. The strategic plan for this case study was developed in Unit I. Initial enterprise budgets, the balance sheet, and cash flow were developed in Unit II. This unit will focus on developing alternatives for your case study and evaluating them as they compare to the base situation. FINPACK will be used for this analysis. There will be other shorter assignments to supplement the farm plan.
UNIT VI: OTHER TOPICS (Summary)

Dealing with risk and uncertainty.
Land acquisition strategies.
Machinery acquisition.
Capital acquisition strategies.

GRADING:

- Exams (mid-term, final) 250-275 pts.
- Lab assignments, quizzes, etc. 370 pts.
- Paper, presentation, discussion* 170 pts.

A point on lab assignments, quizzes and the paper will be 2/3 the value of a point on the exams.

*The paper will be a term paper prepared as a group assignment. This assignment will involve development of the paper, presentation of the topic in class, and in-class discussion of other papers. Further detail will be provided on this at a later date.

The following will represent a late deduct for Econ 430:

- An assignment handed in after the due date and before the graded assignments are handed back will have an automatic, up front, deduction of 15 percent.

- An assignment handed in after the graded assignment is handed back will have an automatic, up front, deduction of 50 percent.
My name is Chuck Steiner and I am a graduate student in the Agricultural Education and Studies department. My research interests involve the application of teaching and learning processes on students and adults in the context of experiential learning theory. As part of my graduate work I am conducting a survey on two upper level courses teaching similar content using different teaching methods. I hope to gain a sense of your ability to apply and learn in these types of situations. This survey is completely voluntary, if you do not wish to complete the survey or answer any of the questions that is your choice. This survey will help gain an understanding of what student’s think of teaching and learning processes in two upper level experiential courses. Thank you for your time and effort in completing the survey. If you have any questions feel free to let me know.

Charles R. Steiner
Graduate Student
Department of Agricultural Education and Studies
Iowa State University
206 Curtiss Hall
515-294-0047
csteiner@iastate.edu
Part 1. Demographic Characteristics

Please choose (circle) the response that fits you best relative to these selected demographic characteristics.

1. I am completing this survey for:
   1. AGEDS 450
   2. ECON 430

2. I am currently enrolled in this course as a:
   1. Junior with three or more semesters to complete
   2. Junior/Senior with two semesters to complete
   3. Senior with one more semester to complete
   4. Graduating senior at the end of this semester
   5. Graduate student
   6. Other (please specify) ____________________________

3. What is your current grade point average?
   1. 1.99 or below
   2. 2.00-2.49
   3. 2.50-2.99
   4. 3.00-3.49
   5. 3.5 or higher

4. What is your current major?
   1. Agricultural Education
   2. Agriculture Studies
   3. Agricultural Business
   4. Other (please specify) ____________________________

5. Have you completed Economics 330 or an equivalent transfer course?
   1. Yes
   2. No

6. Were you raised on a farm?
   1. Yes
   2. No

7. Gender:
   1. Male
   2. Female

8. Age ______

9. Check the following ISU undergraduate courses or equivalent transfer courses that you have successfully completed or are currently enrolled in.

   Agronomy 154, Fundamentals of Soil Science
   Agronomy 206, Introduction to Meteorology
   Agronomy 212, Grain and Forage Crops
   Agronomy 354, Soils and Plant Growth
   Animal Science 319, Animal Nutrition
   Animal Science 425, Swine Systems Management
   Animal Science 426, Beef Cattle Systems Management
   Economics 335, Agricultural Firms and Industry Organization
   Economics 338, Topics in Agricultural Marketing (A, B, C)
   Ag. Systems Technology 330, Agricultural Machinery Mgt.
   Ag. Systems Technology 333, Precision Farming Systems
   Accounting 284, Financial Accounting
   Accounting 285, Managerial Accounting
   Management 310, Entrepreneurship and Innovation
   Economics 135, Farm Marketing
   Economics 451, Agricultural Law
   Economics 466, Agricultural Finance
   Economics 331, Entrepreneurship in Agriculture
   Economics 432, Agribusiness Management
Part 2. Capstone Course Effectiveness

This course is considered to be a capstone course in farm business management for your field of study. We are interested in your opinions as to the effectiveness of this course. Please respond to the following statements regarding the effectiveness of this farm business management capstone course. Circle the response that most closely reflects your opinion using the following scale;

SD = Strongly disagree  D = Disagree  NO = Neither agree or disagree  A = Agree  SA = Strongly agree

1. This course required me to apply previously learned subject matter and content. .................................................. SD  D  NO  A  SA
2. During this course I was able to incorporate new knowledge for solving real or simulated farming situations .......................................................... SD  D  NO  A  SA
3. This course provided a culminating experience in my academic training ........................................................................ SD  D  NO  A  SA
4. This course was effective in requiring student groups to gather and interpret data relative to a specific problem ........................................ SD  D  NO  A  SA
5. This course was effective in requiring student groups to participate in a real or hypothetical problem situation .................................................. SD  D  NO  A  SA
6. This course was effective in using issue analysis requiring student groups to address problems, issues, concerns, or controversy related to farm management ......................................... SD  D  NO  A  SA
7. This course was effective in using small group work to collectively address a project, case study, or issue ......................... SD  D  NO  A  SA
8. This course was effective in using verbal presentations to the class/instructor ................................................................. SD  D  NO  A  SA
9. This course was effective in using written assignments (papers, reports, critiques) based on course materials .................................................. SD  D  NO  A  SA
10. This course was effective in using industry representatives in a planned learning environment .................................................. SD  D  NO  A  SA
11. This course was effective in using problem-solving as an educational outcome ............................................................. SD  D  NO  A  SA
12. This course was effective in using individual or group decision-making as an educational outcome ............................................................. SD  D  NO  A  SA
13. This course was effective in forcing students to use critical thinking ........................................................................ SD  D  NO  A  SA
14. This course had more in-class lectures than other senior-level undergraduate courses .................................................. SD  D  NO  A  SA
15. This course had more student-student interaction than other senior-level undergraduate courses .................................................. SD  D  NO  A  SA
16. This course had more in-class discussions than other senior-level undergraduate courses .................................................. SD  D  NO  A  SA
17. This course had more instructor-student interaction than other senior-level undergraduate courses .................................................. SD  D  NO  A  SA
18. This course had more hands-on experience/activities than other senior-level undergraduate courses .................................................. SD  D  NO  A  SA
19. This course required students to use other class material more than other senior-level undergraduate courses .................................................. SD  D  NO  A  SA
20. This course was more effective than other senior-level undergraduate courses in allowing students to learn from each other ........................................................................ SD  D  NO  A  SA
21. This course was more effective than other senior-level undergraduate courses in allowing students to learn directly from the course instructor ........................................................................ SD  D  NO  A  SA
Part 3. Opinions Towards Learning/Learning Outcomes

There is an interest in your opinions towards learning and the learning outcomes associated with this course. Please indicate your opinion about the statements listed below using the following scale:

SD = Strong disagree  D = Disagree  NO = Neither Agree or Disagree  A = Agree  SA = Strongly Agree

1. This course required me to apply techniques for planning and analyzing farm business decisions
2. This course actively engaged me in the process of management and decision-making relative to farm management.
3. This course stimulated my thinking about farm management.
4. This course stimulated me to go beyond classroom learning and use problem-solving and decision-making skills.
5. This course caused me to use decision-making skills in other situations outside of class.
6. This course caused me to search out more information about farm management issues outside of class.
7. This course increased my awareness of current farm management issues.
8. This course caused me to think more critically and improved my ability to analyze problems.
9. This course improved my ability to make decisions.
10. This course improved my oral and written communication skills.
11. This course improved my ability to work in groups to solve problems.
12. This course caused me to reflect upon my past experiences when solving problems.
13. This course will have a major benefit to me if I were to pursue a career in farming or production agriculture.
14. This course will have a major benefit to me if I were to pursue a career in any agriculturally related occupation.
15. This course will have a major benefit to me if I were to pursue a career outside of agriculture.
16. This course caused me to look at several sources of information when solving problems.
17. This course helped me to learn how to manage a farming operation.
18. This course provided me opportunities to learn from fellow class members.
19. This course strengthened my understanding of how a farm is managed and operated.
20. This course enhanced my knowledge/skills concerning the following:
   a. Production agriculture
   b. Enterprise budgets
   c. Agriculture technology
   d. Agricultural environmental concerns
   e. Record keeping and analysis
   f. Farm strategic planning
   g. Farm resource management
   h. Farm marketing issues
   i. Cash flow analysis
   j. Farm management decision-making
   k. Farm financial management
   l. Federal farm programs
   m. Whole farm planning
   n. Crop share development
   o. Use of computer decision aids
Part 4. Delivery Techniques

There is an interest in your attitudes towards the various delivery methods used in this course and their effectiveness in helping you to learn. Please circle the response that most nearly identifies the effectiveness of the various delivery techniques listed below. If a statement does not apply, then indicate with the “does not apply” response.

NA = does not apply  VI = Very ineffective  SI = Somewhat ineffective  NO = Neutral  SE = Somewhat effective  VE = Very effective

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<th>NA</th>
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<tbody>
<tr>
<td>1.</td>
<td>Lectures by the course instructor(s).</td>
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<td>2.</td>
<td>Whole class discussions</td>
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<td>3.</td>
<td>Individual class written assignments for a grade</td>
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<td>4.</td>
<td>Individual work problems for class discussion</td>
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<td>5.</td>
<td>Group/committee assignments for a grade</td>
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<td>6.</td>
<td>Group/committee discussions</td>
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<td>7.</td>
<td>Hands-on experience/student activities</td>
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<td>8.</td>
<td>Using computers (spreadsheets, etc.) to solve problems</td>
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<td>9.</td>
<td>Using computer simulation software packages (eg., FINPAK)</td>
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<td>10.</td>
<td>Using the “Ag Decision Maker” as a resource</td>
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<td>11.</td>
<td>Using outside reading assignments</td>
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<td>12.</td>
<td>Studying/analyzing strategic or other relevant issues</td>
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<td>13.</td>
<td>Doing outside reading/studying on my own</td>
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<td>14.</td>
<td>Having a structured weekly laboratory activity</td>
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<td>15.</td>
<td>Using an actual farm unfamiliar to me, prior to starting this course, in a laboratory setting (450 Farm)</td>
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<td>16.</td>
<td>Using a “home” farm or one of great familiarity to me in a laboratory setting (ECON 430)</td>
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<td>17.</td>
<td>Using the “Internet” as a resource for information and to solve problems</td>
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<td>18.</td>
<td>Being “actively engaged” with other class members in using the decision-making process to solve problems</td>
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<td>19.</td>
<td>Gathering information from industry representatives or ISU faculty/staff to solve problems</td>
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<td>20.</td>
<td>Understanding that the decisions you make will have an impact upon a farming operation</td>
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Thank you for your cooperation
APPENDIX D. AGEDS 450 STRATEGIC ISSUE OUTLINES
FALL 2003 AND SPRING 2004
STRATEGIC ISSUE TEAMS
AGEDS 450, FALL, 2003

This portion of AGEDS450 is designed for students to work in small groups to examine and research in detail a strategic issue facing the Ag450 Farm in either the short-run or long-run. Strategic issues focus on problems that impact all phases of the farm -- crops, swine, equipment, land, labor, and other activities/resources. They are designed to be “interdisciplinary” problems where students can draw upon previous agricultural courses and apply “problem-solving” and “decision-making” techniques to an interdisciplinary problem.

Strategic issues have been identified for this semester. Each issue is quite comprehensive and will require each team to spend some time seeking information and doing some outside research to adequately solve the problem being worked on.

Members of the strategic issue teams will need to work together. The strategic issues have several different parts so that each team member will have an opportunity to contribute taking one of the specific questions related to the broader issue.

The major topics for strategic issues for this semester are:

1. Swine Committee -- “Update and PRRS Evaluation”
2. Crops Committee -- “GPS Data and Crop Plan for 2004”
5. Machinery Committee -- “Analysis of Custom Silage Harvesting Operation”
6. PR/Web Page Committee -- “Web Page Update”
7. Finance Committee -- “Hiring Student Employee”

Students should review the strategic issue outlines as presented. The outlines discuss the strategic issue in detail including some specific issue questions to be addressed.

Issue teams will have the remainder of the semester to complete their work. Written and oral reports will be given by each team on 12/02/03. The reports need to be long enough to adequately discuss the issue and specific questions and well as recommendations made by the issue team (minimum of 5 pages). The written report should include a bibliography of references obtained and persons contacted for information.

Class time will be made available during the semester work on strategic issues. It is anticipated that lab time and some lecture time will be available for students to work on strategic issues.
Strategic Issue
Public Relations Committee
“Web Page Update”

Situation:

We have completed a successful “60th Anniversary” celebration. The farm’s web page should be updated to include materials developed for the open house and also pictures taken during the open house and program. Also, the web site should be updated to include more information about the swine program at the farm.

Assignment:

1. A short video was prepared showing pictorial highlights over the past sixty years. Work with Dr. Scofield to include a section on the web site entitled, “Looking Back over Sixty Years” and include the video in that section.

2. Add another section to the web site entitled, “60th Anniversary Celebration” and include the following:
   a. develop and write text explaining briefly how the farm started and its original mission, and describe the activities and program for the open house. Be sure to include some information about the gift for the computer lab and office.
   b. select an appropriate number of pictures of the open house and make sure each one is labeled.

3. The bulletin board in the classroom has lots of good pictures of activities for this semester’s class. Select an appropriate number and include them on the web page.

4. Start a “swine” section on the web page and include the following charts from the course manual:
   b. Lean premium received, 1994 - June, 2003
   c. Average backfat, 1994 - June, 2003
   d. Percent lean , 1994- June, 2003

   Be sure to develop some written material and include in this section that explains these charts.
Strategic Issue
Building and Grounds Committee
“State-of-the-Art Farm Shop”

Situation:
One of the long-term goals of the farm is to develop a state-of-the-art farm shop that would be used by the AGEDS450 class but also serve as a resource for other College of Agriculture classes and as a training center for agricultural education teachers, etc. Suggestions are needed from the AGEDS 450 students regarding their ideas as to what needed to be included in this facility.

Assignment:

1. As a committee discuss and identify what you feel should be the major components or “service/work areas” in a state-of-the-art farm shop and repair center. Gather input from other class committees, farm staff, and also other departments (agricultural engineering, agricultural mechanization).

2. Identify the major equipment items that should be included in the farm shop. This does not need to be a detailed inventory but rather only “big ticket” items that would fulfill the purpose of a “state-of-the-art” farm shop.

3. What “instructional programs” should be taught as part of the AGEDS450 class or other ISU classes that would utilize this shop?

4. Make a sketch or diagram showing the layout of your ideas for the shop. Be sure to include office space, tool room, etc. that would normally be needed for instructional purposes. Do not include another classroom.
Strategic Issue
Swine Committee
“Update and PRRS Evaluation”

Situation:

It has been slightly more than one year since the PRRS outbreak. The class decision was to continue the farrow-finish program and learn to “manage the disease” and try to minimize its impact. After one year, this decision needs to be evaluated.

Assignment:

1. The farm has kept farrowing records for several years. These records are updated to June, 2003. Work with Greg and/or Justin to update the farrowing records and compare the sow performance for 2003 to 2002. Also, compare the performance since August, 2002 to that prior to the PRRS outbreak.

2. Obtain the breeding and conception records from Greg and/or Justin for 2003. Analyze these records and identify what has happened to conception rates, breeding rates, etc. in 2003 compared to the previous year. What significant changes have occurred and why?

3. Several management practices were changed as a result of the PRRS outbreak. Work with Greg and identify and review the management practices as a result of the PRRS outbreak. Have those changes been effective? Do other changes need to be made? Critically analyze the management plan implemented and make suggestions to improve the management plan.

4. Sort loss on market hogs sold in 2003 is sharply higher than 2002. What factors have contributed to this increase and what management steps can be implemented to reduce the sort loss to levels in 2001 and 2002.

5. The decision to “manage” the disease has been in place for a year. Based upon your overall review of the swine operation, what is your evaluation of this decision and what is your recommendation?
Situation:

It has been recommended that the Ag450 Farm hire another part-time student employee with major responsibilities related to the swine program. Student employees can be hired as work-study student employees (pending qualification for the program and federal funding available) or hired as student employees with the employing department paying the full cost.

Assignment:

1. Develop a rationale for hiring another student employee stating the reasons necessary for this action.

2. Develop a specific job description for the employee, the minimum qualifications necessary, and conditions of employment (hours worked, schedule, etc.).

3. Develop a cost budget including proposed wage scale, hours worked, fringe benefit costs, and other costs to be paid by the farm. Two budgets should be considered – one for an employee eligible for work study and one for an employee not eligible for work study.

4. Identify specific benefits that should be expected from this employee and quantify (dollars/cents) as many as possible.

5. Will the expected benefits outweigh the expected costs?
Strategic Issue
Crops Committee
“GPS Data and Crop Plan 2004”

Situation:

In the fall of 2001, the Ag450 farm began collecting production and yield data on corn and soybeans using the Ag Leader SMS system. Some yield maps have been developed for the prior years. Yield maps have not been developed for 2003.

Assignment:

1. Develop and print yield maps based upon the data collected in 2003 from the yield monitor for corn and soybeans. Make sure that all maps are clearly labeled and identified. Develop maps for all fields including custom harvested field for ISU.

2. Using the yield maps for the Ag450 farms (those that we farm from year to year), identify strengths/weaknesses or agronomic problems that appear to exist in any particular field.

3. What specific recommendations are suggested to improve upon the GPS data obtained in 2003?

4. Using the GPS data for 2003, the yield results from the 2003 corn and soybean plots, and company production information, develop a list of recommended corn and soybean varieties for 2004 and a herbicide program for corn and soybeans for the spring class to consider.

5. Based upon your class experience this semester, are there other crop/agronomic suggestions for the spring class to consider for the 2004 cropping program.
Strategic Issue  
Machinery Committee  
“Analysis of the Custom Silage Harvesting Operation”

Situation:  
For the past three years, the Ag450 Farm has been involved in a custom silage harvesting operation for the Animal Science Department and others. The Ag450 Farm provides the chopper, wagons (trucks), two tractors, and two employees. The other departments provide the fuel, unloading equipment, and other labor. In 2003, the tonnage harvested dropped sharply because of the decision to close the Dairy Farm and the fact that USDA must put their silage harvesting out for bid and the University is ineligible. This impacted negatively upon the profitability of the silage custom harvesting operation.

Other information on 2003 harvest:  
1,670 tons harvested; 240 tons @ $7.50/ton and balance at $5.50/ton.  
Average efficiency of 40 tons/hour

Expenses:  
Labor — 2 employees @ $13.50 per hour  
Debt payments (equipment) — $3326.66 (2x per year; P&I)  
Tractors — JD 8220 (fixed costs) $25/hour; CaseIH (fixed costs) $17/hour  
Tractors — Variable costs of $1/hour (each tractor)  
Repairs — $4086.90 (chopper); no major wagon repairs

The silage equipment loan will have an unpaid balance $9,396.26 at the end of this year (12/31/03). Payments of $3,326.66 (P&I) are due on 6/30/04; 12/31/04; and 6/30/05.

Assignment:  
1. Using the spreadsheet on the next page, complete the profit and loss statement for 2003.

2. Given that the silage custom operation showed a loss in 2003,  
a. what price per ton would have been needed to cover all costs in 2003 for the amount of silage harvested in 2003?  
b. how many tons of silage needed to be harvested in 2003 to cover all costs if the average custom rate is $5.50/ton?

3. With the closing of the ISU Dairy Farm, what should the Ag450 Farm do about its custom silage harvesting operation?  
a. eliminate the custom silage harvesting operation, sell the equipment, and apply the sale proceeds to the loan. What is the estimated value of the silage equipment?  
b. continue to operate at a loss for the foreseeable future pending the opening of the new dairy farm  
c. re-negotiate the custom rate to make the custom harvesting operation profitable or show a smaller loss  
d. other alternatives??  
Study this issue and make a recommendation to the class.
Strategic Issue
Marketing Committee
"Swine and Crop Marketing Plan"

Situation:

Corn, soybeans, and hog from the Ag450 Farm can be marketed using several different marketing strategies. The mission statement for the farm states that the farm strives to be in the top 25% of prices received by Iowa farmers for these commodities. Corn and soybean harvesting will be completed and the swine inventory is an indication of hog numbers for marketing for the next few months.

Assignment:

1. Review the October and November, 2003 USDA Crop Production Reports. What are the major supply/demand factors that will affect the short-term market prices for corn and soybeans? What are the possible price scenarios for corn and soybeans for the next six months based upon these reports?

2. Based upon the information in question #1, develop an appropriate marketing strategy for corn and soybeans for the 2003 crop (remember 25,000 bu. corn needed for the hog program). Your strategy should include: timing of sales (months), quantities to be sold, expected price, and method of sale (cash, forward contract, hedge, option). Be specific.

3. Review the September quarterly Hog and Pigs Report. Also, review the price projection analysis from Glen Grimes/Ron Plains (University of Missouri) at www.http://agebb.missouri.edu/mkt and from John Lawrence (Iowa State) at http://www.econ.iastate.edu/outreach/agriculture/periodicals/ifo (Iowa Farm Outlook Letter, October 1, 2003). What are the important supply and demand factors that will affect hog prices for the next several months based upon the report and the analyses by Grimes and Lawrence?

4. Using the worksheet on hog marketing alternatives, develop a marketing strategy for hogs to be marketed for the remainder of 2003, and the first quarter of 2004. Your strategy should include: expected price and method of sale (cash sale only, forward contract with Farmland, hedge, or buying put options. Be specific on a recommendation.
Situation: Each year a farm budget is developed by the Spring Semester Finance Committee in cooperation with other class committees. With the “tight” financial condition for this year, a detailed budget is needed. Also, the budget format should conform with the record keeping requirements and accounts in the “Quickbooks” accounting system.

Problem: Develop a monthly income and expense budget for calendar year 2004 using the 2003 budget as a guide. The budget should include all fixed and variable expenses, debt payments, capital assets purchased, and capital assets sold.

Specific Questions:
1. Prepare a detailed budget using the worksheet provided. Consult with other farm committees as needed.
   
2. Analyze the 2004 budget on the following issues:
   a. net cash flow  
   b. liquidity  
   c. debt repayments  
   d. impact upon “hifi” account  
   e. impact upon operating capital  
   f. impact upon current ratio  
   g. funds available for capital improvements  
   h. impact upon net worth on 1/1/05 (increase/decrease)  
   i. impact upon debt/asset ratio

3. Any specific strategies to deal with the cash excess/deficit as projected in your budget.

4. Using the 2004 budget, examine the items related to crop expenses and compare the variable expenses per acre for corn and soybeans to the ISU Estimated Costs of Crop Production. How does the Ag450 farm compare? (Note: 2004 Iowa Crop Production Budgets, FM-1712, found on www.extension.iastate/pubs/FM1712.

5. Using the 2004 budget and the 1/1/04 net worth statement, develop a “debt re-structuring plan” that will improve the farm’s current ratio without a significant negative affect on the farm’s net worth. Your plan should deal with the following:
   a. shifting a portion of the educational labor costs to the University  
   b. shifting retirement benefits for Roger Leininger to the AGEDS department.  
   c. sharing of delinquent debt with the University and the farm.  
   d. defining suggested repayment terms for the farm on re-structured debt (assume University will make the loan)  
   e. preparing a revised 1/1/04 net worth statement based upon the re-structured plan  
   f. calculating the current ratio and debt/asset ratio for the re-structured net worth statement
It has been suggested that the Ag450 farm switch from its current reduced tillage system to a "strip tillage" system. This will necessitate changing tillage and planting equipment and also obtaining permission from the University for the custom farming operations.

Complete a thorough analysis — economic, production, labor, equipment, and land resource analysis if the farm changes tillage practices. Your analysis must be based upon sound research data, NRCS information, and not just opinions.

Specific Questions:
1. What are the advantages/disadvantages of this system compared to our present tillage system?

2. What can be expected in terms of crop yields based upon ISU and other University research trials; ie, what yield comparisons can be made between strip tillage and reduced tillage?

3. What are the machinery requirements for this tillage system? Describe equipment needed and approximate cost. What equipment items owned by the Ag450 farm can be traded?

4. What are the labor requirements for the proposed system? List the estimated labor requirements (hours/acre) for each field operation under both systems and compare the total requirements.

5. What changes would be needed in crop inputs – seed, fertilizer, chemical, etc. What are the anticipated cost savings, if any?

6. Contact Kent Berns and determine his interest in "strip tillage" for the farms that are custom operated by Ag450.

7. After completing this analysis, what conclusions/recommendations can be made regarding this proposed system for the Ag450 farm?
Situation: It has been several years since a multi-year repair and renovation plan has been completed on the Ag450 Farm, particularly for all buildings/grounds not used in the swine program. A detailed repair and renovation program needs to be established including a time-line for completion of the repairs.

Problem: Your assignment is to complete a detailed inventory of all buildings (except swine buildings) on the farm noting repairs/renovation needed to extend the life and usage of these buildings. All repairs/renovation needs to be in compliance with OSHA, EPA, and other ISU requirements. The plan can also include the demolition of unneeded buildings/facilities.

Specific Questions:
1. Make a list of all buildings (exclude swine facilities) and indicate the size, function, and use of each building. Indicate if the building should be repaired and used or demolished.

2. For those buildings listed in #1 that will be retained, make an itemized list of major repairs needed and estimated cost of repair/renovation.

3. For the "grounds" area around the farmstead, indicate any upgrading, tree replacement, landscaping improvements, etc. that are needed and include the estimated costs.

4. Prioritize your lists as identified in #2 and #3 and a five-year time-line for implementation. Indicate the amount of funding needed each year.

5. For any items demolished or disposed of, indicate any funding that can be expected from the sale of material or salvage items. Include these items in your prioritized list as identified in #4.

6. Briefly summarize your findings.
STRATEGIC ISSUE
“CUSTOM SWINE FINISHING OPERATION”
SWINE COMMITTEE, SPRING, 2004

Situation: PRRS continues to persist in the swine herd affecting primarily sow reproductive efficiency. While great strides have been made in trying to “manage and cope” with the disease, it is not clear as to whether reproductive efficiency will eventually reach pre-PRRS levels. In addition, the present farm operation and swine program requires two full-time employees and it is not clear whether the University Administration will allow the farm to hire a second full-time employee. Therefore, an alternate swine plan should be formulated if a change is necessary.

Problem: Your assignment is to research and determine whether a custom finishing operation is feasible to replace the swine farrow-to-finish program. This change would be a major re-organization of the swine enterprise and several issues need to be studied.

Specific Questions:
1. What would be the advantages/disadvantages of a custom feeding operation for the farm compared to the present farrow-to-finish program?

2. Research and find 2 or 3 custom feeding contracts that are currently offered in the industry. Discuss the advantages/disadvantages of these contracts in terms of “how well they fit” the Ag450 farm.

3. Select one of the contracts researched in question #2 and complete a detailed budget of income and expenses to the Ag450 Farm if this contract is implemented. Make sure all variable, fixed, and debt payments (swine finisher) are included.

4. What are the “labor requirements” for the contract identified and how will these requirements match our labor supply?

5. What swine facilities on the farm will be utilized? What facilities would remain idle? What suggestions do you have for the possible use of “idle” facilities?

6. What is your recommendation regarding the custom feeding operation, if a change in the swine program is necessitated?
STRATEGIC ISSUE
“CORN, SOYBEAN, AND HOG MARKETING PLAN”
MARKETING COMMITTEE, SPRING, 2004

Situation: The Ag450 Farm has corn, soybeans, and hogs as its major commodities that are sold to support the farm. With the current swine program, approximately 25,000 bushels of corn are needed as feed with the excess available for sale. All soybeans are sold. The farm's farrow-to-finish program produces approximately 150 market hogs to be sold each month. A written marketing plan is needed to help provide consistency between classes, and provides direction to the farm staff when marketing farm production.

Problem: Your assignment is to develop a written marketing plan that markets the balance of 2003 crops produced, provides for potential marketing opportunities for the 2004 crops produced, and outlines marketing alternatives for hogs sold in 2004.

Specific Questions:
1. What is the marketing plan for the balance of the 2003 corn inventory? The marketing strategy should indicate the timing of sales, quantities sold, delivery points, expected price, the type of sale, and use of futures/options markets if suggested.

2. Identify and discuss the price outlook, supply, and demand factors affecting corn and soybean for the 2004 crop, and then develop a written marketing plan marketing these crops considering these factors:
   a. Amount of excess corn (not needed for feed)
   b. estimated soybean production for 2004
   c. consider possible use of forward contracts, cash sales, options, hedges
   d. indicate the type of sale, quantities, expected price, timing of sales

3. Identify and discuss the price outlook, supply, and demand factors affecting the hog market for the balance of 2004 and then develop a plan for marketing hog until the end of the year. Consider the following factors:
   a. anticipated sales until 12/31/04
   b. opportunities with Farmland contracts
   c. use of futures market
   d. staying open (cash sales only)

4. Summarize your marketing plan indicating the total amount of sales for each commodity for each month in 2004 and provide this information to the finance committee for input into the 2004 budget.
Situation: The Ag450 farm has a custom farming operation that is a major profit center for the farm. The custom farming operation is primarily for tillage, planting, and harvesting of corn and soybeans for ISU. It also includes a custom silage harvesting operation. The Fall, 2004 class completed a detailed analysis of the 2003 custom silage harvesting operation and recommended that it be continued despite showing a “financial loss” in 2003.

Problem: Your assignment is to review the income/expense and labor requirements for the custom corn and soybean tillage and planting operation using the actual custom operations performed in 2003. A detailed income/expense statement needs to be prepared for the various custom farming operations. Also, you are to review the Fall, 2003 strategic issue prepared by the Machinery Committee for the custom silage harvesting operation.

Specific Questions:
1. What are the advantages and disadvantages of custom farming University land? What impacts can it have on the Ag450’s owned farming operation?

2. Using the following data for machinery utilization and reasonable field efficiency rates for Ag450 farm equipment, determine the hours of equipment use per year for these field operations:
   a. V-Ripping
   b. Field cultivating
   c. Planting corn and soybeans
   d. Combining corn
   e. Combining soybeans

<table>
<thead>
<tr>
<th>Machinery Utilization (in acres)</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop/Operation</td>
<td>Custom Owned</td>
</tr>
<tr>
<td>V-Rip</td>
<td>354.5</td>
</tr>
<tr>
<td>Field cultivate (c/sb)</td>
<td>710.6</td>
</tr>
<tr>
<td>Plant corn/soybeans</td>
<td>571.1</td>
</tr>
<tr>
<td>(no attachments)</td>
<td></td>
</tr>
<tr>
<td>Plant corn/soybeans</td>
<td>46.0</td>
</tr>
<tr>
<td>(with attachments)</td>
<td></td>
</tr>
<tr>
<td>Plant corn/soybeans</td>
<td>84.0</td>
</tr>
<tr>
<td>(no till)</td>
<td></td>
</tr>
<tr>
<td>Combine corn</td>
<td>237.5</td>
</tr>
<tr>
<td>Combine soybeans</td>
<td>262.0</td>
</tr>
</tbody>
</table>

3. Determine the total cost per acres for each of the above operations using the worksheet provided. It has been adapted from an University of Nebraska worksheet.
4. Compare the total cost of operating the equipment to the custom rate paid to Ag450 and determine which custom operations were profitable in 2003.
   a. What is the profit (loss) per acre for each individual field operation?
   b. What is the total profit/loss for each individual field operation?
   c. What is the total profit/loss for all custom farming field operations (exclude silage harvesting)?
   d. For those operations showing a loss, what is the minimum number of acres needed for each field operation in order to cover all costs?

5. The custom silage harvesting operation showed a loss in 2003. If the loss from the silage operation is combined with the other custom farming operations, what was the total profit or loss from all custom operations?

6. What changes would you suggest in the custom farming operation over the next 2 years?

Additional Information:

M&W Earthmaster Ownership Costs: $2378.10/year
JD8320 Tractor Lease: $25.00/hour
Case IH 5240 Tractor Ownership Costs: $17.71/hour

Equipment Purchase Prices:
  JD7000 6-row planter $11,083
  JD7200 12-row planter $20,000
  Field Cultivator $13,000
  M&W Earthmaster $7,000
  JD9600 Combine with corn head & platform $82,300

Labor Costs:
  $13.75/hour (manager; exclude edu. costs)
  $ 9.00/hour (student employee)

Diesel fuel: $.994/gallon

Ownership Costs for Analyses:
  V-Ripper 15% of purchase price
  Field Cultivator 15% of purchase price
  Planters 15% of purchase price
  Combine 15% of purchase price

Estimated Repair Costs (Implements)
  Field Cultivator 4.5% of purchase price
  V-Ripper 4.5% of purchase price
  Planters 4.5% of purchase price
  Combine 5.0% of purchase price

Estimated Repair Costs (Tractors)
  JD 8320 $.50/hour (actual usage)
  Case IH 5240 $1.00/hour (actual usage)
Situation: Each year a variety of people visit the Ag450 farm to learn more about Midwestern agriculture and the educational philosophies related to a student managed farming operation. International visitors are provided with a discussion and tour of the Ag450 farm while professional educators visit to learn more about experiential learning applied to an actual farming operation as the laboratory. Students visit the Ag450 farm to learn more about production agriculture and the fundamentals related to crop and swine production. It is our hope that the Ag450 farm, along with its staff and students, can continue our strong outreach program and provide information and ideas for others in education or with interest in learning more about agriculture.

We are continually working to keep our Ag450 farm webpage current and accurate by including recent pictures and updating the information provided. We also want to ensure that the website is user friendly and beneficial to the reader.

Problem: The last pamphlet or flyer is outdated and we have very few copies remaining to provide visitors. The vast changes to the farm and course require the development of a new pamphlet with current information related to the Ag450 farm and course. This could then be provided for visitors and used when presenting ideas relating to the Ag450 farm at conferences or in other areas. There is also a need to develop a handout for the Ames middle school students who will be visiting the farm later this spring.

Continuous updating of the webpage information and pictures is necessary to ensure that people visiting the website are receiving accurate information in a user friendly fashion.

Specific Questions:
1. Using the old pamphlet and current information regarding the Ag450 farm and course, develop a new pamphlet that we can provide visitors or others interested in what we do.

2. Develop the pamphlet so that it is appealing to a variety of people and can benefit them if they have further interest. Ensure that all information is current so that the pamphlet can be mass produced and used for an extended period of time.

3. Include pictures relating to some of the latest changes and advancements at the Ag450 farm.

4. Develop an informational handout that can be provided for the Ames middle school students, topic and information of your choice.

5. Continue to evaluate the current webpage and identify alternatives for updating the format, pictures and information provided.
APPENDIX E. ECON 430 TERM PROJECT OUTLINE
Econ 430
Information for Term Project
Fall 2003
(September 11, 2003)

PART I
The length should be 12-15 pages of text excluding tables, figures, bibliography, etc. We want a report which is quite condensed and to the point. If you envision a 30-40 page paper condensed to 12-15 pages, that is what we are looking for. This should allow for the addition of suggestions I may make on the draft and questions which surface during the question and answer period. As a reminder, the final paper is due December 4th. The paper is worth 110 points.

PART II
A good quality draft of the finished paper is due by Thursday, October 14, 2003. A date will be assigned for discussion of the problem and findings in Econ 430 lecture. After the presentation you will prepare the final version of the paper. This is due Thursday, December 4, 2003.

The grade will be based on two parts: the paper and the presentation. The assignment will be 170 points: 110 points for the paper and 60 points for the presentation and discussion. Thirty of the 60 points will be given as part of your evaluation of the presentations of two other groups and for attendance during the presentations.

The general outline (expectations) of the paper should address the following issues:
1. What is the problem?
2. What is happening with the subject now - literature review, legislative review, etc.?
3. What are your expectations if nothing changes?
   - interviews, personal expectations
4. What does your group propose for changes in the current situation?
5. Indicate why these changes are needed.
6. What are the impacts of these changes on the various sectors of agriculture?
7. Indicate how the changes will be implemented.

IN ADDITION

We want you to list all the contacts you made as you prepared the paper. Provide the following as an Appendix:

- Name of person contacted
- Complete address of person contacted

We need this so we can send a thank you for their assistance. I would suggest that you send a thank you as well.
Needed September 18
Fall 2003
Econ 430 Presentation Groups

1. Paper title (this can change as the paper progresses).

2. Who is the group coordinator?
   Who are other members of group?

3. What is the problem you are addressing?

4. Detailed outline of paper in a logical order showing:
   • major headings,
   • sub headings of each major heading, with a brief description (at least 2-3 sentences) of what will be in each subheading,
   • who is responsible for each major topic and sub topic (headings).
Econ 430 Presentation Groups
September 23, 2003

**Group 1**
Government Farm Programs

**Group 2**
Cost Control, The Importance of Input Cost Control in Agriculture

**Group 3**
Financing Needs of Beginning Farmers

**Group 4**
Integration, Mergers and Takeovers In the Agricultural Industry

**Group 5**
Marketing Agricultural Products

**Group 6**
Increasing Grain (Soybean) Competition from North America

**Group 7**
Can The United States Be Competitive in the Soybean Industry?

**Group 8**
A Solution for the Small Farmer

**Group 9**
Today’s Beginning and Transitional Farmer

**Group 10**
Expanding the Business

**Group 11**
Developing Niche Markets

**Group 12**
Technology In Agriculture

**Group 13**
Government Regulations

**Group 14**
Land Value and Access to Land
REFERENCES


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Kliebenstein, J. (2002). Economics 430, Advanced Farm Business Management course outline. Economics Department, Iowa State University, Ames, IA.


Westera, D. (2002). Experiential learning activities in distance education: Challenges and Examples. Proceedings of the 18th Annual Conference on Distance Education and Learning, Madison, WI.

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Dr. James Kliebenstein, for serving on my graduate committee and also his willingness to share information and allow the study to involve the ECON 430 course, without your assistance and suggestions this study would not have been possible.

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Dr. David Acker, thank you for your willingness to serve as a committee member on short notice, your long standing support of my international opportunities and your willingness to share your thoughts and ideas.

Dr. Allen Knapp, for serving as a committee member and bringing a unique perspective to my graduate program and dissertation research.
Dr. Robert Martin, for providing me the opportunity to teach and become actively involved in the departmental mission, your willingness to discuss issues and interest in my progression throughout the past three years is greatly appreciated. You treated me as a colleague in the department and helped me realize the importance of working with others in the profession.

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