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Perceived Benefits Of An Agricultural Capstone Course At Iowa State University¹

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Abstract

This study compared the quality of a capstone course in the College of Agriculture at Iowa State University to other junior/senior level courses and determined which activities in the course were most beneficial to course graduates. The capstone course used was AgEdS450 in the

Agriculture Education and Studies Department.

Course graduates perceived that AgEdS450 provided more hands-on experiences, more student-student interactions, and more experiential learning than other junior/senior level courses. They also felt that AgEdS450 was "equal to" or "greater than" other courses in student-directed learning, putting course objectives into practice, problem-solving, and decision-making. Many of these factors fit the Crunkilton criteria for capstone courses. AgEdS450 allowed students to apply the knowledge gained from other courses. Preparing written and oral reports was beneficial in their first professional position.

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Introduction

The Association of American Colleges (AAC) recommends the inclusion of capstone courses throughout all collegiate disciplines. Furthermore, AAC recommends that capstone courses be regularly required courses that "pull the disparate pieces of student's work together" (AAC, 1985, p.17). Wagenaar (1993) describes a capstone course as an in-depth study of theory and method with a wide range of topics, a sequence with advancing sophistication, and a means by which final mastery of a discipline's complexity can be shown and assessed.

Several criteria have been identified to measure quality in capstone courses (Crunkilton et al., 1997) including: a planned learning experience, synthesizing previously learned subject material, integrating the material into a base for solving real world problems, and providing a culminating experience which is carefully monitored so students achieve a stated objective (Knowles and Hoefler, 1995; Aupperle and Sarhan, 1995). Additionally, capstone courses should ease the transition between a student's academic experience and career entry.

Crunkilton has identified six educational outcomes and five required learning activities for a capstone course. The expected education outcomes include problem-solving, decision making, critical thinking, collaborative/professional relationships, oral communications, and written communications. Required learning activities include: projects and/or case studies, issue analysis, small group work, oral communication, and industry involvement. These outcomes and activities have been reiterated throughout the literature (Zimmerman, 1991; Wagenaar, 1993; Aupperle and Sarhan, 1995; Crunkilton et al., 1997; and Zimmerman, 1997).

AgEdS450 is a capstone course in the Department of Agricultural Education and Studies at Iowa State University. The ISU Ag450 farm is used as the experiential learning laboratory for the course. The Ag450 farm was established in 1943 to provide students an opportunity to manage and operate a typical Midwestern commercial farm. Course objectives for AgEdS450 include the opportunity for students to participate in the actual management of an Iowa farm, to experience the challenges and satisfactions of the management process, to participate in an effective committee structure, and to actively participate in the decision-making process (Trede, 1997). Students are empowered to make management decisions for the farm including the planning, purchasing, selling, and investing in farming enterprises on a self-sustaining basis. Student farm committees are formed at the beginning of each class and committee recommendations are voted on by the entire class. Each student committee is responsible for the management and operation of specific areas of the farming enterprise. Each committee also is

assigned a long-term strategic issue requiring outside research and study. Written and oral presentation analysis of the issue and the decision-making process are reported to the class. Several oral reports are given by committees throughout the semester.

The purpose of this study was to determine which activities in the capstone course, AgEdS450, were most beneficial to course graduates in their first professional position following graduation. Furthermore, the study was designed to compare the quality of this course to other junior/senior level non-capstone courses in the College of Agriculture at Iowa State University.

Methods

The study was a descriptive survey design. The population for this study consisted of 335 AgEdS450 course graduates that were enrolled between the 1991 fall semester and the 1996 spring semester. This time frame was selected because no known research had been gathered on these course graduates. Independent random samples were generated following the model of Krejcie and Morgan (1970). A total random sample included 214 course graduates with 150 Agricultural Studies majors, 38 Agricultural Education majors, and 26 other majors.

Instrument items for a questionnaire were selected from related studies (Soomro, 1991; Stevenson, 1985; and Hamilton, 1979), input from faculty and staff familiar with AgEdS450, and the researcher's graduate committee. The survey instrument was pilot tested on the 1997 fall AgEdS class to ensure face validity and test the reliability of the instrument.

The survey instrument contained four parts. Part I identified the perceived initial benefits to the course graduates. Part II compared the experiential learning activities in the course with previously completed courses. Part III related the perceived quality of the learning activities and instructional techniques used in AgEdS450. Demographic data were gathered in Part IV.

The Dillman Total Design Method (Dillman, 1978) was followed for data collection procedures. A total of 134 usable instruments were returned for a response rate of 62.6%. A random survey of non-respondents indicated no significant difference between early respondents and non-respondents, early respondents and late respondents, and late respondents and non-respondents. Therefore, the result of this study may be generalized to the population from which the sample was drawn.

Results and Discussion

Demographic Information

Demographic information was collected from respondents who completed the questionnaire. The vast majority of the course graduates were male (85%), had a farm background (94.1%), and enrolled in AgEdS450 one time. Five undergraduate curricula were represented in the sample. Agricultural Studies with 90 respondents (71.4%) had the largest response rate followed by Agricultural Education (16.7%), Agricultural Business (9.5%), and Animal Science and Agronomy (2%).

Working in a management position in a farming operation (family or non-family) was the first professional position of 41% of the sample. Industry jobs related to agricultural sales and/or service accounted for an additional 26%. Eighteen percent of the respondents indicated "other" as their first professional position which included such jobs as researchers, loan officers, military service, entrepreneurs, graduate school, and non-agricultural business. Agribusiness management and teaching accounted for 15%.

Students may enroll in AgEdS450 during the spring, summer, or fall semesters and may enroll more than once in different semesters provided space is available. There was a fairly equal distribution by term and year of graduation with the exception of 1992 and 1997. These years accounted for less than 5% of the responses. Responses were received from 67 course graduates from the spring of 1992 through the fall of 1994 and 68 graduates from the spring of 1995 through the summer of 1997.

Benefits from course activities

Course graduates were asked to indicate the perceived benefits of the capstone course activities related to their first professional position (Table 1). A 5-point Likert-

type scale was used. The course graduates rated the application of knowledge gained from other courses as the most beneficial. Most students enrolled in AgEdS450 during their senior year and had taken many farm production and management classes. AgEdS450 is a culminating experience allowing them to apply knowledge from previous course work in a practical situation.

Preparing written and oral reports rated second as a perceived benefit from the course. Written and oral reports are made by each farm committee several times during the semester. These reports enhance the communications skills and serve as the basis for class discussions and decisions.

Of lesser importance to respondents were "developing respect for different ideas" and "using a variety of assessment procedures." However, both statements had a mean from 3.60 to 3.91. The composite mean for all capstone course procedures was 3.87 indicating a moderate to high level of agreement.

Capstone Managerial Procedures

Data on the managerial procedures used in the class and operation of the farm are presented in Table 2. Benefits to course graduates working in their first professional position were rated on a 5-point Likert-type scale. Being able to identify and solve management problems, particularly production agriculture problems, was highly rated. Making management decision was included in the managerial process. Decisions are made on a committee/group basis after a discussion by the class. The problem-solving process and the use of "critical thinking" skills are emphasized when making these decisions. Statements related to the decision-making and managerial process were rated 4.15 or higher indicating a high degree of usefulness to course graduates.

Clustered together in the managerial procedures were the statements "analysis of farm records," "evaluate

Table 1. Means and standard deviations of perceived benefits of capstone course activities in AgEdS450 in preparation for course graduate's first professional position.²

Capstone course activity	Mean	Std. Dev.
Apply knowledge gained from other courses	4.22	.68
Preparing and presenting reports	4.02	.70
Developing respect for different ideas	3.91	.69
Variety of assessment procedures	3.60	.77
Seek information from ISU extension	3.59	.92
Composite mean	3.87	.47

²scale: 1=strongly disagree, 2=disagree, 3=undecided, 4=agree, 5=strongly agree

Table 2. Means and standard deviations of perceived benefits of capstone managerial procedures in AgEdS450 in preparation for course graduate's first professional position.²

Capstone managerial procedures	Mean	Std. Dev.
Solve production agriculture problems	4.24	.62
Identify and solve management problems	4.20	.66
Make farm management decisions	4.15	.71
Analysis of farm records	4.01	.79
Evaluate new technology	3.99	.76
Work with agribusinesses	3.95	.83
Consideration of environmental factors	3.88	.86
Sustainability of farm resources	3.80	.84
Study new agricultural practices	3.76	.81
Health and safety issues of farm employees	3.59	.87
Formulating agricultural philosophy	3.16	.99
Composite mean	3.90	.49

²scale: 1=strongly disagree, 2=disagree, 3=undecided, 4=agree, 5=strongly agree

new technology," and "work with agribusiness." These statements rated from 3.95 to 4.01. The only statement in this section that did not rate above 3.5 was "formulating an agricultural philosophy." For all eleven statements, the mean was 3.90 indicating a moderate agreement to the perceived benefits of the managerial procedures in the capstone course by the course graduates.

Comparison of AgEdS450 to other junior/senior level courses

This study also compared the perceived benefits of AgEdS450 to other non-capstone junior/senior level courses taken by the course graduates in the College of Agriculture at Iowa State University (Table 3). Respondents were asked to indicate whether AgEdS450 had "fewer or less than," "equal to," or "more or greater than" opportunities and/or interactions than other junior/senior level agricultural courses.

Ninety-two percent of the course graduates indicated that AgEdS450 provided more "hands-on

activities" than other courses. Hands-on activities prevalent throughout the course included required experiential learning experiences outside of class and direct contact and interaction with vendors, Extension specialists, and agribusiness industry representatives, and farm committee activities. Additionally, "student-student interaction" and "learning through experiences" were highly rated by the course graduates. Farm committee organization, projects, and class business meetings are the predominate methodologies used to promote student-to-student interaction and experiential learning.

Since the students are empowered to make management decisions, the capstone course provides many excellent opportunities for students to plan activities and direct their own learning consistent with the course objectives. These two statements rated fairly high in terms of having more opportunities than other junior/senior level courses. The two statements "teacher-student interaction" and "material previously learned in other courses" rated the lowest and provided fewer opportunities as compared to other courses. The role of the course instructor(s) is to facilitate and monitor resulting in less teacher-

Table 3. A comparison of selected variables between the capstone course, AgEdS450, and other junior/senior level courses.

	Factors in the capstone course					
	Less than <u>other courses</u>		Equal to <u>other courses</u>		Greater than <u>other courses</u>	
	n	% total	n	% total	n	% total
Hands-on activities	0	(0.0)	10	(7.4)	125	(92.6)
Student-student interaction	0	(0.0)	15	(11.1)	120	(88.9)
Learning through experiences	0	(0.0)	16	(11.9)	119	(88.1)
Student directed learning	0	(0.0)	25	(18.7)	109	(81.3)
Opportunities to plan activities	1	(0.7)	31	(23.1)	102	(75.6)
Put course objectives into practice	5	(3.7)	28	(20.7)	102	(76.1)
Problem-solving/ decision-making	5	(3.7)	51	(37.8)	79	(58.5)
Teacher-student interaction	16	(11.9)	44	(32.6)	75	(55.6)
Material previously learned in other classes	17	(12.6)	57	(42.2)	61	(45.2)
Goal setting	6	(4.4)	50	(37.0)	79	(58.5)

n = number of responses

% total = percent of total responses

student interaction. In summary, most of the factors identified indicated that course graduates felt that AgEdS450 provided more opportunities than other junior/senior level courses, indicating that the course objectives as are being met.

Summary

Capstone courses are prevalent among all disciplines in colleges and universities across the nation. They provide an opportunity to incorporate previously learned, often disjointed, information into an interconnected, contextual frame of reference from which transitions are made into a career or further study.

The activities of capstone courses are essential if these courses are to truly be capstone in nature. These summative aspects of the capstone course and the required pedagogical characteristics allow for the assimilation of disjointed information.

Conclusions and Recommendations

The following conclusions and recommendations are based upon the findings of this study. These conclusions may or may not be similar to other capstone courses where the students have a more diverse background.

1. Respondents indicated that AgEdS450 course procedures were beneficial to them in their first professional position. The capstone course provided a culminating experience and allowed course graduates to apply the knowledge gained from previous courses. This clearly supports Crunkilton's criteria.

2. Crunkilton stresses the need for oral and written communications in a capstone course. Research results from this study supported that Crunkilton criteria.

3. The capstone course managerial procedures were beneficial to course graduates. Being able to solve "real world" farm management and production agriculture problems in a small or large group setting was beneficial to course graduates. Also, through this problem-solving and decision-making process course graduates were able to reinforce "critical thinking" skills.

4. AgEdS450 clearly exceeds other junior/senior level courses in hands-on activities, student-student interaction, and experiential learning. As the production agriculture industry and other junior/senior level courses change, the course content and procedures in AgEdS450 will need to change.

5. Course graduates generally felt that AgEdS450 was "equal to" or "greater than" other courses in student-directed learning, putting course objectives into practice, problem-solving, and decision-making. These criteria are consistent with many criteria identified for capstone courses.

6. Goal setting was rated about equal to other courses. Additional efforts should be made by course planners of AgEdS450 to ensure that students improve upon this factor and that adequate class time is allowed for goal setting and evaluating goals.

7. AgEdS450 clearly fits the Crunkilton model and definition of a capstone course, particularly those educational outcomes related to problem-solving, decision-making, critical thinking, collaborative/professional relationships, and oral/written communications. AgEdS450 should continue to maintain or improve upon course activities that fit within each of these criteria.

Implications

Implications can be drawn from this study and applied to capstone courses in other colleges of agriculture. The findings along with the review of literature give a clear view of the importance of course activities in capstone courses. Each component serves as an integral part of the entire process. The capstone course is intended to be a preparatory stage for entering the world of work. These courses create student awareness of the inter-connectivity of curriculum, personalities and individuals, teamwork, and delivery methods.

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