

Laboratory Farm-Based Course Meets Content and Teaching Procedures

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Abstract

Ag 450, as an undergraduate course at Iowa State University, has been recognized for several decades as a capstone course whereby students can apply skills learned from other courses in a real farm laboratory setting.

A study was conducted to analyze the appropriateness of the course content and the importance of the teaching procedures used as perceived by the course graduates from 1969-1989.

The results indicated that the course is meeting its objectives and that the teaching procedures being used are highly effective. Students placed a high value on being able to manage and make group decisions on a real farm situation. The use of farm and financial management subject matter rated very high by the course graduates.

The results from this study have implications to community colleges, and other colleges and universities that utilize farms for demonstration or teaching laboratories.

With rapid social and cultural changes in society, it is necessary for higher education institutions to evaluate their

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programs in order to maintain high quality (Noel and Parsons, 1973). The College of Agriculture at Iowa State University, in accordance with the principles of a land-grant institution, has had a long tradition of providing high-quality instructional programs. Many of these programs have been historically guided by a commitment to learn agricultural knowledge from hands-on experience. A 1933 committee stated, "Training for farming should develop maximum efficiency in the production and marketing of agricultural products and skills in the actual management of the farming business (Committee on Agricultural Philosophy and Objectives of Iowa State College, 1933, p.66).

Recognizing the importance of teaching farm management from a hands-on approach, Dr. William G. Murray, in 1933, advanced "that before graduation a student expecting to operate a farm should have training in the farm practices of his 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). A course named Ag 450 was started in 1943 and was designed to incorporate Murray's ideas and concepts. A farm was purchased in 1943 as the laboratory for teaching the class.

A Capstone Course

Ag 450 is recognized as the capstone course where undergraduate students apply skills developed in other courses at Iowa State University. The Ag 450 farm serves as a laboratory and provides an applied farm management experience for the students. The teaching objectives of the course, as identified by Hall (1990), are as follows:

1. to manage an Iowa farm using approved farm management principles and practices;
2. to develop a pattern for decision-making;
3. to develop an understanding and respect for the opinions of others;
4. to improve group communication effectiveness; and
5. to participate in the ACTUAL challenges and satisfactions of a REAL farm operation.

Various farm activities including analyzing farm resources, studying the farm's history, setting goals, solving problems, and marketing farm production are used by the instructors as a means of providing the students with the experience of managing a typical midwestern farm (Hall, 1990).

Evaluation is a fundamental part in curriculum develop-

ment and course improvement. It provides evidence of worth and value of programs and courses, and allows feedback to planners. Students' views are critically important to faculty and academic administrators as a way to assess program effectiveness (Morstain and Gaff, 1977). Odegard (1949) conducted a study on the teaching methods used in Ag 450. He found that the content, organization, and procedures used in Ag 450 during the years 1943-1947 satisfied the graduates.

Klocke (1985), in a follow-up study of students completing the Farm Operation Curriculum from 1959 to 1984 determined that Ag 450 provided students with unique experiences in farm management, decision making, and communications. More than 70 percent of the alumni expressed satisfaction with the course.

Honeyman (1983) studied Ag 450 by interviewing former instructors and examining the Ag 450 farm records. He found that the class organization facilitated the group decision-making process and students benefitted from applying information to actual problems. Honeyman concluded that the Ag 450 instructors have served as advisor, spokesman, liaison, and evaluator for the class by helping student make decisions rather than influencing the outcome of decisions.

Purpose and Objectives

The purpose of this study was to conduct a follow-up study of Iowa State University students completing Ag 450 between 1969-1989 as a means of evaluating the course and planning for the future. Specific objectives were: 1) to determine the benefits derived from Ag 450 as perceived by the course graduates; 2) to determine the appropriateness of the Ag 450 course content as perceived by the course graduates; 3) to determine the usefulness of Ag 450 content in the careers of course graduates; 4) to determine the importance of procedures used in Ag 450; and 5) to compare responses based on selected demographic variables of course graduates.

Procedures

The population for this study included 1277 students who completed Ag 450 at Iowa State University during the year 1969-1989 and resided in the United States of America. The course graduates were stratified into two groups by their undergraduate major. Group one included all Farm Operation and Agricultural Studies majors (N=1024) and group two included graduates of other curricula (N=250). All of group 2 were included in the sample and a random sample of 250 subjects was selected from group one.

A questionnaire was developed by the investigator and pilot tested with the Ag 450 class and a panel of experts. It was statistically tested for reliability and found to be highly reliable. Four 1 to 9 scales (low to high) were used to measure responses.

Demographic data were analyzed to describe the respondents. Nearly all were male (94%), had a farm background when enrolled (95%), and were Iowa residents when enrolled (80%). Almost 50% were enrolled in the Ag Studies curriculum. Only 6% continued their education beyond the

Table 1. Means, standard deviations, and ranks for appropriateness of content in Ag 450.

Experience	Mean	Standard Deviation	Rank
Decision-making	7.854	1.42	1
Recordkeeping	7.763	1.57	2
Problem-solving	7.752	1.47	3
Overall general farm management	7.724	1.59	4
Farm record analysis	7.683	1.64	5
Goal setting	7.626	1.61	6
Communication	7.588	1.57	7
Credit/money management	7.598	1.69	8
Enterprise budgeting	7.573	1.64	9
Crop marketing	7.494	2.01	10
Livestock marketing	7.460	1.69	11
Long-term farm planning/budgeting	7.429	1.81	12
Overall livestock management	7.395	1.64	13
Overall crop management	7.331	1.76	14
Livestock health care	7.202	1.78	15
Livestock feeding	7.202	1.79	16
Employee relations	7.164	1.73	17
Crop storage	7.103	1.79	18
Livestock housing	7.095	1.69	19
Crop pest control	7.076	1.89	20
Labor management	7.061	1.83	21
Purchasing/leasing land	7.011	2.04	22
Overall equipment/facilities management	6.996	1.75	23
Soil tillage	6.985	1.85	24
Seed selection	6.954	1.97	25
Soil conservation	6.947	2.01	26
Livestock selection	6.932	1.87	27
Machinery adjustment/calibrating	6.889	2.01	28
Government programs	6.889	2.28	29
Livestock breeding	6.856	1.92	30
Planting crops	6.852	2.02	31
Grain handling	6.847	1.81	32
Harvesting crops	6.840	1.98	33
Feed handling	6.739	1.83	34
Machinery repair	6.667	1.93	35
Water management	6.665	2.06	36
Building repair and management	6.485	1.99	37

B.S. degree. Approximately 50% indicated their first position as farming and nearly the same number indicated farming as their current position. Over two-thirds had between 1 to 5 years of professional experience. Approximately one-third came from 1974-1978 graduates with the remaining equally divided between 1969-1973, 1979-1983, and 1984-1989.

Findings

The major variables discussed in this paper are the appropriateness of the Ag 450 content and the importance of the teaching procedures. Appropriateness was defined in this study as the suitability of the course content as perceived by the participants in the study. The importance of the teaching procedures refers to the various techniques and teaching strategies used by the instructors and the perceived importance of these techniques by the course graduates.

Appropriateness of Ag 450 content. Tables 1 and 2 summarize the mean scores related to the appropriateness of Ag 450 content. Table 2 shows the composite mean score and standard deviation for subject matter areas related to farm and financial management, livestock management, crop management, and equipment/facilities management. The composite mean scores varied from 6.78 to 7.48 based upon

Table 2. Means, standard deviations, and ranks for appropriateness of Ag 450 as related to component composite scores.

Experience	Standard		
	Mean	Deviation	Rank
Composite farm and financial management ^a	7.48	1.42	1
Composite livestock management ^b	7.08	1.58	2
Composite crops management ^c	7.03	1.69	3
Composite equipment/facilities management ^d	6.78	1.70	4

^a Includes financial management, budgeting, recordkeeping, goal setting, decision making, problem solving, labor management.

^b Includes livestock selection, breeding, feeding, housing, health, and marketing.

^c Includes seed selection, planting and harvesting, tillage, pesticides, soil conservation, and marketing.

^d Includes machinery repair, building repair, grain handling, feed handling, and calibration.

a 1 to 9 scale (1=not appropriate; 5=average appropriateness; 9=most appropriate). Farm and financial management had the highest composite mean score while crop and livestock management were very similar.

Table 2 list the mean score and standard deviation for all 37 items that were used to measure the appropriateness of Ag 450 content. Nine of the top ten ranked items were related to farm and financial management. These items all had mean scores above 7.50, on a 9.0 scale.

In summary, the respondents reported that the Ag 450 content is organized in such a way that it provides the theoretical background for farm activities. However, the lower mean scores for livestock marketing, livestock breeding, harvesting crops, feed handling, machinery repair and management, water management, and building repair and management deserve attention and further analysis.

Importance of Teaching Procedures in Ag 450. Table 3 lists the mean scores and standard deviations for 13 items related to the importance of procedures used in the Ag 450 class. The composite mean score of these 13 items was 7.319. Using a real farm as a laboratory, participating in the

Table 3. Means, standard deviations, and ranks for Importance of procedures used in Ag 450 class (N=267)

	Standard		
	Mean	Deviation	Rank
Using a real farm as a laboratory	8.423	1.03	1
Participating in the management of a farm	8.155	1.15	2
Interacting with the instructor and fellow students in decision making	8.079	1.06	3
Participating in the operation of the farm by actually doing some of the work	7.649	1.58	4
Preparing and presenting reports to the class in making decisions	7.540	1.55	5
Utilizing both classroom and laboratory activities	7.517	1.56	6
Using committees to facilitate class decision making	7.513	1.41	7
Electing officers to provide class leadership	6.992	1.79	8
Providing the opportunity to take the course for credit 3 times at different times of the year	6.981	2.02	9
Having lecture/discussion in class	6.966	1.74	10
Having industry speaker	6.456	1.91	11
Having other ISU staff as speakers	6.456	1.92	12
Taking field trips	6.420	1.98	13
Composite	7.319	1.03	

management of a farm, and interacting with the instructor and fellow students in decision-making rated the highest with mean scores above 8.0. Respondents felt that these procedures were extremely important to the Ag 450 class. Having outside speakers and taking field trips were procedures that rated lower. These mean scores indicate a high degree of satisfaction of the respondents on the procedures used in the Ag 450 class. These results indicate that the Ag 450 class is well-organized and provides a marvelous opportunity for the student to gain hands-on experience in agricultural management. This confirms Murray's (1945) belief that "the Ag 450 farm will work as a laboratory for teaching farm management and production agriculture."

Analysis by Demographic Variables

Respondents were grouped by the various demographic variables and comparisons were made in their responses for the appropriateness of the Ag 450 content and the importance of the teaching procedures used. The following demographic variables were used in the analyses: first position after graduation, current position, years of experience, year of graduation, state residence at time of enrollment, current state residence, farm background, gender, college major, and highest degree earned.

Significant differences using a "t" or "F" test were found in the appropriateness of Ag 450 content when comparing year of graduation. The more recent graduates (within last five years) rated the appropriateness of Ag 450 higher than the other groups. Apparently, they felt that the course content was more suitable and meaningful than earlier graduates. No significant differences were found in the appropriateness of Ag 450 when comparing the other demographic variables.

Significant differences were found in the importance of teaching procedures when comparing the year of graduation, gender, and current residence. Again, the more recent graduates (within last 5 years) rated the importance of the teaching procedures significantly higher than earlier graduates. The more recent graduates felt that it was more important to use a real farm as a laboratory and participate in the management of a farm than the earlier graduates. Earlier graduates have had a longer time to experience real situations of managing a farm or participating in other management situation. When grouped by gender, women rated the importance of the teaching procedures significantly higher than men. This can be explained by the fact that women may have had fewer farm management experiences than men. Lastly, when grouped by current residence, residents from other states rated the importance of teaching procedures significantly higher than current Iowa residents. These results are difficult to explain. No other significant differences could be found when comparing the importance of teaching procedures to the other demographic variables.

In summary, no significant differences could be found when comparing the appropriateness of Ag 450 content and the importance of teaching procedures when the data were grouped for the following demographic variables: first position after graduation, current position, years of experience,

college major, highest degree earned, state of residence at time of enrollment in Ag 450, and farm background.

Conclusions

The results of this study indicate that Ag 450 is meeting its pre-determined objectives related to course content and teaching procedures. As perceived by the course graduates, the major emphasis on farm and financial management was very appropriate. However, the appropriateness of crop and livestock management rated lower. With the current emphasis on sustainability of agricultural resources, integration of technology into agricultural production systems, conservation of agricultural resources, and the concern for the environment, the course content should be reviewed to make sure that it is addressing these contemporary issues.

Procedures used to teach Ag 450 are highly effective. Using a laboratory farm with "hands-on" experience is still a very effective methodology to teach farm management.

The Ag 450 course is well-suited as a "service course" for all students in the College of Agriculture, regardless of departmental major, since no significant differences were found comparing undergraduate majors. Other departments in the College should consider adding it to their curricula.

The Ag 450 course is highly appropriate for students from diverse backgrounds. Non-farm students and out-of-state students felt the content was highly appropriate. The exposure to an actual farm, as a laboratory farm, was a very positive experience to these students. The course content apparently lends itself to problems/solutions affecting mid-western commercial farms and not just Iowa farms.

The Ag 450 course is providing valuable experiences related to interpersonal relationships that are critical for agricultural graduates. Providing skills and experiences related to working with others, serving on committees, and holding a class leadership position were rated highly by course graduates for both their first employment position and their current employment.

Women rated the importance of the teaching procedures higher than men. Therefore, the course is highly appropriate for anyone wanting to experience farm management and learn more about managing an actual farm.

Lastly, the study would indicate that the course could be used by other post-secondary schools, colleges, and universities as a model teaching farm as they deal with establishing and operating teaching and demonstration farms.

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Duane Wachholz of the University of Wisconsin-River Falls, was honored at the 38th NACTA Conference with a plaque to convey NACTA's appreciation of Duane's service as president of the NACTA Judging Conferences from 1984 to 1992 and his continuing service to the NACTA Executive Committee as the NACTA Judging Contest Liaison.