CASE STUDY

Factors Affecting Student Performance In One Unit of A Crop Production Course

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Abstract

Increased enrollment of students without farm experience in agriculture courses has drawn attention to the learning needs of non-farm students. This study examined factors which might affect student performance in a tillage and seeding unit of an introductory crop production course, using a randomized, control group, pretest-posttest design. Data were analyzed using multiple factor analysis of variance. Experiences with farm machinery and crops had the largest effect on both pretest and posttest scores, regardless of whether a student was raised on a farm.

The increased enrollment of nonfarm students in colleges of agriculture has been a cause for concern among educators in recent years (1). Many feel that nonfarm students have learning needs which differ considerably from those of farm students because the nonfarm students generally know little about agriculture when they first enroll (1). Employer preference in hiring graduates with farm experience before their nonfarm classmates (5) implies that the non-farm students completing the same course of study emerge less desirable for employment than their farm-reared classmates. The concern and job market implications have prompted the search for effective means to overcome or lessen the differences perceived between students from rural and urban experiences in the classroom and in the job market.

Nichols (2) stated that "appropriate learning experiences" in college could help students without farm experience overcome problems stemming from a lack of agricultural skills and vocabulary. Appropriate learning experiences, however, are contingent upon many factors which differ from course to course and college to college. These factors include size of enrollment, percentage of students who come from nonfarm experience, instructional methods, subject matter, budgets, local agriculture, instructor to student ratio, and others.

The research reported in this paper was part of a larger study (4). The objective of this portion of the study was to explore the types of pre-enrollment experience factors which have an effect upon student performance in one unit of an introductory crop production course at Iowa State University. It was reasoned that identification of such factors could provide insight into what, if any, special learning experiences for nonfarm students should be provided or encouraged within the course or elsewhere.

Theoretically, one would want to categorize "farm experience" into all its separate components, analyze which components were most instrumental in producing the perceived differences between farm and nonfarm students, and subsequently provide the nonfarm students an opportunity to acquire the crucial components they lack. However, a complete breakdown of farm experience would be a formidable, if not impossible, task; therefore, this study examined only selected components of the "farm experience" of students in an introductory crop production course; Agronomy 114, at Iowa State University.

Materials and Methods

Data were collected by means of a student experience questionnaire, a tillage and seeding unit pretest, and a tillage and seeding unit posttest. All of the questions on the two tests were open-ended. An answer key was constructed prior to coding to help insure uniformity in translation of subjective appraisal into a numeric coding system. The pretest was administered at course entry and the posttest within one week after the unit study deadline date. The pretest and posttest scores were analyzed using the Statistical Package for Social Sciences (SPSS) (3) subprogram ANOVA with the option for multiple classification analysis.

The study population consisted of 321 students enrolled in Agronomy 114 during Winter Quarter, 1980, and Spring Quarter, 1981. Twelve factors were examined as to their importance in accounting for variations in pretest and posttest scores by means of a series of multiple factor analysis of covariance. The covariate was the number of years the student had lived on a farm. The independent variables and their categories are listed in Table 1.

Each factor examined was considered likely to have an effect upon a student's entering knowledge of tillae and seeding. Some factors, such as grade point average, and gender were not agricultural factors **per se** but could have an effect upon a student's knowledge of tillage and seeding.

Results

The series of multiple factor analyses of covariance revealed that the following factors were highly significant (0.01) in their effect upon pretest scores: (1) number of

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years lived on a farm, (2) experience in operation of machinery, (3) high school vocational agriculture instruction, (4) crop-related job experience, and (5) major curriculum. One factor, home farm chores, was significant (0.05) in its effect upon pretest scores.

Table 1. Unadjusted pretest scores for twelve independent variables.

Independent Variable and Category	Mean Pretest Score (Unadjusted)
Student Experience[a]**	
Lifelong Farm	55.08
Some Farm	46.42
Nonfarm	30.75
Home Farm Chores*	
Crop and Livestock Chores	57.69
Livestock Chores	48.62
Occasional Chores Only	44.18
No Chores	32.07
Experience in Machinery Operation**	
Frequent Operation	55.10
Occasional Operation	41.22
Never Operated Machinery	25.08
Gender	
Male	51.10
Female	37.08
High School Vocational Agriculture**	
3-4 years	59.39
1-2 years	49.93
None	41.93
Membership in 4-H or FFA or both	
Member with Crop Project	57.76
Member with No Crop Project	50.84
Not a Member	37.84
Crop-Related Job Experience (includes detasseling, soybean walking, haying, etc.)**	
More than 4 Seasons	53.98
1-4 Seasons	38.19
No Experience	25.16
Land Ownership	
Owns or rents crop land	57.19
Does not own or rent	46.01
Major Curriculum**	
Farm Operation	58.91
Animal Science	45.92
Other: Agriculture Major	45.40
Other: Non-agriculture Major	34.94
Ranking in High School Graduating Class	
Top one-third	48.55
Middle one-third	48.15
Lowest one-third	48.23
College Grade Point Average	
High (greater than 3.00)	48.66
Medium (2.00 to 2.99)	48.56
Low (less than 2.00)	47.60
Quarter of Enrollment[b]	
Winter Quarter	51.03
Spring Quarter	45.79

[a] For the analyses of variance in which student background was used as an independent variable the covariate (years lived on a farm) was not used.

b During the Winter Quarter a majority of the students were enrolled in the Farm Operation Curriculum and during Spring Quarter a majority of the students were enrolled in the Animal Science Curriculum.

*Significant at 0.05 level.

**Significant at 0.01 level.

Table 1 presents the unadjusted pretest scores for each of the factors examined in the series of multiple factor analyses of covariance. Results indicated that there was considerable interaction between and among the independent variables considered.

Posttest analysis indicated that students with "life long and some" farm experience had significantly more tillage and seeding knowledge than nonfarm students after completing the same course of study. Therefore, the number of years lived on a farm was used as a covariate in analyzing the effect of other factors on posttest scores. Table 2 presents the mean posttest scores of the categories within the three variables (high school vocational agriculture, experience in machinery operation and crop-related job experience) which had a significant effect upon posttest scores when adjusted for the covariate of years lived on a farm.

Table 2. Mean posttest scores of the categories within three independent variables adjusted for the covariate (years lived on a farm).

Independent Variable and Category	Adjusted Mean Posttest Score
High School Vocational Agriculture a	
3-4 years	67.16
1-2 years	61.22
None	63.60
Experience in Machinery Operation*	
Frequent Operation	66.37
Occasional Operation	61.22
Never Operated Machinery	59.38
Crop-Related Job Experience**	
More than 4 seasons	65.55
1-4 seasons	65.05
No experience	54.20

a Significant at 0.10 level

* Significant at 0.05 level.

** Significant at 0.01 level.

Discussion and Conclusions

The two factors identified as having the greatest effect on test scores, regardless of the number of years lived on a farm, were operation of farm machinery and work experience in a crop-related job. Instructors should identify students with limited experiences in performing crop-related jobs and in the operation of farm machinery upon entry into an introductory Agronomy course and recommend supplemental learning opportunities. However, there is a limit to the supplementary learning opportunities or motivation for learning which can be provided in a classroom or laboratory setting.

Providing experiential learning opportunities may be another means of lessening the differences between farm and non-farm students in pretest and posttest scores in a tillage and seeding unit. However, there is a possibility that the most interested students are the ones who take advantage of practical experience situations and would score higher on the tests even without having operated machinery and worked in a crop-related job. Whether an experienced student is more competent on the job than an inexperienced student (i.e. non-farm background) is a question that remains incompletely answered.

Appropriate learning experiences to help nonfarm students in this unit may include field work in tillage and seeding. Time, space, large number of students, and budget may preclude an introductory course such as Agronomy 114 from offering such experience to each student. Individual students should be encouraged to secure practical production experiences during vacations or through intern type programs.

The results of this study reemphasize the need for nonfarm students to gain applied experiences in order to realize maximum benefit from enrollment in an introductory Agronomy course.

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Evaluation of Agricultural Mechanics Students For Advance Proficiency Standing or "Test Out"

Steve Forsythe

Introduction

Young men and women come to colleges with agricultural programs to pursue a degree in a chosen field of agriculture. In many cases, they are enrolled in the first or basic farm shop classes which involve both subject matter and skills used in teaching and operating a farm shop. Many college age young men and women who are specifically pursuing a career in teaching (or an Agricultural Education degree) or other areas of study are required to take a beginning class in farm shop in addition to other more advanced Agricultural Mechanics coursework. Many of these students already possess a strong mechanics background. This may have been acquired in their high school vocational agriculture program or by related occupational experiences.

In most beginning farm shop courses, students from all walks of life and backgrounds are grouped together. The advanced students are already competent in skills required of the course participants. They also are superior in the objective areas of testing in the cognitive domain. An Advanced Proficiency Standing or "Test Out" procedure should be available to these students.

Evaluation

Evaluation can be defined in many ways. Phipps (4) defines it as a means of finding out the strengths and weaknesses of a program as well as discerning effectiveness. Dobson, Dobson, and Kessinger (1) in **Staff Development: A Humanist Approach,** maintain that evaluation is based on comparison and is product orientated. In a 1969 article in **The Agricultural Education** magazine, Salmon (5) questions whether teachers were exerting sufficient influence in all phases of agricultural mechanics and evaluation. Obtaining information as to the worth of a product, procedure, or objective is the goal of evaluation. Evaluation has many definitions with no standard or single "correct" definition. Some agricultural educators feel it certainly entails value judgments and/or placing values on things. Farmer (2), an educator of Agricultural Mechanics teachers stated it best when he reported that in trying to reward a student for previous achievement, value judgments are going to enter into any evaluation.

The student who feels he or she should be rewarded for previous training and achievement in Agricultural Mechanics must have a means of being evaluated. In most cases, the role of evaluator falls squarely on the shoulders of the course instructor who is responsible for transferring that knowledge and training to the student. He or she is the course instructor in the beginning farm shop class. Several guidelines or procedures must be developed.

Guidelines - Procedures

These may include:

1. The student or applicant must need the course to meet some requirement for a certificate or degree that is being pursued at the respective college or university. This would make eligible all full- or part-time students enrolled at a college or university.

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