fect of temperature on the specific phase of agriculture being studied, as well as the effect on the overall industry.

There is a second reason for resistance to change. Instructors who have received adequate student evaluations by using a set format are reluctant to chance lower ratings. These people should read the excellent review of measurements given by Burger and Seif in the September, 1975, issue of **NACTA Journal** (3). Students have become trained to expect a lecture — note taking routine with three or four major tests, and they feel insecure when they are not given a detailed course syllabus. However, a rigid format may allow no time for the pure enjoyment of learning, which comes primarily through development of the ability to observe and interpret the constantly changing world around us. Students who learn to depend on a complete course outline have a tendency to consider **any** change as an indication of disorganization on the part of the instructor.

Two other obstacles to change exist due to the overall philosophy of college and university teaching. Provision is rarely made in the greenhouse or other laboratory facilities for independent student work below the graduate level. Students are expected to attend regularly scheduled laboratory sessions and may be restricted at other times. Often they need to make daily, or sometimes hourly, observations of changes taking place. A possible solution is shifting work areas so that there are zones restricted for greenhouse and research activities, thus enabling students to have access to areas where their own work is in progress.

Finally, there is the problem of evaluation. Giving the usual written test to be graded with an answer key will not serve the purpose. Again, there are students who feel insecure. They want a hard mid-term exam to cram for and forget. A teacher is vulnerable; there have been instances of suits brought against teachers by students who felt they had been graded unfairly. This is a real and increasing problem. Although most educators agree that motivation by threat is undesirable, our philosophy of teaching is sometimes based on just this concept. If our innovations are designed to allow individualized effort, it is essential that we make clear that the motivation will not come from the formalized test. It is equally important that students be given certain guidelines and that frequent well-organized progress reports are required. If a student is helped to set his own goals, working to achieve them becomes much easier. Too frequently goals are set for him that may be neither suitable nor attainable.

Innovative teaching is difficult to define; it is work to design; it takes time to prepare, present, and evaluate. Innovation is imperative if we are to keep abreast of the rapid changes occuring in the society of which our graduates will be a part. This is the only way we can cope with a large and changing student population and also fulfill our responsibilities to students, industry, taxpayers, and ourselves!

Above all we need to avoid the straight-jacket of formality and seriousness that personifies many college curricula. Learning is work, as is innovative teaching. But if we are willing to do the work, innovative techniques can make both learning and teaching spontaneous, personal, and enjoyable.

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Student Performance Factors In An Introductory Course For Animal Science

C.E. Stufflebeam

Abstract

The effects of several student characteristics on their performance in an introductory course in animal science were studied. The subject matter of the course was oriented heavily toward the biological sciences. As a group, sophomore, junior, and senior students scored significantly higher than freshmen students. ($P < .005$). Some of the data studied indicated animal science majors scored significantly higher than students with other majors. No differences were observed between male and female students nor between students with less than three years of farm background and those with more than five. The number of women in the course and the number of students without farm backgrounds have both increased rapidly during the last five years.

Introduction

For a number of years, students in Principles of Animal Science at Southwest Missouri State University have been asked to fill out a questionaire relating to their background and experiences. This helps the instructor become better acquainted with the students and also provides a reference if additional information is needed about one of the students. The questionaires have also provided information for answering a number of questions about how the various backgrounds, interests, and other factors might affect a student's performance in class.

The objectives of this study were to answer these questions: 1) Do students reared on a farm perform bet-

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ter in their introductory animal science courses than do students reared in town? 2) Do students who have declared animal science as their major have an advantage over other students in an introductory animal science course? 3) Do female students do as well or better than male students? 4) Do upperclass students do better in introductory courses than freshmen?

The introductory course involved in this study is biologically oriented. Anatomy and physiology of the digestive and reproductive systems are introduced. Basic principles of animal genetics are discussed and illustrated. Elementary principles of health and disease, along with a survey of the importance of animal products, are also introduced. The course is a prerequisite for most of the upper division courses in animal science. It is required in the curriculum of all majors in agriculture.

Methods

Information regarding each student's farm background, class level, major, and sex was taken from the student questionaires and from the class rolls. Student performance was expressed as a percentage of the total points earned for the course.

The data was divided into two groups for analysis. They are referred to in this paper as the fall and spring phases. The fall phase includes data on 207 students in three sections during the fall semesters of 1974 and 1975. The spring phase includes data on 197 students enrolled in three sections during the spring semesters of 1973, 1974, and 1975.

Of the 207 students in the fall phase of the study, 124 were freshmen. However, 101 of these were first semester freshmen or had less than 10 semester hours of credit. In the spring phase of the study only eleven of the 91 freshmen were in their first semester. Because of this difference in the college backgrounds of the freshmen in the fall and spring phases, the data were analyzed separately.

Five variables were compared in each of the phases. Data were compared in groups of two or three variables by analyses of variance using equal subclass numbers. The number of observations in each subclass was determined by the number in the smallest subclass.

TABLE 1. Means and Standard Deviations of Student Scores in Principles of Animal Science in the Fall Semesters of 1974 and 1975.

	Mean	Standard Deviation	Number
Class Level			
Freshman	76.4	8.4	75
Upperclassman	82.7	7.5	75
Total	79.5	8.5	150
Farm Background			
Five Years or More	78.3	8.8	60
Three Years or Less	78.1	9.2	60
Total	78.2	9.2	120
Majors			
Animal Science	80.4	8.8	40
Other Agriculture	78.9	8.4	40
Non-Agriculture	75.3	9.1	40
Total	78.2	9.2	120
Sex			
Men	78.8	7.7	40
Women	79.1	10.6	40
Total	78.9	9.2	80

TABLE 2. Means and Standard Deviations of Student Scores in Principles of Animal Science for the Spring Semesters of 1973, 1974, and 1975.

	Mean	Standard Deviation	Number
Class Level			
Freshman	75.2	11.2	66
Upperclass	80.6	10.1	66
Total	77.9	11.0	132
Farm Background			
Five Years or More	78.8	11.2	66
Three Years or Less	77.0	10.7	66
Total	77.9	11.0	132
Majors			
Animal Science	81.0	10.7	34
Other Agriculture	77.9	10.5	34
Non-Agriculture	76.8	13.7	34
Total	78.5	11.8	102
Sex			
Men	79.0	12.1	40
Women	78.9	10.6	40
Total	79.1	11.3	80

In the fall phase of the study two sets of analyses were made: 1) farm background versus major within class level, and 2) sex versus major within class level. Three similar comparisons were made in the spring phase: 1) background within class level, 2) major within class level and 3) sex within class level. Class level (freshmen or upperclassmen) was used as a subclass in each analysis because a preliminary study indicated a difference in performance due to class level. This preliminary study had also indicated no differences among year and sections.

Results and Discussion

A significant difference was observed in the scores of upperclass students compared to freshmen. All analyses were consistent in revealing this difference which was significant at the probability level of .005. Preliminary data had indicated this difference; therefore, all other analyses were made on a withinclass basis.

A very small difference was noticed among the means for the three sections in the fall phase of the study. However, the probability that this difference would happen due to chance was only about 25 percent. There were no significant interactions involving section or year with any other variable.

Differences were observed among the three majors in the fall semesters. Comparisons were made among animal science majors, other majors in agriculture, and all other majors outside of agriculture. The means for these three majors were 80.4, 78.9 and 75.3, respectively, with an overall standard deviation of +9.2 (see Table 1). The scores of animal science majors were highest, those of non-agriculture majors were lowest. These differences were significant at the .025 level of probability.

In the spring phase of the study the same trend was observed, but the differences were not as great. Animal science majors scored highest and non-agriculture majors scored lowest. The means for animal science majors, other agriculture majors, and non-agriculture majors were 81.0, 77.9 and 76.8, respectively. Standard deviations were greater than in the fall with an overall deivation of $\pm$11. (Table 2).

The general conclusion made was that animal science majors score higher than other agriculture majors and non-agriculture majors. Agriculture majors other than animal science also tended to score higher than non-agriculture majors.

No differences in performance were found between male and female students. There was less than one-half point difference in the mean scores of men and women in both the fall and spring semesters.

No significant differences existed due to variations in the students' farm backgrounds. One explanation for this could be that the subject matter in the course was primarily biologically-oriented rather than production-oriented. On the other hand, whatever advantage farm-reared students may have had might have been more than compensated for by the stronger science backgrounds of the urban-reared students. Another study is being conducted to determine the effects of high school science and mathematics backgrounds on performance in college-level courses in animal science.

Table 3. Results of Analyses of Variance Among Various Factors Affecting Performance in an Introductory Course in Animal Science.

Variable	Fall Phase Probability of a Chance Occurrence (less than:)	Spring Phase Probability of a Chance Occurrence (less than:)
Class	.0001	.005
Section and/or Year	.25	*
Farm Background	*	*
Major	.025	.25
Sex	*	*

*F Ratio was lesss than 1.0.

Two additional observations made during this investigation are of some interest. During the past five years, the number of women in this introductory course has increased significantly. The percentage of women enrolled for each of the past five calendar years was 4.0, 16.3, 21.0, 26.2, and 29.0. respectively. The same trend has been observed in most other classes in agriculture at this institution. The percentage of students without farm backgrounds has also increased from 29 percent in 1972 to 37 percent in 1976.

A Program of Professional Graduate Studies In Animal Science

L. M. Schake

Abstract

Since 1969 the Department of Animal Science has offered the Master of Agriculture degree in eight different suboptions to train industry professionals. Major components of the 36 credit hour graduate program include formal training in agriculture and business, a professional internstudy, and a professional paper. The philosophy, development, application, and success of the degree are discussed for students, teachers, and administrators.

Introduction

The American land grant colleges are exceptional and unique among educational institutions in the United States. Land grant colleges evolved educational programs founded upon scientific research to train and prepare students for specific and practical service in agriculture and related areas (Mumford, 1940). This concept has been extended and adapted to current and perceived needs as both research and production agriculture have advanced.

During the past several decades technological advancements in animal agriculture have been applied more rapidly than ever, resulting in larger production units which require more investment capital and greater management expertise than previously. These changes, a direct result of scientific advances, have spawned the need for educational programs that prepare students more thoroughly than do traditional baccalaureate degrees for careers as professional managers in commercial agriculture. This need was crystalized as a new program of professional graduate studies, the Master of Agriculture (MAgr), in the College of Agriculture at Texas A&M University in 1969. The degree concept was similar, in many respects, to the Master of Business Administration (BMA) program offered by business colleges.

The Department of Animal Science was instrumental in applying the new degree concept. Staff from ranch management, feedlot management, meat industries, applied genetics, swine management, and other disciplines were designated to chair these MAgr degree programs and counsel students. It soon became obvious that students were curious about and interested in this new professional degree. The subsequent discussion is based upon six years of experience representing 68 Animal Science MAgr graduates.

A New Teaching Concept Emerges

The goal of the MAgr degree is to train agri-business professionals (practictioners) as opposed to training teachers and researchers through traditional Master of Science (MS) programs. Students desiring training beyond the BS degree now have two options available to them. Qualified students can now complement their career objectives with more precise training than before. Rapid student enrollment in this program indicated student interest in pursuing the MAgr degree.

Entering students were required to meet the same minimum requirements for graduate studies in either MAgr or MS programs. This requirement included a Graduate Record Exam score of 800 or more plus a 3.0 (4.0 possible) or above grade point average for their BS degree. Students with less than a 3.0 grade point average were required to demonstrate their academic abilities during a probationary program. Non Animal Science

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