

summarizing and reviewing school farm demonstrations (1.0); teaching students new skills on the farm (1.0); and evaluating the outcomes of school farm instruction (1.0). Teachers apparently feel competent in discipline on the school farm.

Summary

The inconsistencies of teacher preparation and inadequate facilities at the agricultural high school level are being reduced in Paraguay. A concerted effort is being made to improve teacher training. Programs of this nature will become even more effective by basing offerings on data identifying teacher interests and needs. Through the assistance of the International Development Bank, in-service programs for teachers

are being conducted and facilities are being improved. The results of these efforts will be to effect the quality of instruction of students and ultimately the productivity of agriculture.

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Empirical Research Project As a Teaching Tool For Undergraduate Agricultural Marketing and Prices

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Abstract

Empirical research projects can help students to bridge the gap between theory and application of theory in agricultural disciplines. Incorporation of modern computer technology, a problem solving component and theoretical material develops and reinforces the linkages between university instruction and professional development. However, student stress and anxiety, faculty time and available resources hinder adoption of empirical research projects in some environments. The Oklahoma State University experience may be a model for other universities to use as a blueprint for the construction of individually tailored empirical research projects.

Recent literature has emphasized the role of the university in the development of students' professionally applicable skills. Schaefer has indicated that today's agricultural graduates need good communication skills, both written and verbal, problem solving skills, appropriate technical backgrounds, and task-oriented cooperative attitudes. Merritt provided a ranked list of twelve high priority course areas not adequately represented in agricultural curricula. Included among these areas were problem solving (ranked second in order of importance), use of computers in agriculture (ranked seventh) and student projects (ranked twelfth). In an effort to address these student and curricula concerns, an empirical research project is currently being used at Oklahoma State University to teach agricultural marketing and prices.

The design and administration of the empirical research project used will be described in this article.

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Reasons for particular design decisions, as well as perceived effectiveness of the teaching method will also be discussed. Before discussing the specifics of the research project, a general overview of the course will be presented to allow the reader to evaluate potential applicability of using empirical research projects as a teaching aid in other agricultural courses.

The Course

"Agricultural Marketing and Prices" is a senior level course. It is required for agricultural economics students in the "marketing and business" option and is a controlled elective for agricultural economics students in other options. Enrollment typically ranges from 40 to 55 students. Usually, over 90 percent of these students will be seniors with declared majors in agricultural economics. Prerequisites for the course include both a junior level "Agricultural Marketing" course and a junior level "Agricultural Prices" course. On average, approximately 50 percent of the students in a given class will have had a course on microcomputers, another 20 to 30 percent will have had another computer course (generally in FORTRAN or COBOL programming), while 20 to 30 percent will have had no formal computer training. The basic teaching goals of the course include analysis of the marketing system with emphasis on inter-industry and intra-industry relationships, and application of decision tools to the problems of system efficiency.

Design of the Term Project

The Ideal

Educational literature suggests a number of characteristics and techniques useful in the design of undergraduate term projects. The importance of incorporating computers into the educational process is also recognized by many authors (Diamond and Cantrell; Fiske, Battle and Taylor; Foster and Walker; Merritt; Olien; Reber and Kern; Quick and Talley;

Weber, Young and Pearson). Moreover, microcomputers have been used in teaching *Agricultural Price Analysis and Commodity Futures* (Drinka; Harris). Furthermore, term projects which require students to use computers can either teach computer literacy or reinforce other courses which teach computer literacy.

The work of both Merritt and Schaefer points to the benefits of incorporating a problem-solving component into the term project. In addition, Schaefer also pointed to the need for adequate technical backgrounds, good verbal and written communication skills, and a task-oriented cooperative attitude. The need for adequate technical background suggests that the incorporation of a theoretical and/or empirical component in the term project could be beneficial to the students. The need for good verbal and written communication skills can be addressed by the inclusion of both an oral presentation and a paper in the project. A task-oriented, cooperative attitude may be encouraged by using a team approach in the project.

Krohne and Laux argue that reduction of student stress and anxiety enhances the learning process. Hence, well defined and communicated teacher expectations regarding the term project, non-threatening teacher attitudes, a pre-grading option, and other measures designed to reduce student stress could improve the quality of the term project.

The literature also indicates that student perceptions of individual choice fosters feelings of personal control, which in turn enhances learning (Dellmeier and Friend; Harvey and Harris). A project which provides students the widest possible flexibility in topic selection should increase the students' perceived level of choice and thus the level of learning. Lastly, Brumback discusses the advantages of using peer response. Incorporation of some means of peer response into the term project should improve quality and enhance retention.

The OSU Term Project

The term project used in the senior level "Agricultural Marketing and Prices" course responds to the need for practicing communication skills by containing both a written and an oral component. The paper, worth 75 percent of the project points, must be in the general area of agricultural marketing and must be empirical. Students may choose from a wide array of agricultural marketing issues including farm level decision making, agribusiness management, agricultural marketing policy, comparative advantage and international trade. Other market issues may also be used as long as the empirical requirement can be met. Students have chosen a wide variety of term paper topics. Recent choices have included: "Lead-Lag Relationships in Farm, Wholesale, and Retail Beef Prices"; "Buying Behavior of a Major U.S. Grain Exporter"; "Price Prediction Models for Oklahoma Feeder Cattle"; "The Impact of Gold Prices on Soviet Grain Import Policies"; "Hard Red Winter Wheat Marketing Strategies"; "An Economic Analysis of Shifts in

Comparative Advantage Between the Midwest and Southern High Plains Cattle Feeding Industries"; and "Estimation of the Export Demands of Frozen Bull Semen and Frozen Cattle Embryo Transplants."

The oral presentation, worth 25 percent of the project points, is divided into a 10 minute class presentation of the paper and a 5 minute period of oral response to questions from student peers, the instructor, or other class visitors. The term project, as a whole, is worth 20 percent of total course points, equivalent to the worth of a one hour exam. In addition, each student is given the option of working either individually on the project, or as part of a two or three student team.

To increase computer literacy and to facilitate the manipulation of data, one class period is devoted to instruction in the use of "SAS", the Statistical Analysis Software package housed in the University computer. However, students are not limited to "SAS", or to the university computer. They are free to use any software or computer with which they feel comfortable, including microcomputers. The students also have access to departmental data entry personnel for assistance in data entry.

The empirical research project appears to aid students in bridging the gap between theory and application of theory. It also develops an increased appreciation of the value of theory, the scientific method, and empirical research tools for solving "real world" problems. The term project allows students to integrate information from a broad range of courses and experiences in a single project. For example, the student papers have been able to give undergraduate students experience in estimating supply and demand elasticities, making price projections, doing marketing policy analysis, evaluating marketing alternatives, performing sensitivity analysis, and in estimating explanatory models. Techniques of analysis have included linear and log-linear regression, analysis of variance, graphical analysis, linear programming, and time series analysis.

Additionally, several procedures have been incorporated into the design of the term project in an attempt to reduce student stress and anxiety, thus improving the learning process. Progress on the term project is structured and monitored throughout the semester. By the beginning of the second week of the semester, the names of team members must be submitted to the instructor. By the end of the third week research topics must be submitted, and by the end of the sixth week outlines of the proposed research are required. Instructor approval of the research topic and outline is required before the student may proceed into the analysis stage of the term project. Students are also allowed to work with faculty other than the instructor on the term project if other project requirements are met. At the end of the tenth week, students have the option of turning in their term papers for pre-grading. They may accept the pregrade as the final grade on the

term project, or make changes suggested to raise their grade. Suggested changes have ranged from minor editorial changes to complete reformulation of statistical models and analysis.

Student presentations are typically given during the last 1½ weeks of the semester during lengthened class sessions (usually 2 hour instead of 1 hour sessions). Term papers are due when students take the final exam. No minimum length of paper is specified. The term papers have ranged from 8 to 50 pages and have averaged approximately 15 pages. The quality of the resulting research papers has ranged from poor to very good, with several students winning national awards with their papers.

Observations on the OSU Experience

Student acceptance of the term project is quite high. Comments on formal course evaluations and informal discussions with students and alumni reveal a consistent and broad appreciation of the experience. Some students have indicated that their interest in graduate school was sparked by this term project. Others have indicated that confidence in their abilities as agricultural economists was enhanced by applying information learned in the classroom to solve "real world" problems. Approximately 10 to 15 percent of students, through formal course evaluations, will usually argue that the term project should comprise more than 20 percent of the final grade because of the amount of student effort involved.

The major disadvantage of the term project is cost. The empirical research project requires significant time commitments on the part of both the instructor and the students. Instructor interaction with students outside of the classroom is at least tripled because of the project. However, this increased interaction can also play a valuable role, serving as a catalyst to increased student involvement and motivation. Some students may not have taken the senior "Agricultural Marketing and Prices" Course because of the additional time requirements arising from the project — although this has not been tested. Even though student evaluation of the research project is quite high, student anxiety and frustration can also be high early in the research process in spite of the careful structuring. Although team approaches can foster a cooperative spirit in students and reduce instructor workload, it can also be a source of student frustration.

Summary and Implications

The Oklahoma State University experience indicates that empirical research projects can be a valuable tool in teaching undergraduate Agricultural Marketing and Prices. The empirical research project can be designed to enhance student written and oral communication skills, computer literacy, problem solving ability, and professional confidence. Design decisions can minimize student anxiety and stress associated with the project. The primary disadvantage associated with empirical research projects is increased

faculty and student workload. Individual faculty and administrators will need to weigh the relative magnitude and distribution of benefits and costs before adoption of the technique.

Although many of the experiences at OSU could be expected to have general applicability, many are situational. Different course prerequisites at other institutions may either expand or diminish the ability to utilize the empirical research project. Similarly, differing computer, programming, data entry, or faculty resources may change potential applicability and transference of the OSU experience. However, it does appear that an empirical research project holds promise as a learning tool. Many institutions should be able to use an adapted version of the technique to improve the learning process, and they are welcome to contact the authors for more information.

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