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Classroom Use of Computers — Some Observations

Dale Menkhaus, William C. Russell and Harlan Hughes

Introduction and Historical Perspective

The use of the computer in all phases of agriculture has increased tremendously during recent years and will likely continue to increase as more agricultural software is developed. A survey of agricultural lenders and agricultural consultants indicates that in five years one producer in six will own a computer, compared with one in thirty-six which these two groups believe presently exists (Agri. Finance). Consequently, students in agriculture need and demand training in the use of the computer.

Computer use in agricultural courses is not new. Computerized management games have been used since the early sixties as a training device to duplicate the environment in which a business firm operates. The computer has also been instrumental in reducing student time required to solve algorithms to obtain solutions to programming and statistical models. In addition, computer programming courses, while frequently not taught in Colleges of Agriculture, have been required in many agricultural curricula for several years.

Thus, the computer has been part of agricultural curricula for quite some time. Why, then, this sudden interest and focus on the use of computers in the classroom? Litzenberg (p. 970) suggests three reasons: 1) the availability of computers, 2) the need and/or demand for computer skills by employers of agricultural students as well as agricultural producers, and 3) increased computer capabilities for classroom activities such as interactive processing. Another contributing factor might be the increasing availability of agricultural software.

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Objectives

In general, the objective of this paper is to identify how Colleges of Agriculture are satisfying the demands and needs of students in the area of computer instruction. Specifically, the objectives are to determine: (1) the types of computer facilities available for teaching in Colleges of Agriculture; and (2) the extent to which course content incorporates use and application of computers. The emphasis is not so much the enhancement of teaching activities through the use of the computer, but identification of the need for computer training by graduates of Colleges of Agriculture and how Land Grant Institutions are meeting this challenge.

Procedure

A mail survey of the Land Grant Institutions, designed to obtain information on the availability and configuration of their College computer teaching laboratories, was sent to Deans of Resident Instruction in Colleges of Agriculture in April, 1983. Additional questions focused on the extent to which the use and application of computers is being incorporated into existing courses.

Results and Discussion

The results of the questionnaire sent to Colleges of Agriculture in Land Grant Institutions are summarized and described below. Questionnaires were received from thirty institutions, a 60 percent return. Since nonrespondents were not contacted, no information is available regarding the nature of nonresponse bias. Thus, the reader is cautioned against making inferences from the results reported below regarding the population. Nevertheless, given the objective of this study to identify types of computer facilities and how they are used in teaching, the survey respondents provided a good base of information which would be useful to those planning to install, or modify existing computer teaching laboratories.

Laboratory Facilities and Configurations

Fourteen of the institutions responding to the questionnaire reported that a computer teaching laboratory was in place. Most have been installed during the past two years, particularly those with microcomputers. Sixteen indicated that the College of Agriculture did not have such a facility. Two of these institutions indicated that computer laboratories were available in selected departments within the College, and there were no plans to centralize a computer laboratory. Seven of these sixteen universities have computer facilities for student use within individual departments. Nine indicated that such a college computer teaching laboratory was planned. Seven of these are scheduled to be installed within a year. These results suggest that the majority of Colleges of Agriculture have provided or plan to provide facilities to be used to enhance computer training of students.

The configuration of the computer teaching laboratories which are already in place is quite varied. Two

of the fourteen colleges of agriculture with computer laboratories reported having the facility equipped solely to access the campus mainframe. Two are equipped with only micros, and the remainder have the laboratory equipped with micros and terminals to access the mainframe.

Several brands of micros have been selected to equip the laboratories including IBM-PCs, Apple IIs, Radio Shack TRS-80 Model II and III, and DEC 350. There seems to be little consensus with regard to brand, with a number of universities purchasing more than one brand or model with memory capacities ranging from 48K to 256K.

Of these institutions having microcomputer laboratories, all but two have equipped their micros with dual disk drives. At least one machine in each case has dual disk drives and one of the two not equipping all micros with dual disk drives has a hard disk which is accessed by each micro.

Of the Commercial software purchased for the laboratories, VisiCalc appears to be the most popular. Other software is provided by the Individual institutions.

Colleges with computer teaching laboratories are generally satisfied with the facility; but several indicate that more equipment, space and access are needed. Evidently, where available, these laboratories are in demand by students and faculty.

Computer Type and Courses

The campus mainframe computer is used extensively in Colleges of Agriculture teaching programs in institutions responding to the questionnaire. Of those courses in Colleges of Agriculture requiring students to use the computer, about 55% make use of the mainframe. Approximately 30% of the courses requiring computer use employ the microcomputer with the remaining 15% using subscriber networks such as AgNet, CompuServ, Plato, AgriStar and DHI Computer Services.

The majority (24) of the agricultural colleges reported offering courses which specifically address the use and application of computers, or plan to institute such a course by Fall, 1983. Little to moderate use, in most cases, has been made of computerized instruction techniques.

Faculty Training

Computer technology is changing very rapidly and faculty must be retrained in order that they may better use this technology. Survey respondents have recognized this need. Several (20) have conducted college or university seminars and workshops to train faculty in computer literacy. These seminars have included introduction to computer facilities and equipment, the use of the computer for instruction, software and programming, electronic spreadsheets, word processing, time sharing, and specific applications for faculty members.

Computer Training — One Approach

The College of Agriculture at the University of Wyoming has recently initiated a recommended program to improve computer training of agriculture students. A college wide introductory course, "Computers in Agriculture and Home Economics", was recently approved, with the objective of simply acquanting students with the uses of the computer in agriculture. Included in this course is a discussion of different types of computers and computer systems and their role in agricultural decisionmaking, and research and dissemination of information. Students are expected to run agriculture-related programs on different computer systems and learn the capabilities and uses of each system. Development of computer software, or programming, constitutes a minor part of the course. After completing this introductory course, selected students will hopefully have a sufficient interest in computers to pursue additional training in computer programming through courses offered in the Computer Science Department and other Colleges on Campus.

The next phase of the College's training program is to incorporate computer applications in several upper level undergraduate and graduate courses in the College of Agriculture. The decision as to whether to implement specific computer applications courses and/or to provide this training in existing courses, will be left to each of the Divisions in the College. With the increased interest in computers, more students are encouraged to enroll in special problems courses which provide them with an opportunity to get more experience in using computers than may be available in existing courses.

Challenges Facing Educators

A challenge for university teaching faculty is not only to acquaint students with tools which can be used to aid in management, family budgeting and generally improve operations, but also to provide students with some "hands on" computer use. In this respect, faculty members face a dilemma. Should an instructor take class time to allow for students to obtain this "hands on" experience at the expense of teaching tools and principles? It would be ideal to do both, however, time and resources are not always available to allow for this, so priorities must be established.

The answer to this dilemma may, in part, be programmed learning through the use of computerized teaching modules. In this way, the computer is used for the enhancement of the teaching activities themselves. These teaching devices not only provide the slower student with additional opportunities to learn subject matter, but they also can be used to motivate better students through the use of more complex problems. As indicated by the survey of Land Grant Institutions, these tools are not used in College of Agriculture courses to any great extent. One reason might be that these tools may not be available and may cost too much time and money to develop.

Instructors must be cautious not to use the computer as a "crutch". As Sjo (p. 559) points out, most learning is a tedious, time-consuming effort and requires self-discipline. Techniques making learning fun are perhaps best suited to once-over-lightly courses. Classroom instruction that places emphasis on learning through experience rather than teaching fundamental principles is selling the student short. A curriculum or course which emphasizes "how to do something" may provide high marginal value in the first year after graduation but diminishes rapidly thereafter. Thus, the basis for teaching, including instruction in the use of computers, must be concepts, principles and theories, because they are retained longest. Such an approach provides the student with the tools to adjust to changing conditions and to analyze problems under changing conditions. Thus, college educators must be careful to guard against emphasizing too much of the "hands on" approach to using computers. Computers will continue to change, but the theories and principles which provide the basis for the problem-solving software will remain relevant. The challenge is to use the computer in the classroom to complement the student's comprehension and understanding of the principles

Concluding Comments

The integration of computers into the curricula of Colleges of Agriculture requires three distinct actions. First, administrators must provide faculty and students with access to computer equipment. The results of the survey of Land Grant Institutions suggest that this action is well underway. Second, faculty must be acquainted with and when appropriate trained in microcomputer technology. While the survey indicates that some informal seminars are being offered, formal retraining programs are limited and professional associations are not filling this gap. This retraining will take place when the reward system fully acknowledges or supports this activity.

Third, teaching software has to be developed that continues to teach the principles and concepts but lets the computer do some of the mathematics so that students can be exposed to more real world applications of the principles and concepts. The computer should also be useful in sorting data required for individualized instruction. It appears that the microcomputer may have its most potential for the gifted and the slower students who want or needs more drill. This will take some special purpose software not yet available.

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Teleconferences Useful In Farm Management Course

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Introduction

Teachers at the undergraduate level in colleges of agriculture must be alert for instructional techniques that stimulate student interest, convey more content, or both. This is particularly true when previous methods cease to be cost- or time-effective. In the 1970's the traditional use of fieldtrips to representative study farms and agribusiness firms began to appear deficient in both regards. Rising petroleum prices meant that students had to pay for the full-day trip, which, because of the distances involved, only allowed them an hour of net interview time with the farmer and a half-hour with the manager of the agribusiness. Other classes that day had to be sacrificed. Frequently inclement weather distracted minds. There were perennial problems of collecting the fees from the student. The question became, "Is there an alternative instructional medium that will be of at least as great interest and educational value, cost less per student contact hour, and take less time?"

Possible alternatives included videotapes, microcomputers, and the creative use of the telephone. The principal problem with videotapes was the lack of student-manager interaction. Microcomputers, though potentially interactive, lacked the human element, and required significant capital costs and development time. Telephone-enhanced instruction had the potential advantages of interaction, time savings and multiple-manager interviews, without the high costs associated with other methods. Previous work at the University of Wisconsin (e.g. Parker and Riccomini, 1977; Monson, undated) defined the range of possible formats for telephone instruction. These included "telelectures" (one person giving a formal presentation to a group elsewhere), "conference calls" (individuals at various locations interacting), and "dial-up" or "telephone-based instruction" (groups at various locations tuning in to a pre-arranged presentation). The emphasis at Wisconsin was to teach general education or extension material to great masses of people (over 25,000 in 1974-75). By contrast, Mullen, et al (1979) emphasized the effectiveness of smaller-scale telelectures by experts in a distant location to a classroom within the university setting. Telephone education has also been used by the U.S. Army and in such widespread locations as Florida and California, Quebec and Britain (Parker and Riccomini, 1977).

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