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

Peter H. Calkins and Dennis D. DiPietre

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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This paper evaluates the educational and interest levels, as well as the cost- and time-effectiveness, of "teleconferences" through which farm and agribusiness managers are interviewed from their places of work by a group of students under the supervision of a laboratory instructor in a university classroom. In contrast to Mullen, we evaluate interviews rather than lectures. We also supplement his findings by analyzing the effects of telephone enhanced instruction on course grade, and measuring cost-effectiveness using formulae reported at Wisconsin.

Teleconference Procedure

The physical equipment required for the teleconferences included a special telephone the size of a portable typewriter with one loudspeaker and three microphones: one built into the console into which the instructor could speak directly, and two on extension cords that could be passed among students in the classroom (for photo, see Mullen et al). In addition, a carousel projector and screen were used to show color transparencies of the physical plant and key enterprises of a farm or agribusiness firm.

In a typical two-hour laboratory session, the instructor introduced a farm operation with a 20-minute slide presentation. Previously, the students had been given inventory sheets, a farm map, and the optimal crop plan for the farm, as determined by linear programming; and been asked to prepare 10 questions on the production, marketing, and financial decisions of the farm. Then, the instructor placed the telephone call to the farm operator. While the students posed continuous questions the instructor projected slides of the home computer, barn, dairy, new tractor, or other aspect of the operation being discussed. When general issues arose, the faces of the farm operator and spouse were shown to simulate conversation. Finally, the instructor phoned the cooperative, bank, slaughter outlet, or other agribusiness firm most closely related to the operation in question. A fifteen-to-thirty minute conversation with the manger of this agribusiness firm spotlighted the nexus between farm production and the key inupt supplier or market outlet for the farmer.

Experimental design

Background data on the farms and agribusinesses were collected by an undergraduate during the preceding summer. At each farm the student completed inventory sheets, balance sheets, cash-flow budgets, production records on the crop and livestock sector, and the name of the agribusiness firm most important to that farm operation. He also took color photographs. He then interviewed the agribusiness firm, focussing on the firm's dealings with farmers. Finally, he wrote a brief descriptive report on each farm and agribusiness, which was distributed to the students. During the semester, ten farms and ten agribusiness firms were presented, allowing the students to contact ten times as many managers as compared with a field trip.

The students were divided into two groups of seventy-five each. Half participated in five teleconferences in the first half of the course, the other half participated in the remaining five teleconferences in the second half. Attendance was uniformly high. It was hypothesized that test scores in a given half of the course would be higher for the group concurrently exposed to teleconferences. To record information on other predictor variables, students were asked on the first day of class to fill out personal data cards as to the extent of their farm background. In addition, for majors in agricultural economics (65 of the 150 students), we obtained cumulative grade-point averages as an index of general academic achievement. Finally, to measure attitudinal variables, we administered a post-course questionnaire for students to evaluate teleconferencing as a learning device, indicating whether or not they felt it had given insights that would improve their course grade, describing the greatest benefits and disadvantages of the approach, and comparing teleconferences with field trips taken in the past.

Our aim was to answer the following questions:

1. **Was teleconferencing viewed by students as an adequate replacement for field trips?**
2. **Did the students enjoy it?**
3. **Did they feel teleconferencing improved their grade?**
4. **Did it actually improve their grade?**
5. **What types of students reacted most favorably to teleconferences?**
6. **Were teleconferences cost- and time-effective?**
7. **Would we recommend that instructors using field trips switch to teleconferences?**

Results and Discussion

While only about one-sixth of the students felt that telectures were distinctly superior to field trips, 79 percent considered them at least an adequate replacement. Those who felt teleconferencing superior to field trips rated teleconferencing above-average[1] with respect to general satisfaction (75%), interest (70%), and educational value (60%). Notably, only 30 percent of students who considered teleconferencing superior to fieldtrips believed it would improve their grade.

Regardless of their preference, students clearly enjoyed the teleconferences. The modal score for interest was 4 ("above average"). The observed behavior of the students reinforced this finding: they often applauded spontaneously at the end of the session, and would keep the farm manager on the phone for as long as 45 minutes beyond the scheduled one-hour interview. Some of the underlying reasons for this high level of interest appear in Table 1. Most of the students seemed genuinely excited to converse directly with managers, and to get a taste for dealing with them on (perceived) equal footing.

[1] A rating of 4 to 5 on a scale of 5.

Table 1. Greatest benefits and disadvantages of teleconferences as perceived by students (N=139)

Benefits	Number of Students	Reporting Percent	Disadvantages	Number of Students	Reporting Percent
Converse directly with farm/business manager	45	32.3	Manager unprepared/unenthusiastic/poor communicator	28	20.1
Opportunity to see many farms and agribusiness	43	30.9	Difficult to visualize details of entire operation	21	15.1
Concrete applications of theory taught in lecture	40	28.8	Not educational or related to economics	19	13.7
New insights and deeper understanding	39	28.1	Time insufficient/inefficiently used	17	12.9
Enhanced interest in course	18	12.9	Uninspired lab instructor	14	10.1
Saved time	9	6.5	Ill-preparedness of fellow students	11	7.9
Excellent printed supporting material	7	5.0	Unprofessional quality of slides	10	7.2
Others	12	8.6	Others	15	10.8

The students generally (72%) did not feel that telelectures improved their course grades. This reaction may in part reflect their understanding that grades are relative, and that everyone exposed to teleconferencing might benefit by similar absolute amounts.

To test whether telelectures actually did improve course grades, test scores were compared in the first and last halves of the course by student group. No significant differences resulted. Moreover, when we regressed final course grade on a wide range of attitudinal variables, as well as previous grade-point average, only this last variable proved significant. These findings confirm the results of previous studies (noted in Mullen, et al, 1979) that could find no measurable increase in learning effectiveness from using tele-teaching over other methods.

One very significant finding of the present study, however, was that teleconferencing is viewed as much more beneficial by those students disadvantaged by a nonfarm background, shorter experience with college education, and low test scores (Table 2). Those with D and F grades, nonfarm backgrounds, and sophomore standing consistently ranked telectures higher in educational value, interest, time effectiveness, overall satisfaction, positive impact on course grade, and/or superiority to field trips. This advantage is particularly important given the growing proportion of students in colleges of agriculture from non-farm backgrounds. This result suggests that teleconferencing can be viewed as a remedial aid in stimulating interest (and perhaps learning) in marginal students. As instructors seek ways to reach all students, particularly in large lecture courses, this point cannot be overemphasized.

Teleconferencing also proved to be both time- and cost-effective. In a two-hour laboratory session, the students routinely received as many contact hours with farm and agribusiness managers as they would in an eight hour field trip. Moreover, the cost per student contact hour was much lower:

Field trip

Cost/student contact hour (s.c.h.)=$7.50/student÷1⅔ s.c.h/student=$5.

Table 2. Rating of teleconferencing by course grade, background, and year in school

	GRADE					BACKGROUND		YEAR		
Criterion	A (24.7%)	B (36.3%)	C (27.4%)	D (7.5%)	F (4.1%)	Farm (87.0%)	Nonfarm (13.0%)	Soph. (25.7%)	Jun. (53.7%)	Sen. (20.1%)
Superior education[1] value	2.9	7.6	7.9	22.2	100.0	7.0	11.8	8.6	8.2	7.4
Above-average interest[2]	45.7	45.3	55.3	55.6	100.0	--------n.s.--------		62.9	42.5	48.1
Above-average time effectiveness	----------n.s.----------					31.6	41.2	----------n.s.----------		
Above-average overall satisfaction	25.7	32.1	42.1	55.5	100.0	34.2	47.1	45.7	31.5	29.6
Believe would improve course grade	19.4	26.4	29.0	62.5	100.0	26.3	41.2	40.0	24.3	23.1
Believe superior to field trip	----------n.s.----------					15.5	26.7	----------n.s.----------		

[1]Five on a scale of 1 to 5.
[2]Either 4 or 5 on a scale of 1 to 5.

Values in parentheses are the percentages of students in each classification.
N.s. indicates there were no significant trends by grade, background, or year in school.

Teleconference

Total cost per semester=$300 equipment rental+$500* slide and handout development=$800.

Total s.c.h./semester=150 students x 5 weeks x 1½ s.c.h./week=1125 hours.

Cost/s.c.h.=$800/1125=$0.71.

* $1500 per 10-farm set, projected to be used for three semesters.

This figure for teleconferencing costs, though low, is nonetheless higher than that for mass telephone education programs in Wisconsin (as low as $0.14/s.c.h. in 1975) because our system was used much less intensively for much smaller numbers of students.

Conclusions

Instructors using field trips should consider switching to telelectures. The above results show that students feel it is an adequate replacement, that they enjoy it, that although it does not apparently improve course grade it augments the limited experience of those disadvantaged in other ways, and that it is cost- and time-effective. It is particularly helpful in its remedial effect as part of a broader package of didactic tools to reach all students.

Table 1 indicates that our results may also have underrated the effectiveness of teleconferences because of problems in implementing the approach the first time. It is essential for those considering the use of teleconferencing to select good communicators to be interviewed, guide the discussion along lines relevant to the course, coach laboratory instructors to be enthusastic and use time efficiently, insist that students prepare well, and obtain a complete set of interesting slides to be shown during the teleconference. Under these conditions, teleconferencing promises to be an effective tool indeed in teaching undergraduate farm management.

UPDATE STUDY

Success of Former Vocational Agricultural Students In College of Agriculture Curricula

Layle D. Lawrence,

Since World War II, many professors and administrators in colleges of agriculture have questioned the wisdom of college-bound students taking vocational agriculture in high school. Although these reservations are seldom written, the advice to those students is "Get all the math and science you can in high school." Rarely, if ever, are students advised to "Get all the agriculture you can in high school." Thus, many high school students have elected to forego vocational agriculture in order to "better" prepare themselves for the rigors of college.

To assess validity of such advice, a number of studies were made in the 1950s and early 1960s to determine academic success of former vocational agriculture students in colleges of agriculture. Wiggins (1953), studying graduates from Pennsylvania State College over the period 1941 through 1952, concluded that "vocational agriculture ... was equal to any other high school curriculum as preparation for an agricultural curriculum at the Pennsylvania State College." Cunningham (1958) studied agriculture student performance at Ohio State University. He found that students with vocational agriculture in high school had higher scholastic records in technical agriculture subjects and mathematics than did those without such training, but did not do so well in English. Horner, et al. (1960), reporting results of a study involving 421 agricultural students at the University of Nebraska, stated that "a good course in high school vocational agriculture is excellent college preparation for the student planning to attend agricultural college." Similar results were found in studies conducted in Kansas, Oregon, West Virginia, Iowa, and several other states. A summary of 27 of these studies was made by McClelland (1965) in which he concluded:

1. Former students of vocational agriculture do as well or better than those without vocational agriculture in agricultural colleges.
2. Students who had vocational agriculture were more successful in some beginning agricultural courses and in botany.
3. Vocational agriculture students who plan to attend college should also enroll in preparatory mathematics and science courses.

Considering the problem well-researched, few, if any, studies of this nature have been conducted since 1965. However, Barr (1982), reported that a number of deans from midwest and eastern colleges currently have the impression that vocational agriculture students do not get the mathematics, English, and science backgrounds in high school necessary to

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