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ABSTRACT

How distance education affects academic performance and student attitudes was studied for graduate students in an off-campus location taking a course required for their majors. The performance and attitudes of the distance (off-campus/remote) class of 16 students were compared with those of a control group of 12 students in a similar class and 25 students in the on-campus class hosting the distance class. Final grade scores were significantly lower for the host distance class than for the control class taught conventionally, but scores for the remote distance class were between the other two classes. Three of the 16 members of the remote class stated a negative opinion about the technology, and 8 of the 25 in the host class reported negative feelings about the course. The technology was very distracting to students in the beginning of the course. However, by the end of the course, most students were receptive to distance education as part of the future of instructional delivery, but they still favored the conventional way of teaching. Achievement data are not very conclusive, but the lower grades of the host distance class may reflect their more negative attitudes. (Contains 12 references.) (SLD)

Distance Education: Graduate Student Attitudes and Academic Performance

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The world of higher education is rapidly changing. Contributing to this change is the increasing number of nontraditional or off-campus students who are seeking post-secondary education. Complicating this matter are decreasing funds available to education, thus limiting a university's ability to hire full-time faculty members. Indeed, many schools are now depending on adjunct and temporary faculty to teach courses, particularly off-campus courses. Fortunately, technology is now available which may prove to be a potential remedy for these problems. While not a panacea, distance education, through interactive compressed video technology, may be an effective alternative for instructional delivery. However, since the technology is relatively new, many questions remain unanswered. This research examines two of these questions -- how does distance education affect academic performance and how does it affect student attitudes?

Interactive distance education is now a part of the new information technology for delivering instruction throughout the world (Granger, 1990). Universities and schools are experimenting extensively with this technology for various training and learning objectives. The reasons for using distance education range from offering courses to wider audiences and saving travel time for both students and faculty, to providing better services to the community. Currently, decision makers in higher education are expending resources to implement this technology and move their institutions to the forefront in developing innovative instructional delivery systems (Jordahl, 1991).

Through distance education, students and instructors are connected via television and computers. A learning environment is established among two or

more sites, permitting interaction among all participants (Moore & McLaughlin, 1992). At this point, the technology is advancing at such a rapid rate that "real time" interaction is spontaneous between instructors and students.

The research is quite limited in the area of interactive distance education because of recent advances in this technology. Although some research is available concerning student attitudes and instructional delivery, it is seriously lacking concerning academic performance. In one study of learner preferences and attitudes towards distance education, Nadel (1988) discovered that students who require a great deal of structure in order to learn had more positive attitudes toward distance education than those who prefer collaborative learning. In another study at the University of Northern Colorado, students felt that some direct contact with the instructor is important for the overall success of the course and that interaction must be encouraged and planned for on a systematic basis (Riddle, 1990). In an Australian higher education study, faculty attitudes were negatively affected because of the lack of face-to-face interaction among students (Taylor & White, 1991). While the lack of interaction seems to be a major criticism of distance education, most advocates believe that involving the learner, allowing for participation, making materials easily accessible, and providing a means of feedback are necessary to bridge the distance between teacher and learner (Kruh & Murphy, 1990).

Several studies (Barron, 1987; Kabat & Friedel, 1990; Pirrong & Lathem, 1990; and Riffie, Kirk, & Hudspeth, 1990) have examined the relationship between distance education and student performance as measured by grade point average. None of these results showed significant differences between the students in the

distance classes and the students in the traditional classes.

The major differences between the distance education classroom and the conventional classroom is the proximity of the teacher to the students, a feature which this study attempted to address. Several questions drove the investigation. First, are there any differences in the academic performance or attitudes of students in a distance class and those in a traditional lecture/discussion class? Secondly, within the distance format, are there any differences in the academic performance or attitudes of students in the host class (on campus) and those in the remote class (off campus)? Finally, if differences do exist, what are some possible explanations?

This research compared the academic performance and attitudes of the students in the host class (on-campus) with the students in the remote class (off-campus). A conventional (lecture/discussion format) class served as a control. The institution involved is a large, urban university which served as the host site, with the remote site at a community college 90 miles away.

Method

Subjects

Subjects in this study were students in three sections of the same graduate course. The subjects were all majors in the same department as the course being taught, and for all of them this course was a requirement. The students in the distance education sections of the class were aware of the class format prior to registration. The content and requirements were identical for both distance education sections and for the conventional section.

Design and Procedures

This study employed both qualitative and quantitative methods to examine the impact of distance education on academic and attitudinal measures. The distance education class consisted of two sections -- the host class, located on campus, and the remote class, located off campus at a community college in a neighboring city. Through compressed video technology, one instructor could teach both sections of the class interactively. Four cameras at each site that pan, tilt, zoom, and focus provided the means for simultaneous image transmission that can be controlled by the instructor from either site. The system is further enhanced with monitors, FAX, and computer interfacing components to provide additional methods of interaction between teacher and student. The instructor was present for 10 of the 15 classes at the host site, but only 5 of the 15 at the remote site. The third section was the traditional lecture/discussion class in which the instructor was present all 15 times.

In order to determine if the course format or venue had any effect on the academic outcomes, the final grades from the three sections were analyzed in an Analysis of Variance, with a Scheffe followup when necessary. Since a minimum GPA of 3.00 is required for all graduate students, it seemed unlikely that there would be any significant pretreatment differences among the three groups. Nevertheless, prior GPA was examined to ensure that pretreatment differences were not present.

At the end of the semester, students completed course surveys in all classes which solicited responses to open-ended items concerning the quality of the course

and the instructor. Also, students were given the opportunity to write their concerns about the distance education class at the beginning, middle, and end of the semester.

Results

The original research plan called for an Analysis of Covariance to be performed on the data, using prior GPA to statistically adjust for possible pretreatment differences. However, this plan was abandoned for several reasons. First and most important, GPA proved to be an unsatisfactory covariate because the slopes of the regression line were not the same for all three groups, resulting heterogeneity of covariance. In other words, the relationship between prior GPA and class GRADE was weak in at least one of the three groups. Another reason for abandoning the ANCOVA was because a oneway ANOVA revealed that no significant differences between the three groups existed for prior GPA (p=.4579), indicating that the groups were equal prior to treatment. Table 1 displays these results.

Table 1

ANOVA Summary Table for GPA by Treatment Group

Source of Variation	df	MS	F
GROUP	2	.0733	.79
Error	49	.0924	
Group Means			
Group 1 - Control (n=12)		3.54	
Group 2 - Host Distance (n=25)		3.60	
Group 3 - Remote Distance (n=16)		3.66	

The ANOVA results and subsequent Scheffe followup for final GRADE showed that the scores for the host distance class were significantly lower ($p < .01$) than conventional (control) class. These results appear in Table 2.

Table 2

ANOVA Summary Table for GRADE by Treatment Group

Source of Variation	df	MS	F
GROUP	2	2.731	8.63 **
Error	49	0.3166	

Group Means

		Grp 1	Grp 2	Grp 3
Grp 1 - Control (n=12)	3.50			
Grp 2 - Host Dist (n=25)	2.72	*		
Grp 3 - Remote Dist (n=16)	3.12			

** $p < .01$

Notice that the average GRADE for the host distance class was 2.72, which translates to about a C+. Remember, however, that this is a graduate class and students are expected to make a B or better. The students in the host distance class had an overall GPA of 3.60 prior to treatment, compared to 3.54 for the control class. Although the difference is not statistically significant, it adds supporting evidence to the significant difference found on final GRADE. There were no differences between the host distance class and the remote distance class or between the remote distance class and the control class.

Open-ended item responses indicate that perhaps the students' attitudes toward the course (especially toward the technology) were reflected in their grades.

The disparity of opinion between the two distance classes is illustrated in the open-ended item which asked the students to list criticisms of the course. Note that only 3 of the 16 (19%) students in the remote class stated a negative opinion about the technology, compared to 8 of 25 (32%) in the host class. Table 3 displays these criticisms.

Table 3

Summary of Course Criticisms From Host and Remote Distance Classes

Host Distance Class (n=25)	Remote Distance Class (n=16)
The room was too small for the number in the class.	The host class was silly and distracting. The equipment got in the way. The tempo too slow.
I do not care for distance education!!	Distance learning should continue to be used, but not on a large scale until the bugs are worked out.
I would have rather spent 3 hrs a week on a stomach pump.	Distance learning is not a pleasant experience.
This course did not enhance my knowledge. Too much time was spent on equipment.	No comment (13)
Distance Education - Never again. This class should not be taught in this format.	
My learning opportunities were limited by the presence of the remote class. It was a chore to speak up in class when often questions had to be repeated to be heard.	
I wish we had had more hands on experience with the distance equipment.	
Get a new room for distance education.	
No comment (17)	

The concerns summaries revealed that the technology was very distracting to students in the beginning of the course. During the initial part of the class, most were concerned about the amount of personal attention they would receive and availability of the instructor. Further complicating this situatic.. were problems with the quality of the sound. Also, none of the students were used to seeing themselves on TV and many were surprised at and made uncomfortable by the camera movement during the class. On a positive note, many students were pleased to be part of the distance education class because of the possible impact of the new technology on their own teaching. Finally, some students at the remote site were reluctant to participate and expressed a need for the instructor to visit them.

During the mid-semester feedback session, students in the remote class cited the lack of immediate feedback from a live instructor as a negative factor in distance education. They insisted that the course would be better if the instructor would spend more time teaching from the remote site. On the positive side, the technology was working much better and many students were becoming more comfortable with the mode of instruction. In fact, the remote site students developed a sense of community by forming study groups and sharing their thoughts and feelings about the distance education course. However, the absence of a real instructor continued to be a predominate theme in many of the comments.

By the end of the course approximately half of the students in the host site were still not excited about distance education. Some students felt that the remote site made them feel crowded and divided the instructor's attention. Also, the sound system was not very clear and it was hard to hear comments from the

students in the remote site. The students in the remote site were a little more excited about the technology. On the whole, they felt that it was a giant step forward in education for rural areas of the state. Some specific complaints included the quality of the sound and the availability of the instructor. Also, many of them felt that note-taking was more difficult for the remote site and that visuals needed to be left up longer. In addition, many of them complained about the lack of interaction with the host site.

Discussion

By the end of the course most students were receptive to distance education as a part of the future of instructional delivery, but still favored the conventional way of teaching. This attitude was developed, at least in part, because the students used the technology during their class presentations. In addition, many of them could see the possible impact of this technology on their futures as teachers. Still, both sections liked the course better when the instructor was present at their site to handle question about the topic or course requirements.

On the whole, the comments from the remote class were more positive than the comments from the host site. One explanation for this could be that the remote class was more appreciative of the possibilities for and convenience of distance education. After all, they are the ones who normally have to travel 90 miles to take a course. The host class, on the other hand, seemed almost indignant about sharing their time with another class and having to put up with the limitations of a new technology.

The achievement data were largely inconclusive. While the host class did have lower final grades than the conventional class, there was no difference between the final grades of the host and remote distance classes. There was also no difference between the final grades of the conventional class and the remote distance class. It is difficult to say, therefore, that the technology alone was responsible for the lower grades in the host class. The most probable explanation was the students' negative attitudes toward technology, rather than the direct effect of the technology on achievement. Also, the host class had 25 students, compared to only 16 in the remote class and 12 in the conventional class. Perhaps the larger class size added to the confusion already presented by the new equipment. Finally, it is important to remember that the technology was new to the students and the school. When the problems with the equipment are solved, the attitudes of the students will likely improve.

The research on distance education is quite limited, particularly concerning academic performance of students in these classes. In addition, many higher education administrators are still skeptical about the efficacy of this technology in solving any of their educational problems. Quite possibly this skepticism comes from experience with the one-way, "talking head" technology of the past. In all fairness, the initial cost of distance education is high; therefore, it is not unreasonable for administrators to expect a financial and academic return on their investment. Clearly, there are many questions about distance education in need of systematic investigation. This university will continue to monitor the attitudes and achievement of students in both distance education and conventional classes.

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