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ABSTRACT

This study investigated differences between distance education and on-campus students using samples from a population of political science students. One group of 101 students was enrolled in Texas government classes taught on campus, and the other group of 101 students was enrolled in Texas government classes taught by Internet. A multiple-choice pretest was administered again as a posttest to measure student progress. A survey instrument was also used to collect student demographic data and perceptions of the course. For the pretest an independent samples t-test was used to determine whether differences in pretest performance existed between the two groups. No statistically significant differences were found in pretest performance between the groups. No statistically significant differences were found for posttest performance between the groups. Differences in survey scores for the two groups were not statistically significant. A Pearson-product moment correlation coefficient was calculated to determine the relationship between student performance and perceptions, using posttest scores and survey perceptions. The results indicate that no statistically significant relationship exists between scores and perceptions in either the on-campus group or the Internet group. (Contains 5 tables and 20 references.) (SLD)

A COMPARISON OF DISTANCE LEARNING AND TRADITIONAL LEARNING ENVIRONMENTS

Amy S. Glenn, Ed.D.

The purpose of this study was to determine differences between distance-education and on-campus students. Samples were drawn from a population of political science students. One group of students was enrolled in Texas government classes taught on campus. A second group of students was enrolled in Texas government classes taught by Internet.

A multiple-choice objective pretest was administered to determine whether performance differences existed between the two groups prior to new learning. The same instrument was administered as a posttest in order to measure student progress. A survey instrument was also employed which asked for both student demographic data and for student perceptions of the course.

For the pretest instrument, an independent samples t-test was used to determine whether differences in pretest performance existed between the two groups. No statistically significant differences exist in the pretest performance between the two groups. The posttest scores for the two groups were used to examine new learning. No statistically significant differences exist in the posttest performance between the two groups, using an independent samples t-test.

The survey instrument measured whether students in the two groups perceive the course differently. An independent samples t-test was used. The survey scores between the on-campus group and the Internet group were not statistically significant.

A Pearson-product moment correlation coefficient was calculated to determine the relationship between student performance and perceptions, using posttest scores and survey perceptions. The results indicate that no statistically significant relationship exists between scores and perceptions in either the on-campus group or the Internet group.

A COMPARISON OF DISTANCE LEARNING AND TRADITIONAL LEARNING ENVIRONMENTS

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For a number of years educators and business leaders have maintained that the training a worker receives will not guarantee a lifetime of employment. The average person entering the labor market can now anticipate a number of career changes. These trends have been frustrating to both workers and employers. An educational system that can help workers keep pace with the changing economy is needed. The trends reinforce the need for lifelong learning. Distance learning may provide at least a part of the solution.

According to Dede (1990), distance learning is vital for American education in the 1990s for reasons that are demographic, economic, political, and pedagogical. A need has been documented for learning to be delivered to students independent of time and place restrictions. Flexibility of time and place, as well as financial considerations, are driving an increasing interest in distance learning in higher education. Lewis and Hedegaard (1993) quoted John Sperling, founder and chairman of the board of University of Phoenix, as saying that as we move to meet the educational needs of working adults in a mobile society, our conception of the university must extend beyond place and embrace process. Sperling felt that the modern university must be defined by the lives of its

students, rather than by the traditional concept of a campus (Lewis & Hedegaard, 1993, p.1).

Distance learning occurs when a teacher and student are separated by physical distance, and technology is used to replace the traditional instructional methods. According to Spears (1992), distance learning may be delivered through many technological formats and can be defined quite broadly to encompass everything from correspondence courses to instructional videotapes, access via computer satellite, and telecommunications technology.

The precise number of people who currently are completing distance learning courses is unknown, but an estimate from Eddy and Spaulding (1996) placed the number in the millions. Although the figure seems high, in 1993, Lewis and Hedegaard had estimated that almost half of all college and university students were involved in distance learning courses. The trend for the seven years since that estimate has been one of ever increasing numbers.

Distance learning is an innovative approach to education. Individuals who are geographically distanced from a traditional classroom setting can be provided educational opportunities through distance technology. New ways of learning are designed to meet demands for speed, flexibility, and spatial location. Today's learners are dispersed both temporally and geographically. Employers are looking for less expensive and more effective solutions, solutions that do not include costly educational facilities and work time. Too, instructors are not being

utilized to the fullest because traditional methods limit the number of learners instructors can reach. Distance learning reduces the costs of instructor and student travel and may increase instructor productivity.

According to Ryan and Cooper (1995), many educational institutions are unable to meet the current demand to provide multiple geographically interspersed campuses. Constraints in budgets, location, and size are prohibitive. For example, a traditional off-campus educational setting requires that the instructor travels and is present with the students in a classroom environment, thus increasing budget costs. However, a distance learning environment allows instructors and students to be geographically separated. Distance learning technology facilitates interaction between teacher and students.

Piirto (1993) has promoted distance learning as the solution to the fiscal challenges facing rural schools, because the format allows rural high schools to provide expanded curricula. Too, universities are able to begin focused target marketing for students who are unable to attend classes on campus. Another advantage of distance learning is that more students can be educated at a specific investment level than can students in a traditional environment because one instructor can teach in multiple classrooms.

Helphinstine (1995) believed communities benefit from distance learning because it enhances learning opportunities, while at the same time breaking

down geographic barriers to education. Miller, McKenna, and Ramsey (1993) stated that distance education provides many benefits, including an increased student population, decreased travel time for both instructors and students, and the maintenance of interaction with an instructor. On a broader scale, Dede (1990) stated, "Distance learning can enhance pluralism to prepare Americans for competition in the world marketplace" (p. 247).

In spite of all of the apparent advantages, a question exists concerning whether college students who learn through distance learning receive instruction comparable to that received by traditional on-campus students. Some research studies have been conducted to determine whether a difference in academic success exists between distance learning students and on-campus students. The purpose of such studies was to ensure that the educational quality of distance learning students was not being compromised by the mode of instruction. Several preliminary studies (Chaparro & Halcomb, 1990; Kulik, Bangert & Williams, 1983; Petty & Rosen, 1990) offered modest support for the positive impact of new technologies on instruction, although such evidence was not uniform, yet others (Sawyer, 1988; Welsh & Null, 1991) found traditional means more effective. A variety of individual differences among students, such as learning styles, previous experience with technologically assisted instruction, and factors related to socioethnic background may be responsible for the mixed

results. Because only limited research data comparing distance learning delivery to traditional delivery is available, additional research was necessary.

The problem of this study was an examination of learning outcomes, when comparing distance learning delivery to traditional delivery. Given the continuous improvements to educational technology and to evolving distance education programs, empirical research data regarding the effects of modern technology on distance learning is needed. Educators need to assess the attitudes and opinions of students participating in the new learning environments. Specifically, the study attempted to determine:

1. If students who complete political science courses via distance learning perform differently on objective tests from students who complete political science courses on campus.
2. If students who complete political science courses via distance learning perceive the course differently than students who complete political science courses on campus.
3. If a relationship exists between student performance and student course perceptions.

This study looked at the difference between outcomes in distance learning and traditional learning deliveries. The study included only distance learning environments that provide for instruction via the Internet.

Significance of the Study

Distance learning is becoming an increasingly popular mode of education. For example, many community colleges and universities are moving toward providing complete programs via Internet courses (Gubernick & Ebeling, 1997). As more institutions commit to some type of distance education, a number of major issues and implications associated with distance education are emerging (Willis, 1994).

The primary concern of good teaching, regardless of delivery system, should be how well students learn. Technology is, of course, of no use if it does not enhance the learning process. The question remains as to whether distance courses offer a comparable education to traditionally delivered courses. To say that Internet-based instruction is beneficial to students requires some measurement. However, a search for empirical research related to the effectiveness of a distance learning environment, as compared to a traditional classroom environment, yields few results. Limited research data are available on this subject. This study was designed to determine the differences in both performance and perception between students in Internet classes and students in on-campus classes.

Meeting the needs of students is the goal of every effective distance education program. Regardless of the technology, the primary role of the student is to learn, which requires motivation, planning, and an ability to analyze and to

apply the instructional content being taught. When instruction is delivered at a distance, additional challenges result, because students are often separated from others, who share their backgrounds and interests. Further, students have few, if any, opportunities to interact with teachers outside of class. As technological innovations change the nature of distance learning, educators need to assess the attitudes and opinions of students participating in the new learning environments. Some limited research has occurred.

Kulik, Bangert, and Williams (1983) looked at integrating computers into classroom teaching in secondary schools. Their study utilized quantitative techniques to integrate findings from 51 independent evaluations of computer-based teaching in grades 6 through 12. The analysis showed that computer-based teaching raised students' scores on final examinations by approximately .32 standard deviations, or from the 50th to the 63rd percentile. Computer-based instruction also had smaller, positive effects on scores on follow-up examinations given to students several months after the completion of instruction. In addition, questionnaire responses showed that students who were taught on computers developed very positive attitudes toward the computer and positive attitudes toward the courses that they were taking. Finally, the computer reduced substantially the amount of time that students needed for learning.

Sawyer (1988) compared computerized study guides and conventional study guides at the college level and found traditional methods more effective.

Her classroom experiment compared exam performance for college students, using either conventional or computerized study guides to supplement their texts. The two study guides contained the same questions and exercises, but one was in a conventional workbook format, while the other was on a computer disk. The 64 students using the conventional study guide had higher achievement scores than the 53 students using the computerized study guide.

Two studies, one by Petty and Rosen (1990) and one by Chaparro and Halcomb (1990), looked at the impact of computerized tutorials on course performance. Both showed positive effects. Petty and Rosen wrote a computer program to teach a unit in basic concepts in experimental design. The graphics-based program included both tutorials and simulations. The students who used the program earned significantly higher test scores than the students in another class who did not, and they reported that they enjoyed learning to use the program. Petty and Rosen reported student reactions to this experience were completely positive, even though many of the students had not been required to use a microcomputer for course work previously.

Chaparro and Halcomb (1990) investigated the use of a computerized tutorial, Self-Test And Review (STAR), in a computer-managed general psychology course. The students (n=1136), who voluntarily used the tutorial to study for multiple choice quizzes, comprised 49% of the research group. The quizzes constituted a major portion of their course grade. Students were enrolled

in either a lecture or self-paced section. Lecture sections met in the classroom for traditional lecture, discussion, and classroom activities. Self-paced sections met in a computer-managed testing center to study and to take chapter quizzes. Results indicated that, across both section types, the students who used STAR as a study tool achieved better course performance than the students who did not use STAR. Further analysis revealed that though the groups of users and non-users were self-selected, students of varying academic abilities were represented in each group.

A study by Welsh and Null (1991) showed more positive effects from traditional learning. The purpose of the Welsh and Null study was to determine the ability of computer-based instruction to surpass that of conventional teaching of classic experiments in psychology. In experiment one, students from an advanced cognition and thinking course (N=24) participated in a simulation of the role of context in prose comprehension and in a simulation of a study of sentence-picture verification latencies. Half of the students completed each experiment with the computer, and half were taught traditionally. In experiment two, the researchers studied the effectiveness of computer-based instruction in experimental laboratory sections that did or did not require a follow-up assignment (N=75). The second variable was introduced so that some factor of seriousness or importance of the laboratory exercise could be measured. Contrary to the hypothesis, the students in the conventionally taught groups

performed better than the students using a computer. Although the conventional group that was given an assignment performed the best, and the computer group with no assignment did the worst, this interaction was not significant.

None of these earlier studies looked at entire courses on-line as compared to traditional courses on campus. Studies that look at courses offered entirely on-line are recent. Barry and Runyan (1995) focused on the effectiveness of distance learning instruction in comparison to on-campus training for military courses. Their findings were that student achievement in distance learning courses is comparable to student achievement in on-campus courses. Gubernick and Ebeling (1997) reported a study conducted by the University of Phoenix that demonstrated standardized achievement test scores of its on-line graduates were 5% to 10% higher than the scores of graduates of competing on-campus programs at three Arizona public universities. These more recent results are similar to the results summarized by Velsmid (1997), in which investigators at the University of Michigan concluded computer-based instruction yielded higher average scores than traditional instruction.

Smeaton and Keogh (1999) found when virtual lectures are used in place of traditional delivery methods, no significant difference exists in attainment levels as measured by end of semester exam scores. Furthermore, neither prior experience nor study/usage patterns had any impact on performance when using virtual lectures. Schulman and Sims (1999) used a test-retest study to measure

the performance of students who had self-selected for Internet courses. These test scores were then compared to scores in the same class taught traditionally in earlier semesters. Their results showed no significant difference between the two groups. Finally, Wegner, Holloway & Garton (1999) studied the effect distance learning had on student achievement by comparing one traditional classroom section with one Internet-based section of the same class. To assess student achievement in the course, an identical exam was administered to both groups. Results indicated no significant difference in test scores between the two groups.

Although a limited number of researchers have compared the effectiveness of Internet courses to on-campus courses, this study attempted to control for more factors (i.e., instructor, assignments, synchronous enrollment) with a larger number of students than included in the previous studies. The research data from this study was used to assess the effects of modern technology on distance learning. Such data, provided from evaluations of current programs, can provide insights for improving learning.

General Procedures

Three methods of measurement were used: an objective pretest, an objective posttest, and a survey instrument to obtain data about student demographics and perceptions of the course. Students in the study were

enrolled in Texas government classes at Tyler Junior College. The classes were taught by the same instructor and used identical assignments. Half of the students attended traditionally taught classes on the Tyler Junior College campus. Half of the students accessed course material only through the Internet.

The on-campus student sample was taken from two traditional classes. The first class met for three weekly 50-minute classes during a 16 week spring semester. The second class met for four weekly two-hour classes during a five week summer term. Both classes employed identical methods. The courses were taught predominately as lecture courses with some films and class discussion. Lectures followed a strict outline that was identical to and covered the same topics as the Internet course. Students were required to complete 15 projects, five critical thinking assignments, and five writing assignments. Options from which the students could choose were given on all assignments. Options included assignments carried out strictly on the Internet, assignments that involved real-life experience, and assignments that used traditional library research. When completed, all 25 assignments were placed in a notebook that was turned in at the end of the course. In addition, all on-campus students took a pretest during the first class meeting and a posttest and survey during the final class meeting.

The distance delivery sample was taken from two Internet classes. The first class met only once, for a course orientation, during a 16-week spring

semester. The second class met only once, again for a course orientation, during a five-week summer term. Both classes employed identical methods. The courses were taught completely as Internet courses, although the same films and resources available to the traditional classes were available to these students. Lectures were written on-line and followed the same strict outline and covered the same topics as the traditional course. Students were required to complete 15 projects, five critical thinking assignments, and five writing assignments. Options from which the students could choose were given on all assignments and were identical to the assignments in the on-campus classes. Again, all 25 completed assignments were placed in a notebook that was turned in at the end of the course. In addition, all students in the Internet classes took a pretest at the beginning of the course and a posttest and survey at the end of the course.

The Instruments

Pretest/Posttest Instrument

A multiple-choice objective pretest was administered to both groups to determine whether performance differences existed between the two groups prior to new learning. The questions were taken from a standard Texas government course bank developed by a panel of political science educators for Houghton-Mifflin publishers. The same instrument was administered as a posttest in order

to measure student progress. Concern was not with the specific amount of progress, but rather in comparing the progress of the students in the on-campus classes to the progress of students in the Internet classes. The reliability of the test was assessed using a pilot study conducted with similar students enrolled in Texas government courses at Tyler Junior College. The multiple-choice objective instrument (pretest/posttest) was administered to students in the pilot course. The internal consistency of the test instrument was assessed by the data collected in the pilot study using the split-half method. In addition, the test had been in prior use.

The Survey Instrument

A survey instrument, patterned after a teacher/course rating form used at Tyler Junior College, was also employed. The study used a two-sided scantron form so that results could be fed directly into the computer. Side A of the form asked predominately for student demographic data, which included age, gender, rank, academic history, interest in the course, computer availability and literacy, grade point average, reason for taking the course, and expected grade in the course. On side B of the form, perception response options similar to the responses on a Likert-scale included the following choices: very good, good, not applicable/neutral, poor, and very poor. The questions on side B were concerned with student perceptions of course quality, content, format, objectives,

assignments, materials, workload, exams, grading, responsibilities, relevance, and helpfulness. Also measured were instructor helpfulness, promptness, feedback, and interaction. For purposes of measurement, each response was assigned a numeric value from 1 to 5, and the number values were used to determine statistical results. The survey questions to be used had been in prior use and were deemed a reliable method of student rating by the college.

Selection of the Subjects

The sample was drawn from a population of political science students at Tyler Junior College. One group of students was enrolled in Texas government classes taught on campus. A second group of students was enrolled in Texas government classes taught by Internet. Students were allowed to select the course in which they would be most comfortable. The same instructor taught both classes. From both the Internet class and the on-campus class, students were drawn at random, so that each sample was identical (N=101). Despite self-selection, the two groups were surprisingly similar in characteristics. A cursory glance at demographics shows the similarities between the two groups. These characteristics are shown in Table 1.

Table 1

Comparison of Characteristics Between Groups

	On-Campus Sample		Internet Sample	
Characteristic	Frequency	Percentage	Frequency	Percentage
Age: under 18	1	1.0	4	4.0
Age: 18-19	32	31.7	31	30.7
Age: 20-21	43	42.6	38	37.6
Age: 22-25	11	10.9	12	11.9
Age: 26-30	7	6.9	6	5.9
Age: 31-35	4	4.0	4	4.0
Age: 36-40	2	2.0	2	2.0
Age: 41-50	1	1.0	4	4.0
Age: over 50	0	0.0	0	0.0
Gender: Male	28	27.7	33	32.7
Gender: Fem.	73	72.3	68	67.3
Computer Literacy: Yes	95	94.1	94	93.1
Computer Literacy: No	6	5.9	7	6.9
Computer Access: Yes	85	84.2	95	94.1
Computer Access: No	16	15.9	6	5.9

Collection of the Data

Students in the selected classes completed the pretest at the beginning of the spring and summer 2000 semesters and the posttest after completion of the last unit. Students were given the same amount of time, two hours, in which to complete the pretest and posttest.

Additionally, students completed the survey instrument at the end of the session just prior to the posttest. A standardized set of instructions were attached to each pretest and posttest, as well as to each survey in an attempt to decrease possible fluctuations in results due to instructor influence and/or testing differences. To ensure anonymity on the survey instrument, only student numbers identified the surveys. The pretest, posttest, and survey were all administered at the College Testing Center.

Analysis of the Data

Hypothesis 1

To address hypothesis1, no statistically significant performance differences on a cognitive assessment of course content exist between students who complete political science courses via distance learning and students who complete political science courses on campus, both the pretest and the posttest instruments were used. Scores from the pretest instrument were used to determine whether differences existed between the two groups prior to any new

learning taking place. The posttest instrument was used to determine differences between the two groups as the result of new learning gained by completing the course.

For the pretest instrument, an independent samples t-test was used to determine whether differences in pretest performance existed between the students who completed political science courses via distance learning and the students who completed political science courses on campus. The sample size for the pretest was 202 students, of which 101 completed the courses via distance learning and 101 completed the courses on campus.

As Table 2 illustrates, no statistically significant differences exist in the pretest performance between the students who completed political science courses via distance learning and the students who completed political science courses on campus ($t=-1.827$, $p=.069$).

Table 3 illustrates the posttest scores for the students who completed political science courses via distance learning and the students who completed political science courses on campus. No statistically significant differences exist in the posttest performance between the students who completed political science courses via distance learning and the students who completed political science courses on campus ($t=-.969$, $p=.334$). The null hypothesis is therefore not rejected. Students who complete political science courses via distance learning do not perform differently on objective tests from students who complete

Table 2

Pretest Results

Group	N	Mean	SD	SE	t	p	F
On Campus	101	53.545	11.754	1.170	-1.827	.069	2.663
Internet	101	57.010	15.003	1.493			

Table 3

Posttest Results

Group	N	Mean	SD	SE	t	p	F
On Campus	101	86.584	11.021	1.097	-.969	.334	.829
Internet	101	88.218	12.877	1.281			

political science courses on campus.

Hypothesis 2

The following null hypothesis was tested by using responses provided by students on a survey instrument: No statistically significant differences exist in the perceptions of students who complete political science courses via distance learning and students who complete political science courses on campus. Student perceptions researched in this study include reactions to the course and how it was delivered.

To test hypothesis 2, an independent samples t-test was used. Analysis of the difference in scores on the course survey was completed to determine whether a statistically significant difference existed in student perceptions of the course between students who completed political science courses via distance learning and students who completed political science courses on campus.

The two dependent mean scores were determined by a composite score that was taken from the survey instrument items. The survey scores were indexed to create the composite scores. Table 4 illustrates statistics for the composite scores of the two groups. The mean score for the on-campus group was slightly higher than that of the distance-education group. However, the survey scores of the on-campus group and the Internet group are not statistically significant ($t=1.775$, $p=.077$). The null hypothesis was therefore not rejected. Students who complete political science courses via distance learning do not perceive the course differently than students who complete political science courses on campus.

Hypothesis 3

The following null hypothesis was tested using posttest scores and survey items: No statistically significant relationships exist between student performance and student course perceptions. The posttest scores were used to determine

Table 4

Group Statistics for Composite Score on Survey Items

Group	N	Mean	SD	SE	T	p	F
On Campus	101	83.495	10.1928	1.0142	1.775	.077	.499
Internet	101	81.000	9.7765	.9728			

student performance, and the composite score for the responses on the survey instrument were used to determine student perceptions about the course. A Pearson-product moment correlation coefficient was calculated to determine the relationship between student performance and student perceptions. The results of the calculation are illustrated in Table 5. The results indicate that no statistically significant relationship exists between posttest scores and the student perceptions.

As Table 5 illustrates, no statistically significant relationship exists for either the on-campus group (r=.140, p=.163) or the Internet group (r=.173, p=.112) between performance and overall perceptions. The null hypothesis was therefore not rejected. No significant relationship exists between student performance and student course perceptions in either of the groups.

Table 5

Correlations among Performance and Overall Perceptions

Group	N	R	P
On Campus	101	.140	.163
Internet	101	.173	.112

Implications for Practice

The following implications for practice were based on the findings and conclusions of this study. Because no statistically significant differences exist in the posttest performance between the students who completed political science courses via distance learning and the students who completed political science courses on campus, students appear to learn equally well regardless of the instructional delivery medium that is used when those students self-select among the groups. When students are chosen at random, the statistical results may well be different. The use of distance education technology for political science courses, therefore, should be continued. Because no significant differences exist between students who complete political science courses via distance learning and students who complete political science courses on campus, students appear to develop similar perceptions about the course regardless of the instructional delivery medium that is used when those students self-select among

the groups. When students are chosen at random, the statistical results may well be different. When examining student performance and perceptions, whether those of students who complete political science courses via distance learning or those of students who complete political science courses on campus, no correlation exists when those students self-select among the groups. When students are chosen at random, the statistical results may well be different. Therefore, faculty could view student performance and perceptions as relatively unrelated factors in the instructional process. This study should be replicated in other courses that are delivered in both distance and on-campus environments. Further study should be conducted as well to determine the most effective distance-learning technology. Too, further study should be conducted to measure the effect that student selection of delivery method has on performance and perception.

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