

Aviation Distance Learning: An Initial Case Study

of

Intent, Implementation, and Evaluation

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Abstract

The concept of distance learning is not a new concept in education but is somewhat innovative in collegiate aviation programs. The following study involved an evaluation of the examination performance of 70 students in three different aviation classes; one class met in a traditional classroom and two in a distance learning setting. A statistical comparison of the examination scores of all these students found no significant difference and in several cases, slightly elevated test scores by the distance learning students.

Introduction

Distance learning is increasing in popularity and is acknowledged to have many advantages. These advantages include improved cost-effectiveness when addressing the needs of far-flung learners, reduced needs for classroom facilities, and opportunities to communicate with a wider circle of students and teachers (Pearlstein, 1993).

Embry-Riddle Aeronautical University (ERAU), involved in serving aviation through education, is particularly well positioned to maximize these benefits through its offering of degree programs at more than 100 locations throughout the continental United States, Alaska, Hawaii and Europe. In addition, the university also provides undergraduate and graduate degree programs and courses through independent study to students not served by a designated resident center. With this delivery infrastructure already in place, along with a history of successful experience, it seemed appropriate to take advantage of the new telecommunications technologies -- specifically distance learning -- as a way to reach more students and to address a broader range of instructional goals in aviation education. The idea of audio-taped lectures supplemented with notes and texts was first introduced a number of years ago, and served to bring the program to a point where distance education was an endeavor that comprised a significant percentage of the overall university activity.

The initial effort to chart a new course for the future focused on obtaining information and assistance, where possible, from others already heavily involved in telecommunications. These included a group of pioneering institutions involved in the Annenberg/CPB Project's New Pathways to a Degree Project (1993). As a part of this project there are seven New Pathways colleges, universities, and statewide consortia which are using different combinations of technologies and strategies to offer degree programs to underserved populations. These educational initiatives are one of the primary sources of information for the Annenberg Foundation's "Going the Distance: A

Handbook for Developing Distance Degree Programs." The initial evaluation of the Annenberg efforts reveals one central issue: The specific technologies are less important to the success of the program than are the "people variables," the factors that allow faculty and students alike to function effectively within these new environments.

Other invaluable sources of guidance in "distance learning" come from the Association of Commonwealth Universities, the International Council for Distance Education, the Canadian Association for Continuing University Education, and the Ontario Universities Registrars' Association. Additionally, a United States consortium of four regional, legislative compacts is now in place between groups of states in the West, the South, New England, and the Midwest that facilitate the sharing of resources. What is new is the means by which these states are able to share their resources and avoid unnecessary duplication of costly degree programs.

Aviation education is still on the threshold of significant use of distance learning because the number of institutions that offer complete degree programs is still relatively small. Further, the technologies undergirding distance learning are constantly evolving; that which are taken for granted today was revolutionary ten years ago, and what can now only be dreamt of will be commonplace in another decade.

In this paper the authors are attempting to bring together a discussion of the issues and challenges involved in implementing one specific kind of distance learning technology. As an example of such an effort, the instructional delivery system, an overview of several separate classes of students receiving differing instructional treatments, and a statistical comparison of the performance of those students on various evaluation instruments will be discussed.

Instructional Delivery System

The two ERAU instructional delivery systems for this study were the traditional on-campus lecture format and videotapes of each class. The class members in the on-campus class were graduate students and the videotapes were used by off-campus graduate students enrolled in the course in a distance learning setting. The video tape of the class was made during the regular scheduled class period. The studio classroom in which the on-campus class met was equipped with two television monitors and three television cameras. Two cameras were operated by technicians and the third camera, a document camera, was operated by the instructor at the teaching podium. Mixing and final editing of the videotapes was done *ex post facto*.

Student Profiles

The student subjects for this study were three classes of students enrolled in MAS 602 - Air Transportation, a required core class in the Master of Aeronautical Science degree of ERAU in Daytona Beach, FL. The first set of subjects (n=16) was the class that was present in the distance learning studio/classroom on campus and is referred to as the On-Campus Students (ONC). The second set (n = 27) and the third set (n = 27) of subjects are

those students enrolled in the distance learning segment of the study. These subjects sets are referred to respectively as distance Learning - Summer 1993 Students (DL-S) and as Distance Learning - Fall 1993 Students (DL-F) since that is the academic term in which the students enrolled.

The distance learning students were located in 22 states in the U.S. and in nine foreign countries and all completed the academic segment of the course by watching the videotapes of the ONC students. These students completed all the same assignments as the on-campus students but interacted with the instructor and other students in the distance learning class on the Telenet computer bulletin board system (BBS); this group of students took a proctored mid-term and final examination which were graded by the same on-campus instructor.

Discussion

Table 1 contains the age and the undergraduate grade point average (UGPA) of all students by group. Although the DL-S and the DL-F groups were somewhat older than the ONC students, an ANOVA for difference

Table 1
Subjects' Age and Undergraduate Grade Point Average (UGPA)

Subjects	Age	UGPA
ONC		
Mean	31.09	2.76
SD	8.46	.42
Number	11	15
DL-S		
Mean	35.68	3.04
S D	5.67	.47
Number	25	17
DL-F		
Mean	36.00	2.95
S D	7.07	.57
Number	27	17

in age of the subjects at $p < .05$ indicated no significant difference, $F(2, 60) = 2.225$ with a critical value of 3.13. With respect to UGPA at $p < .05$, there was no significant difference, $F(2, 46) = 1.321$ with a critical value of 3.18. Since there were a very small number of females in comparison to males, no gender comparisons were made.

Table 2 contains a comparison of the numerical averages scored by all students on the written assignments for the course, the mid-term and final examinations, and the final course average. The written assignments consisted of an analysis and evaluation of a current aviation journal (a critique); there were two critiques assigned during the term. The purpose of this assignment was to give the student an opportunity to engage in library research, critical thought, and scholarly writing. The distance learning students uploaded the assignment to the central BBS computer and the instructor downloaded the file

and graded the assignment. The examinations were sent from the main campus to the student's designated proctor and then returned to the main campus for grading. The results of all evaluations were sent to the student by private electronic mail (E-mail).

Table 2
Subjects' Test Scores and Final Course Average

Subjects	Test Scores				Average
	Critique 1	Critique 2	Mid-term	Final	
ONC					
Mean	87.81	88.28	83.38	88.79	86.74
SD	6.25	6.56	11.47	7.34	5.70
Number	16	16	16	16	16
DL-S					
Mean	88.89	89.35	87.48	85.84	87.32
SD	5.98	4.98	7.45	7.15	4.28
Number	27	27	27	27	27
DL-F					
Mean	89.72	90.00	87.70	90.44	89.34
SD	4.82	4.55	6.93	1.90	3.24
Number	27	27	27	27	27

The difference in scores of the subjects on the first written assignment, Critique 1, at $p < .05$ was not significant, $F(2, 67) = .5829$ with a critical value of 3.13. For Critique 2, the difference in scores of the subjects on the second written assignment, at $p < .05$ was also not significant, $F(2, 67) = .3900$ with a critical value of 3.13. It should be noted (see Table 2) that the distance learning students scored somewhat higher on each assignment.

The difference in scores of the subjects on the mid-term examination at $p < .05$ was not significant, $F(2, 67) = 1.576$ with a critical value of 3.13. On the final examination, the difference in scores of the subjects at $p < .05$ was considered significant, $F(2, 67) = 4.367$ with a critical value of 3.13. Casual inspection of the data in Table 2 indicates that the DL-S students had the lowest examination average (85.84) while the DL-F students had the highest average (90.44). However, it appears that the difference in variance between the groups, from 3.61 for the DL-F students to 53.87 for ONC students, may have been a contributing factor for the significant F value. With respect to the final class average, the difference in scores of the subjects on class average at $p < .05$ was not significant, $F(2, 67) = 2.338$ with a critical value of 3.13.

Conclusions

Summarizing the data, it appears that there is no significant difference in the learning that takes place (as measured by examination scores, written assignment, and class average) between students in a traditional, instructor-oriented, lecture-style class and those individuals that receive instruction in a distance learning setting. Such a finding is consistent with results obtained by Carl and Densmore (1988) who found that "no differences

were found between . . . sections but differences in performance on some measures were found" (p. 90). The same study indicated that ". . . given the same course materials and videoconferencing system, student receiving the course at distance . . . can be expected to perform as well as students receiving the instruction in a normal classroom setting" (p. 91).

When considering the fact that most of the numerical scores for the distance learning students were slightly elevated over those of the on-campus students, a possible explanation of this phenomena might be the fact that the distance learning students are more mature (or motivated). While measurement of such maturity is difficult, extremely subjective, and beyond the scope of this study, it is a factor that might be considered and could be the subject of additional research. Perhaps, such a difference, if present, might cause the distance learning students to stay on task more effectively, complete the required reading assignments more readily, better organize their study habits, and even value the educational experience more.

However, the implications for distance learning to become more of a fixture in the educational arena, particularly in aviation settings are clear. With few aviation related programs available except at widely scattered locations (particularly at the graduate level), no longer must the securing of an advanced aviation degree be a logistics challenge above all. The days of an effective educational experience being solely place and time dependent are just about over. A previously inaccessible student can now be part of any educational event; the classroom boundaries have become limitless. Granted, the physical presence of all participants is probably best, but such proximity is not the only way. Perhaps the words of John Sperling, founder and chairman of the board of the University of Phoenix (a leader in on-line education) capture the essence of the distance learning challenge best. Sperling (Lewis and Hedegaard, 1993) stated "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. An adult university cannot be campus bound, rather its borders must be defined by the lives of its students. . ." (p. 68).

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