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***DISTANCE LEARNING IN COLLEGIATE AVIATION:
A SURVEY OF THE HISTORICAL, THEORETICAL, AND CONTEMPORARY ASPECTS***

C. Daniel Prather

Abstract

Distance learning, which, for the purpose of this study, is defined as academic courses that can be completed via the computer and internet and entirely absent from the traditional classroom, has seen tremendous growth in the past decade. In fact, according to management guru Peter Drucker, "The future [of higher education] is outside the traditional campus, outside the traditional classroom. Distance learning is coming on fast" (Gubernick & Ebeling, 1997, para. 4). Indeed, according to the U.S. General Accounting Office (GAO), about 1 in 13 post-secondary students enrolls in at least one distance learning course each semester (U.S. GAO, 2002). These distance learners, who tend to be older and more likely to be employed full-time while attending school part-time, are changing the landscape of higher education (U.S. GAO, 2002). In an effort to better understand this phenomenon, a case study was conducted on this topic. Sources of evidence include the available literature on distance learning, as well as the websites of those institutions with collegiate aviation programs. This study, which was conducted during Fall 2005, provided an understanding of the historical, theoretical, and contemporary issues surrounding distance learning. A significant contribution of this case study is a current listing of those institutions offering either online aviation courses or complete online aviation academic degrees. In addition, the study revealed that 21 percent of collegiate aviation programs are currently offering courses via distance learning, which represents an increase of 30 percent in the past 5 years. It is predicted that the number of collegiate aviation programs offering courses via distance learning will continue to grow in the future, as both technology and student needs evolve.

Detroit makes luxury cars and stripped-down economy cars, four-wheel drives, and sport convertibles. College Inc. makes only one expensive model-with leather seats and air-conditioning. Technology is changing that. (Gubernick & Ebeling, 1997, p. 84)

Introduction

Distance learning, which for the purpose of this study is defined as academic courses that can be completed via the computer and internet and entirely absent from the traditional classroom, has changed considerably in recent years and is today a growing force in postsecondary education (U. S. General Accounting Office [GAO], 2004). According to the U.S. Department of Education, enrollments

in distance education quadrupled between 1995 and 2001 (U.S. GAO, 2004). During Fall 2003, according to the Sloan Center for Online Education, over 1.9 million students were studying online (Sloan Consortium, 2004). This number rose to 2.35 million students in 2004 (Sloan Consortium, 2005). This 18.2 percent growth rate in one year far exceeds the overall rate of growth for the higher education student population. Amazingly, institutions do not believe that enrollments in distance learning have reached a plateau, believing instead that enrollments will continue to increase. Taking advantage of this student demand are public, private nonprofit, and private for-profit institutions. In essence, all types of higher education institutions have jumped on the bandwagon to meet the surging student demand for distance learning (Sloan Consortium, 2004).

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In an effort to better understand the current distance learning phenomenon in higher education, as well as the prevalence of distance learning in collegiate aviation, this research effort was guided by several questions. First, how has contemporary distance learning evolved from early efforts at correspondence education? Second, why is distance learning so popular today? Third, to what degree is collegiate aviation engaged in distance learning? Fourth, how should distance learning be implemented in higher education? Lastly, how will distance learning evolve in the future? Guided by these questions, this paper reports on the use of distance learning in collegiate aviation and presents a discussion of the historical evolution of distance learning, the theoretical foundations applicable to learning at a distance, and the technological aspects associated with distance learning.

Methodology

To answer the research questions adopted for this study, a case study approach was chosen. As Yin (2003, p. 1) explains, "case studies are the preferred strategy when 'how' or 'why' questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context." Specifically, this case study could be considered a "descriptive" case study, in that it describes the various aspects of distance learning and the use of distance learning in collegiate aviation. Additionally, the case study was designed as an "embedded case study," which allowed distance learning in higher education to be examined, as well as distance learning specifically in the field of collegiate aviation (Berg, 2004; Yin, 2003).

The evidence for case studies may come from six sources: (a) documents, (b) archival records, (c) interviews, (d) direct observation, (e) participant observation, and (f) physical artifacts (Yin, 2003, p. 83). Yet, depending on the topic being studied, "a valid and high-quality case study [can be conducted] without leaving the library and the telephone or internet" (Yin, 2003, p. 11). For this particular case, two main sources of evidence were analyzed. First, documents related to distance learning were thoroughly reviewed. By performing a comprehensive literature review on distance learning, an in-depth understanding of the issues affecting distance learning was gained. Second, the institutional websites of each of the 114 institutions listed in the most recent University Aviation Association (UAA) Collegiate Aviation Guide were explored to determine the current aviation distance learning offerings (University Aviation Association [UAA], 2003). Additionally, the website of one additional institution not included in the UAA Collegiate Aviation Guide, but offering an aviation

degree program, was also explored. Most of the institutional websites had a "Distance Learning" or "Distance Education" page, which allowed a thorough review of courses and academic programs offered online. To corroborate findings on the "Distance Learning" page, an institution's aviation department webpage was also reviewed if available. As necessary, both Fall 2005 and Spring 2006 online course schedules for various institutions were reviewed to determine the availability of online aviation courses. An e-mail inquiry with faculty and/or staff was necessary at three institutions to conclusively determine the availability of aviation distance learning offerings at those institutions. It should be noted, however, that this study is limited to only those institutions with aviation programs as listed in the 2003 UAA Collegiate Aviation Guide (with the one exception previously mentioned).

Special effort was made to enhance the validity and reliability of this case study. Specifically during the data collection phase, validity was enhanced with the use of multiple sources of evidence (including journal articles, internet articles, government documents, textbooks, websites, and email inquiries). These multiple sources of evidence allowed the "development of converging lines of inquiry," a process known as data triangulation (Yin, 2003, p. 98). Reliability was enhanced with the use of a case study protocol and the development of a case study database. The case study protocol, which addressed the research questions, data collection procedures, and data analysis, served as a guide during the case study. As Yin (2003, p. 101) notes, the case study database consists of both the "data or evidentiary base and the report of the investigator." Thus, in addition to this article, copies of all documents analyzed during the data collection phase have been retained by the researcher. Additionally, the specific links for the pertinent sections of each institution's website were copied and placed in a separate document to allow for easy access to the institutional data analyzed during this case study.

This case study, which was conducted over several months during the Fall of 2005, resulted in a better understanding of the historical evolution of distance learning, theoretical foundations of distance learning, the current state of distance learning in collegiate aviation, considerations regarding the implementation of distance learning, and future possibilities. In addition, an accurate and up-to-date (as of Spring 2006) table of those institutions offering either online aviation academic courses and/or online aviation academic degrees was created (see Appendix).

Historical evolution

The original form of distance learning, in the form

of correspondence education, began in 1840, when Sir Isaac Pittman, an English educator, began teaching shorthand by mail ("History," n.d.). Learning at a distance began taking a foothold in the U.S. in 1873, when Anna Ticknor created a Boston-based society encouraging studies at home by creating educational opportunities for women of all class societies. Ticknor's efforts provided correspondence instruction to 10,000 members during a 24-year period. Printed materials sent via the mail were the main mode of communication, teaching, and learning (Nasseh, 1997). Cornell, albeit unsuccessfully, attempted to establish a Correspondence University in 1883 ("History," n.d.). However, official recognition of education by correspondence in the U.S. arrived that same year as the Chautauqua College of Liberal Arts was authorized by the state of New York to begin granting academic degrees to students who successfully completed work at summer workshops and by correspondence during the academic year (Nasseh, 1997). Additionally, Thomas J. Foster began home-study courses in mine safety in the 1880s, which grew into the International Correspondence School ("History," n.d.).

With correspondence study growing in popularity, the National University Extension Association (NUEA) was established in 1915 to both research the effectiveness of this relatively new form of education, as well as establish national guidelines for credit transfer, acceptance of credit, and quality standards. Although mail was the dominant instructional delivery method until 1910, new technologies, such as the lantern slide and motion picture, began emerging to create more visually-based options for correspondence study ("History," n.d.). Indeed, Thomas Edison proclaimed in 1913, that "Our school system will be completely changed in the next ten years" (Jeffries, n.d.). Interestingly, however, the most promising form of technology created during this period was instructional radio. Between World War I and World War II, the federal government granted broadcasting licenses to 202 colleges, universities, and school boards (Nasseh, 1997). Unfortunately, this new form of education failed to create high student demand, and by 1940, only one college-level credit course was still being offered in this manner. Even so, as Nasseh (1997, para. 6) states, "the concept of education by radio was a major reason for development of educational television by the mid 20th century."

In 1932, seven years before television was introduced at the New York World's Fair, the State University of Iowa began experimenting with the transmission of instructional courses via television. Although World War II slowed the introduction of

television, military training efforts revealed the potential for using audio-visual media in teaching. This success generated renewed interest in applying this technology to schools, and in the decade following the war, intensive research programs were carried out to analyze how instructional media affected classroom learning. By 1948, five U.S. educational institutions were involved in television, with Iowa State being the first on air. By the late 1950s, 17 programs utilized television in their instructional materials. By 1961, 53 stations were affiliated with the national Educational Television Network (Jeffries, n.d.).

In the early 1960s, the innovative Midwest Program on Airborne Television Instruction launched its "flying classroom" from the Purdue University Airport to broadcast instructional programs to school systems and the general public in Indiana and five surrounding states. At its zenith, this program was reaching nearly 2,000 public schools and universities in Indiana and five surrounding states. Although this unique experiment was ended in 1968, it had generated substantial interest in educational television, and by 1972, no less than 233 educational stations existed. Even so, by the mid 1960s, much of the interest in funding instructional television had diminished. Reasons for this included teacher resistance to television in the classroom, the expense of the television systems, and the inability of television alone to meet the various needs for student learning (Jeffries, n.d.).

New technological advances introduced microwave technology in the late 1960s and early 1970s and cable and satellite television during the late 1970s and early 1980s. Had it not been for changing student demographics and changing national trends in the U.S., these technologies may have encountered similar resistance experienced by earlier technologies. However, the costs of traditional resident education were escalating, the American population was becoming more mobile, interest in career-oriented activities was growing, and the public was growing more dissatisfied with educational institutions in general (Nasseh, 1997). In addition, Britain's new Open University brought a fresh vision for distance learning by providing audio and video materials with its correspondence courses beginning in 1969 (Moody, 2004). This institution played a major role in conducting research in distance learning and is recognized as being the largest and most innovative educational organization in the world. In essence, the success at Open University brought the needed respect and confidence to correspondence education.

By 1985, the internet, already well established as a technology supporting a broad community of researchers and developers, was beginning to be used for daily computer

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communications in the form of electronic mail (Leiner, et al., 2003). Later, the World Wide Web was created and opened up a new dimension in distance education. Today, the internet plays a major role in distance learning, and has, it seems, replaced U.S. mail and video courses as the preferred mode of delivery.

As the method of delivering distance learning courses has evolved from using Rural Free Delivery and the U.S. mail, to satellite, interactive compressed video, computer software, electronic mail, voice response systems, and the world wide web, distance education has grown to cater to over 2.3 million students that were enrolled in at least one online course in Fall 2004 ("History of distance education," n.d.; Sloan Consortium, 2005). Today, whether referred to as distance learning, distance education, technology-based education, virtual education, virtual classrooms, online learning, or online education, it is clear that this aspect of higher education is becoming increasingly popular among students.

Theoretical Foundations

Regardless of the growing popularity of distance learning, one may wonder if this mode of education is as beneficial to the student as the traditional, on-campus course. Is there, in other words, a difference in student outcomes when comparing distance learning and traditional courses? Perhaps the most significant study addressing this question is that of Thomas Russell. Noting that studies comparing differences in student learning among traditional courses and distance courses began appearing after the growth of correspondence courses in the early 1900s, Russell (2001) compiled a body of literature that resulted in *The No Significant Difference Phenomenon*. This phenomenon refers to his finding that "an overwhelming number of studies showed that when the course materials and teaching methodology were held constant, there were no significant differences between student outcomes in a distance delivery course as compared to a face to face course" ("Frequently asked," 2005, para. 2). This theory, which has since been supported by findings from Merisotis and Phipps (1999), proposes two main assumptions. First, delivering education at a distance does no harm. Second, simply converting a face to face course into a technology-mediated distance delivery course does not help improve student outcomes. Thus, in studying this theory, we come to

understand that it is not the technology alone, but the application of the technology, that has the potential to positively affect learning. In applying this technology, Merisotis and Phipps (1999) suggest that learning tasks, learner characteristics, student motivation, and the instructor be considered.

Lehrer and Connolly (1994) have shown the no significant difference theory to be true, at least in the collegiate aviation environment. Their study of 70 students in three different aviation classes focused on both traditional, on-campus lecture format and videotapes of each lecture in a distance education format. Their study revealed no significant difference in learning that takes place (as measured by exam scores, written assignments, and class averages) between students in a traditional, on-campus lecture class and those receiving instruction via distance learning technologies.

In analyzing the pedagogical components of web-based instruction, Jung (2001) utilizes the transactional distance theory. According to this theory, there are three key constituent elements that define every distance education program: dialogue, structure, and learner autonomy. Dialogue refers to the extent to which instructors and learners can interact with each other. Structure, in turn, refers to the responsiveness of an educational program to an individual learner's needs. Lastly, learner autonomy is best described as the extent to which learners make decisions affecting their own learning and build their own knowledge, based on their individual experience. In first defining this theory in the early 1970s, Moore (1972, p. 83) proposed that there is a positive relationship between distance as measured by "individualization and dialogue, and autonomy." In further explaining this hypothesis, Moore (in Jung, 2001, p. 527) later argued that the "degree of transactional distance between teachers and learners is a function of the extent of the dialogue, the extent of the rigidity or the flexibility of the course structure, and the extent of the learner's autonomy." In testing this hypothesis, various studies have been conducted across different technologies, such as audio-conferencing, videoconferencing, interactive television, and computer networks. It appears that these empirical studies indicate that transactional distance theory provides a useful conceptual framework for both defining and better understanding distance education (see Figure 1).

Figure 1: A theoretical framework of transactional distance theory for the pedagogical features of web-based instruction.
Adapted from Jung, 2001, p. 529

In theorizing about the substantial growth in distance learning, Singh, O'Donoghue, and Worton (2005) utilize a cost and demand theory that attempts to explain this growth. Quite simply, the increasing costs for higher education, combined with the demand for additional learning, have provided a powerful incentive that encourages the growth of distance learning. Likewise, as proposed by Volery (2000), the fast expansion of the Internet and related technological advancement, in conjunction with declining budgets and social demands for improved access to higher education, has provided a substantial incentive for universities to introduce distance learning courses.

As noted by Scarpellini and Bowen (2001, p. 143), the demand for access to higher education has "steadily increased in recent decades due to changes in the economic and social structure." Additionally, technological advances, by widening the accessibility of education, have fueled the growth in demand. With key technological issues such as

content, delivery, and infrastructure, Scarpellini and Bowen (2001) theorize that although technology made education more accessible, "it does not produce learning without the appropriate inputs and outputs by both the instructor and the student." Thus, higher education administrators must remain cognizant of the need to properly incorporate distance learning by setting appropriate goals and providing the necessary resources to enable both instructors and students to accomplish those goals.

Current state of distance learning in collegiate aviation

Although uttered more than a decade ago, Lehrer and Connolly's (1994, p. 10) comment that "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," is still somewhat true today. According to Scarpellini and Bowen (2001), only 17 institutions were offering aviation distance education courses as of their study in 2001. Bowen, Scarpellini, & Fink (2001), in a survey of institutions

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offering aviation academic programs, discovered that 90 percent of the responding institutions were interested in distance education, with 67 percent agreeing that distance education is becoming a critical issue in aviation education. Additionally, 77 percent of respondents planned to pursue distance education now or in the future. The most common modes of delivery included online communication and internet (71 percent) and videotapes (11 percent).

This case study revealed that, as of the Spring 2006 course offerings, 24 institutions in the U.S. and Canada were offering completely online academic courses in aviation (see Appendix). This represents a 30 percent increase during the past five years in the number of institutions offering aviation courses via distance learning (as compared to data compiled by Scarpellini and Bowen, 2001). Although this represents an increase, it should be noted that only 21 percent of the 115 institutions studied for this case study currently offer aviation academic courses in an online format.

Three of these technologically-progressive programs are housed at institutions in the state of Texas, while the states of Indiana, Minnesota, and Oklahoma each have two institutions offering aviation distance learning courses. In general, the institutions with distance learning aviation courses are geographically well-dispersed throughout the nation, with one institution (Concordia University) offering online aviation courses from Canada.

Admittedly, it would be a difficult and likely impossible task learning to pilot an aircraft with only online training received at home. However, many aviation courses lend themselves quite well to the online environment. Courses currently being offered by some of the institutions examined in this case study include Airline Management, Airport Planning, Aviation Law, Aviation Safety, Private Pilot Ground, and Human Factors. In sum, while some aviation courses and programs may need to be completed in a traditional format, innovative aviation programs are offering those classes that seem well-suited to the distance learner.

In addition to a sampling of aviation courses which can be completed online, four of the institutions studied also offer complete online aviation academic degrees. All four of these institutions offer master's degrees, while one also offers bachelor and associate degrees. Embry-Riddle Aeronautical University, the institution offering the most online aviation degree choices, offers the Associate/Bachelor of Science, the Master of Aeronautical Science, and the Master of Science in Management degrees (all with numerous concentrations available). Although Indiana State University, St. Cloud State University, and Utah Valley State College offer online degrees, both Indiana State and Utah Valley State require the completion of a commercial pilot certificate. Similarly, St. Cloud State requires students to possess Airframe & Powerplant and/or Avionics certification. As a result of these requirements, the

online degrees offered by these three institutions were not considered fully online degrees as defined for this research effort, and as a result, are not included in the Appendix.

It appears then, that although 77 percent of responding institutions in the study by Bowen et al. (2001) planned to pursue distance education now or in the future, only a handful of additional programs have actually begun offering aviation courses online. Although 24 of the 115 institutions studied currently offer at least one online course in aviation, one wonders if the remaining 91 institutions with aviation programs are considering distance learning options as well. If so, various considerations should be addressed.

Considerations with Distance Learning Implementation

For those collegiate aviation programs currently considering offering either courses or complete degrees via distance learning, several issues should be considered: (a) who the learners are, (b) who the competing institutions are, (c) potential faculty concerns, and (d) costs. First, the unique demographics of those most attracted to distance learning should be considered. As Palmieri (1997, p. 4) explains, the various challenges to be encountered in offering distance learning demand that you have a "good knowledge of who your learners are and what their circumstances are likely to be." For instance, most distance learning students are older and more likely to be married. Undergraduates enrolled in distance learning courses are more likely to be female. In addition, distance learning students are more likely to pursue studies part-time while working full-time. Lastly, graduate students enrolled in distance learning courses tend to have higher incomes than students not enrolled in distance education courses (U.S. GAO, 2002).

It is also helpful for aviation programs considering offering distance learning courses to consider the general characteristics of those institutions currently offering distance education programs. Although private for-profit providers are actively engaged in distance learning, public institutions enroll the most distance education students in this nation. Second, institutions have chosen the Internet as the delivery mode of choice for their distance education offerings. Lastly, institutions enrolled the most distance education students in subjects related to business, humanities, and education (U.S. GAO, 2002).

Administrators considering offering aviation courses through distance education must also consider any preconceived notions that faculty may have regarding the use of technology in this way. Are the faculty technologically-savvy? Will additional training be required to better orient them with the online learning environment? As explained by Scarpellini & Bowen (2001, p. 143), all too often, distance education instructors are "thrust online without the proper training or time to manage this new and important connection." Additionally, Santilli and Beck

(2005) explain that it requires much more time to teach an online course than a traditional face-to-face course. Communicating with students and building and sustaining learning communities is a time consuming endeavor. As Santovec (2005) explains, faculty teaching online may be required to incorporate at least ten discussion boards per term and actively participate in the discussions. This, of course, is in addition to the traditional classroom responsibilities, such as the creation of syllabi and the creation and grading of tests. Yet, there continues to be little recognition of this fact by institutional administrators. Thus, it would behoove aviation program administrators to consider the impact of the additional time required on faculty load and compensation. Many institutions are meeting this challenge with adjunct faculty. That, of course, may also meet with some challenge by existing faculty who feel they should have the opportunity to meet this demand.

Acknowledging that the success of any distance learning program is tied to overcoming faculty resistance and gaining faculty participation, Mattson (2004), in a survey of UAA professional members, discovered that feelings of optimism, skepticism, and fear of the impact of technology-driven educational delivery were held by faculty. Although a majority of respondents were familiar with online technology and its use in distance learning, the majority were also neutral in their perceived support and funding made available for online educational efforts. "The key to successful program implementation," Mattson (2004, p. 14) concludes, "is that all stakeholders are afforded the opportunity to have realistic input and are kept knowledgeable about steps in the process."

While challenges have been noted, faculty benefits have also been attributed to distance education. Positive effects include learning new teaching techniques that could be applied to the traditional classroom, working with a more diverse student population, more self confidence, and greater flexibility ("Students aren't," 2005; Lehrer & Connolly, 1994).

Although distance education may be a cost-effective way to serve more students without adding additional campus infrastructure, technology is not necessarily inexpensive and administrators should count the costs associated with distance learning prior to offering such courses. Costs include the price of the learning management system license, program administration, infrastructure, technology equipment, video conferencing network, travel, salaries for support personnel, supplies, increased bandwidth capacity, and course and program planning and development (Santovec, 2005). Costs may be reduced by negotiating with vendors, consolidating distance education offices, and securing sponsorship and investment funds. In essence, as Santovec (2005, p. 5) explains, "controlling costs in distance education is a full-time job."

For those institutions committed to integrating

technology in the education of their students by offering online courses, Carr-Chellman and Duchastel (2000) present the preferred qualities or elements of the "ideal online course." These suggested elements should not be taken lightly, as Scarpellini-Metz and Bowen (2005, para. 10) explain, "too often instructors have merely transferred their standard material to electronic media without modifying to meet the needs of [a] new environment."

First, according to Carr-Chellman and Duchastel (2000), there should be an online study guide that serves as the student's main reference to the content, structure, and activities associated with the course. Although similar to the traditional syllabus, the online study guide enables the student to proceed without substantial further personal interaction or clarification from the instructor. Second, the ideal online course should generally not have the primary learning resources online. As the authors point out, it still remains easier for students to study from a traditional textbook than to roam through online textual materials of any length. While online lectures may be advantageous, as a general rule, the active nature of online learning precludes large amounts of text via lecture notes or lecture transcripts from being placed online. Third, the ideal online course should be centered on student tasks, such as projects or assignments, which constitute the learning experiences that the students will engage in, either independently or collaboratively, in order for them to master the course objectives. The authors suggest that online courses should provide the students with the broad goals that are to be attained, while leaving them with substantial latitude to pursue their own goals. Indeed, as Bliss (2002) states, "students become more engaged when they feel they have ownership of the learning situation" (p. 14). The authors also encourage timely instructor feedback. Another useful quality of an online course is the online availability of successful work by prior students. These provide current students with an indication of the level of effort required for various assignments, as well as the level of quality the instructor is looking for.

Additionally, the following three types of communication need to be considered when designing the ideal online course: (a) student-content interaction, (b) student-instructor interaction, and (c) student-student interaction. It is now generally understood that by facilitating the student-student interaction, there is less reliance on the student-instructor interaction, which enables larger numbers of students to enroll in the course without imposing undue burden on the instructor. One manner in which to facilitate the student-student interaction is via online forums. Another communication issue to carefully consider includes the balance between asynchronous versus synchronous interchange. Each has advantages and disadvantages. Advantages of asynchronous interchange include flexibility and time to consider responses to

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questions posed, while disadvantages include lack of real-time interaction with fellow students, difficulty in having questions to faculty promptly answered, and need for greater motivation on the part of the student. Synchronous interchange is advantageous in terms of allowing students a more direct sense of collegial interaction, immediate resolution to questions posed, and possibly a strong contribution to the team building required to sustain future student interactions (Carr-Chellman and Duchastel, 2000). Disadvantages of synchronous interchange include lack of flexibility and less time to consider responses to questions posed. Once the "ideal online course" is designed, it would be helpful to remember that "electronic pedagogy is not just about fancy software packages or simple course conversion. It is about developing skills involved with community building among a group of learners so as to maximize the benefits and potential that this medium holds in the educational area" (Palloff and Pratt, 1999, p. 159).

Although distance education may be unfamiliar to some in higher education, the rules of quality education at a distance are not very different than from the classroom setting. Saba (n.d.) points out that the most important factor is advanced planning. He proposes a five-step planning model: (a) analyze the needs of the learner, (b) design instruction based on students' learning needs, (c) develop instructional materials, (d) implement instructional sessions, and (e) evaluate the results systematically. He also notes that in addition to faculty support, the following should be considered to ensure successful distance teaching and learning: (a) students must be prepared, or at least screened for their competency in learning at a distance; (b) a help desk should be provided for students to resolve technical problems; (c) instructors should form a community of learners among their students so the members can assist each other and learn from each other's experience; and (d) students should also have access to the instructor via email or phone in case they encounter difficulty in comprehending course materials (Saba, n.d.).

Future Possibilities

There really is no choice for colleges and universities. Where these technologies are widely available, where the cost and convenience factors are of such potential importance, and where the demand is increasing, someone will step into the vacuum if colleges and universities do not In such a competitive context, there may be a few schools with sufficient prestige not to worry that they will lose students to other providers. But for the vast majority . . . the race is on. (Burbules & Callister, 2000, pp. 278-279)

Despite the past growth of distance learning, as well as the current trend in higher education to provide more online course offerings, this aspect of higher education will continue to be seen as a niche among higher education,

unless institutions believe in its importance and are willing to embrace it as part of their long-term institutional strategies. To effectively accomplish this, Lorenzetti (2005) presents five steps to bringing distance education into the mainstream. First, align the missions. Second, validate the constituency. Third, develop a business model. Fourth, become one with the existing infrastructure. Fifth, involve faculty in curriculum development. Additionally, Kilfoil (2003) states that strategic planning in distance education involves addressing the following five issues: (a) where we are now, (b) where we want to be, (c) strategic issues and appropriate strategies, (d) implementation and deployment, and (e) monitoring and evaluation.

Promisingly, the vast majority of institutions across all sectors recognize the importance of distance education. However, although the majority of doctoral/research, masters, associates and specialized institutions agree that online education is critical to their long-term strategy, only one-quarter of baccalaureate institutions feel this way. While the traditional campus will likely continue to maintain a prominent position in the academic community, it is possible that baccalaureate institutions may lose students to other institutions that are more effective in incorporating distance education and online learning in their long term strategies (Sloan Consortium, 2004).

As Gumpert and Chun (1999) so aptly point out, although the U.S. successfully transitioned from elite higher education to mass higher education, the move toward a more universal higher education is not without challenges. In providing education both to those who have been traditionally excluded from the system by virtue of demographic and geographic factors, and to an increasing number of lifelong learners, the system of higher education in this nation is being forced to consider how to meet this demand. If this demand is to be met at the 3,600 accredited institutions in this nation, then logistical challenges can be identified and resolved. However, if these needs will be met in virtual classrooms and by virtual universities, the challenges will likely be more difficult to resolve, at least initially.

As stated by Gumpert and Chun (1999, p. 392), the only prediction about the future that can be made with confidence is that "technology will have an impact on higher education and that the impact will be far-reaching." Likewise, "predicting the future of educational technology, embedded as it is in a complex and poorly understood endeavor, is close to impossible" (Gumpert & Chun, 1999, p. 392). Even so, various trends are becoming apparent. As Garrison (in Jeffries, n.d.) states, "distance education is 'inexorably linked to the technology.'" As noted by the Internet Society (ISOC), the internet and related technologies must continue to change and evolve at the speed of the computer industry if it is to remain relevant. This evolution, they share, will bring us new applications,

such as Internet telephone and Internet television (Leiner et al., 2003). As a result, we must expect distance education to continue to evolve as these new technologies and applications come on line. Another trend will be the growth of distance education in the international arena. In fact, a report on international distance education notes that "countries like Thailand or China see e-learning, including cross-border e-learning, as one way to broaden access to tertiary education" ("Report on international," 2005).

Although it is difficult to predict the future, the members of the Distance Education and Training Council (DETC) agree that (a) distance education growth will be explosive for many years; (b) demand for convenience, shorter programs, and more subjects will drive growth; (c) technology will play a greater role in distance education; (d) the Internet and online learning will be heavily utilized; (e) public acceptance of distance education at all levels is increasing; (f) competition in distance education at all levels is increasing; (g) excellence in product and service is vital; (h) higher education will be turning to distance education as a 'mainstream delivery medium;' (i) regulatory interest in distance education will increase, as hundreds of new 'providers' create more activity and 'problems' for quality oversight officials; and (j) restrictive credit transfer policies by colleges must be eradicated if DETC institutions are going to rise to the next level of marketplace competitiveness (Distance Education and Training Council [DETC], 2004).

Conclusion

Distance learning, in its many forms, has grown substantially during the past century. What once was simply a collection of correspondence courses by mail using Rural Free Delivery, has evolved into hundreds of courses and even complete academic degrees that may be accessed by

students at any location and at any time simply with the use of a personal computer and Internet connection. Although collegiate aviation is utilizing technology in many areas, with more advanced training aircraft, classroom audio-visuals, and email communication among students and professors, the application of available technology to distance learning in collegiate aviation is currently only being pursued by a select number of institutions.

Although 21 percent of the institutions in the 2003 UAA Collegiate Aviation Guide currently offer at least one online aviation academic course, it appears that the number of aviation programs joining other academic fields in offering distance learning courses and degrees will likely continue to increase, based on the historical growth of distance learning in collegiate aviation, the interest expressed in distance learning by a number of aviation programs, and the room for growth in this area among collegiate aviation programs. Indeed, it appears likely that within a decade, the majority of collegiate aviation programs will be offering at least one distance learning course in aviation, with additional institutions also offering complete online aviation academic degrees. As previously noted by Bowen et al. (2001), the interest exists among aviation programs for distance learning, and as technology continues to be refined (including adoption of Bluetooth technology, expansion of wi-fi, and use of interactive technology) and students demand flexibility in their learning (including more members of the workforce engaging in lifelong learning), distance learning will become much more prevalent in collegiate aviation. Indeed, collegiate aviation programs will meet the changing needs of students, as these programs continue the pursuit of excellence in a more technologically-advanced 21st century. →

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Appendix

Aviation Distance Learning Offerings

Academic Institution	Home State	Online Courses	Complete Online Aviation Degrees
Central Texas College	TX	@	
Central Washington University	WA	@	
Community College of Baltimore County	MD	@	
Concordia University	Montreal	@	
Daniel Webster College	NH	@	Master of Business Administration for Aviation Professionals
Delta State University	MS	@	Master of Commercial Aviation
Eastern Michigan University	MI	@	
Embry-Riddle Aeronautical University	FL/AZ	@	Associate/Bachelor of Science (in Professional Aeronautics, Aviation Maintenance Management, Aircraft Maintenance Technology), Master of Aeronautical Science (in Aeronautics, Aviation/Aerospace Education Technology, Aviation/Aerospace Management, Aviation/Aerospace Operations, Aviation/Aerospace Safety Systems, Human Factors in Aviation Systems, Space Studies, and Space Operations Management), Master of Science in Management (in Air Transportation Management, Aviation/Aerospace Industrial Management, Aviation Enterprises in the Global Environment, and General Management)
Indiana State University	IN	@	
Iowa Lakes Community College	IA	@	
Lenoir Community College	NC	@	
Metropolitan State College of Denver	CO	@	
Minneapolis Community & Technical College	MN	@	
Northrop Rice Aviation Institute of Technology	TX	@	
Ohio University	OH	@	
Oklahoma State University-Tulsa	OK	@	
Purdue University	IN	@	
San Jacinto College	TX	@	
St. Cloud State University	MN	@	
St. Louis University, Parks College	MO	@	
Southeastern Oklahoma State University	OK	@	
University of Nebraska at Omaha	NE	@	Master of Public Administration (in Aviation)
Utah Valley State College	UT	@	
Vaughn College of Aeronautics & Technology	NY	@	

Note:

Only those institutions offering online academic courses and academic degrees are included. Non-degree courses and certificate programs are not included. All information obtained from institutional web sites and various e-mail inquiries to admissions/aviation program staff.

@ refers to at least one online aviation academic course being offered as of Spring 2006.