A Case Study of Adoption and Diffusion of an Existing Asynchronous Distance Learning Program

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(ABSTRACT)

This case study examines an asynchronous distance learning program to identify characteristics critical to the diffusion and adoption process necessary for effective implementation. These attributes extrapolated from the review of literature and case study examination are both insightful and timely, since many educational institutions are currently implementing distance learning programs without a formal plan or vision. The study specified how an asynchronous program dealt with the diffusion and adoption process by providing a thorough examination of secondary documentation and archival record review, coupled with program interviews.

Media for communicating information has expanded from simple print, voice, and face-to-face communications to include fax, voice mail, computer-assisted instruction, email, video and other technologies. These technologies are central to the mission of education. Institutions have entered the distance learning arena with the intent of capturing and attracting nontraditional students, as defined by age, marital status or employment status, to the academic market.

Adoption and diffusion mechanisms focus on societal and customer needs. At institutions of higher learning, students are the customers and their academic needs should come first. The corporate sector is indirectly shaping education by hiring students who have acquired the skills needed to compete in the information age. Distance education must have an integrated strategic plan that successfully aligns all vital programs to support academic, industry and societal needs. Students and faculty must have easy access to information resources, support services, policies and procedures for distance education.

The information resulting from this examination may facilitate adoption and diffusion of asynchronous distance learning programs. Based upon identified characteristics, the ancillary product of this case study was a compiled list and discussion of lessons learned, composed from the review of literature and case study examination. Key recommendations from the study, and substantiated in the review of literature, follow:

- The case study had an adaptable infrastructure that changed with the times.
- The purchase and use of distance learning technology was consistent with the strategic plan.
- Participants had easy access and training to distance learning technology.

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Introduction

The motivation to implement distance learning technology without fully understanding what purpose it serves and the ultimate consequences of adopting such technology are unclear (Ely, 1999). Distance learning technology is a symbol of status and progress that many institutions are purchasing and incorporating without a vision or strategic plan.

Many of the earliest studies in the evolving field of instructional development were on rejecting new educational media (Ely, 1999). Rogers' (1962, 1983, 1995) research was on diffusion and his aim focused on adoption of new ideas, practices, and products. He defined diffusion as the process through which an innovation spreads and is transmitted to members of a social system. Adoption is a mental process in which an individual passes from hearing about an innovation to using it on a regular basis (Rogers, 1983). Adoption differs from diffusion in that it deals with adoption of a new idea, while diffusion pertains to the spread of new ideas in a social system, or with the spread of innovations between social systems (Rogers, 1983).

Diffusion and adoption educational studies attempt to explain what, where, and the why of technology acceptance or rejection, as well as how society views advances. "The innovation-development process consists of all the decision activities, and their impacts that occur from recognition of a need or problem, through research and development, and commercialization of an innovation, through diffusion and adoption of the innovation by users, to its consequences" (Rogers, 1983, p. 135). Rogers (1983) believes we should increase our understanding of the motivations for adopting an innovation by asking "why" it was adopted. Innovation decisions are unique, distinctive and made based upon prior knowledge and experiences. To manage educational innovation more skillfully, we need to know more about why a particular innovation is or is not adopted economically, technically or socially. These relationships are the heart of this study, as the researcher seeks to identify attributes, common problems, and catalysts for success related to the diffusion and adoption of contemporary distance learning technology.

Need for the Study

Distance education is one of the most powerful new forces influencing the direction of education either through supply of distance learning technology or the demand for courses by society. Hardware for delivering instruction (satellite, cable-based television and computer networks) are available to virtually all educational institutions, as are multi-mediated courses (Evans & Nation, 1993).

The educational community challenge for the information age is (Holmberg, 1995):

- To restructure distance education to include strategic management.
- To create accessible, cost-effective, value-driven, high-quality services for the distance learning community.

Ely (1995) asserts that the glamour of distance education technology engulfs many schools before they fully understand what purpose it serves and the outcome of its adoption and use. Is the move to use distance education technology because it is necessary or because it is possible? "What we really need to know is why technology is in the school and how it is being used, by whom, for what purpose, how often, and what results have occurred as a result of its use" (Ely, 1995, p. 3). The answers are not in the technology itself, but in the people who decide

about the purpose of its use, the way it is used, and the evaluation decisions made about technology usage (Ely, 1995).

Purpose of the Study

This descriptive study examines an asynchronous distance learning program to identify characteristics critical to the diffusion and adoption process necessary for effective implementation. These attributes extrapolated from the review of literature and case study examination are critical to discern since many educational institutions are implementing distance learning programs without a plan or vision. The information resulting from this examination may facilitate adoption and diffusion of distance learning programs.

Based upon identified characteristics, the ancillary product of this descriptive case study is a compiled list and discussion of lessons learned, composed from the review of literature and case study examination, that can be used by any institution interested in implementing and improving distance learning programs. The study specifies how a mature asynchronous program dealt with the diffusion and adoption process, and usage through an examination of secondary documentation and archival record review coupled with program interviews.

The future of distance education has been the subject of considerable speculation in recent years. The researcher prepared for the case study by assimilating a broad spectrum of literature on diffusion and adoption, strategic planning, and distance education. The distance education section discusses its history; technology tools used for online course implementation, including examples of well-known distance learning universities; and meaningful measures of success. This review of literature provides a springboard to examine a mature asynchronous distance learning program and its diffusion and adoption process.

Diffusion and Adoption

Researchers agree that individuals become aware of an innovation randomly, either through their own research, through peers, or change agents (Rogers, 1983; Sherry & Billig, 2000). Change agents interact with and serve as a communication link between professional and client systems. Rigorous promotional efforts by change agents directly affect the rate of adoption (Rogers, 1983).

Rate of Adoption

The rate of adoption is the speed with which members of a social system adopt an innovation. It is measured by the length of time required for a percentage of people to adopt an innovation. There are five influential characteristics (Rogers, 1983): relative advantage, compatibility, complexity, divisibility, and communicability. An explanation of each characteristic is helpful in describing the innovation process.

1. *Relative advantage* is the degree to which the adopter perceives an innovation to be superior. Sub-dimensions of relative advantage are the degree of economic profitability, low initial cost, a decrease in discomfort, savings in time and effort, and the immediacy of the reward.
2. *Compatibility* is the degree to which an innovation is perceived to meet the needs of potential adopters. An idea that is compatible with previously adopted ideas and the cultural norms of a social system is adopted first.

3. *Complexity* is the degree to which an innovation is perceived to be difficult to understand and to use. The perceived complexity of an innovation affects its rate of adoption and simpler ideas are typically adopted first.
4. *Divisibility* is the degree to which an innovation may be experimented with on a limited basis. Early adopters face financial loss and peer ridicule if the innovation is inadequate. New ideas that can be tried on an installment plan, such as low introductory rates or money-back guarantees, encourage sampling without risk. Innovative peers may act as a "psychological trial" for the later adopters, since divisibility is less significant to them.
5. *Communicability* is the degree to which the results of an innovation may be disseminated.

Displaying an innovation's superiority in a tangible form increases the adoption rate (Rogers, 1983; Sherry & Billig, 2000). Rogers (1983) contends that communicability and visibility are the critical elements in moving an innovation towards adoption, which places members of social systems into adopter categories. "Adopter categories are the classifications of individuals within a social system on the basis of innovativeness" (Rogers, 1962, p. 148). Rogers (1983) places people into these categories: early adopters, early majority, late majority and laggards.

Early Adopters

Early adopters increased the rate of adoption because they vigorously experimented with new ideas and are in a technology savvy and financial position to do so. Rogers (1983) notes the first individuals to adopt a new idea do so because they become aware of the innovation before their peers or require less time to move from knowledge to decision. Early adopters serve as role models, have the greatest degree of opinion leadership, and are an integral component of the social system. Individuals who have a greater share of influence over a social system are referred to as "opinion leaders" (Rogers, 1983). Ely (1999) divides opinion leaders into two distinct groups: those who possess a vision about the innovation benefits and take steps toward promoting its acceptance, and individuals in government and higher education who are the innovation promoters and advocates.

Early and Late Majority

Early majorities interact regularly with their peers and are eager to adopt innovations. Late majority can be persuaded that an innovation is useful; however, they adopt it as a result of economic necessity. Both the early and late majorities require reassurance that there is adequate administrative and technical support available to them before they adopt (Rogers, 1983).

Laggards

Laggards adopt innovations last and are suspicious of anyone or anything associated with change. Research indicates there is significant shifting in a social system within categories, and laggards are the most likely to drop out of the social system. An individual does not necessarily remain in the same social position over time or products.

Adoption of Innovation

Damanpour (1988) and Rogers (1983) describe the organizational innovation process as one that occurs in two stages, initiation and implementation. Initiation includes all the information gathering, conceptualizing, and planning for the adoption of an innovation, leading up to the decision to adopt (Rogers, 1983; Zaltman, Duncan, & Holbek, 1973).

Initiation

The initiation stage is composed of two phases: agenda setting and matching. In the agenda setting phase, individuals in an organization identify an important problem and pursue an innovation as a means of solving it (Damanpour, 1988; Rogers, 1983). This is in contrast to the arguments of March in 1981, who states that organizations seem to be driven by solutions rather than problems and they continuously scan for and match any suitable innovation to any problem (Damanpour, 1988). Matching is the second phase of the organizational innovation process and it allows the conceptual matching of the problem to the innovation. This process helps determine how well the innovation might solve the identified problem.

Implementation

The decision to adopt marks the beginning of the second stage, implementation. Rogers (1983) describes this stage as the events, actions, and decisions involved in utilizing an innovation. The implementation stage is composed of three sequential phases: redefining/restructuring, clarifying, and routinizing.

1. The redefining/restructuring phase is the point when the innovation gradually begins to lose its foreign character or is reinvented to accommodate the organization's needs.
2. During the clarifying phase, the organization frequently uses the innovation for multiple tasks. It is in this phase that the meaning and advantage of the new idea becomes clear.
3. When the innovation has lost its separate identity and becomes a regular solution to the original problem, routinizing has occurred.

Rogers (1995) states the most crucial decision is *when* to begin diffusion of innovation and *how* to demonstrate its benefits. Brancheau and Wetherbe (1990) note that an organization should expect a delay between adoption of technology and how to use the tool effectively. They state it is important to recognize users who are likely to be laggards so that intervention strategies, such as training, can be designed for them. The type of support received early in the use of technology can encourage or discourage its acceptance (Geoghegan, 1995).

Geoghegan (1995) applies Rogers (1983) and Damanpour's (1988) research to the educational adoption process for information technology and instruction. He divides educators into early and mainstream adopters. Early adopters are technologically savvy and avid experimenters. They encourage revolutionary change and are visionary risk-takers. Early adopters are the first to adopt and use technology innovation. The negative result of their successfulness is it often sets inappropriately high expectations for predecessors. Mainstream adopters are conservative in their instructional approach and prefer incremental change. They commonly encourage evolutionary change rather than revolutionary change and are conservative, risk-reluctant, and problem oriented. Mainstream adopters prefer to concentrate on the processes and tasks rather than the tools used to address the problem. Table 1 summarizes the differences between early adopters and mainstream adopters. These differences apply to both education and industry.

Table 1

Information Technology Adopter Categories

Early Adopters	*Mainstream Adopters*
Encourage revolutionary change	Encourage evolutionary change
Visionary	Conservative
Strong technology focus	Strong problem and process focus
Risk-takers	Risk-reluctant
Largely self-sufficient	Need support from leadership and peers
Horizontally networked	Vertically networked

Source: Geoghegan (1995, p. 30)

The subsequent section discusses strategic planning, implementation and evaluation and concludes with a discussion on strategic management.

Strategic Management: Planning, Implementation, and Evaluating

In the planning stage, stakeholders are identified and mutual trust is established, followed by extensive training for all personnel involved in demonstrating the added value of technology and how to use it (Lau, 2000). Essentially, top management, stakeholders and vital customers jointly deliver an institutional vision and road map for achieving the vision within 3 to 5 years. The implementation and deployment stage is closely tied to adoption by end users. Evaluation "involves quantitative and qualitative judgements about the value of the material and its ability to achieve its given purpose" (Belanger & Jordan 2000, p. 17), and it should be an ongoing process. Evaluation is fundamental to planning because it provides an important link between planning cycles and also provides the opportunity for course-corrections.

Strategic Planning

In depth planning and efficient project management throughout the organization are essential to initiating change. The first step in planning a program is to analyze the organizational environment and identify performance problems. The identification of performance problems and learning needs of the administration, faculty and students is part of a systematic quality improvement program and critical to any strategic plan.

Two common reasons for failure are (Chute, Thompson & Hancock, 1999)--

1. Insufficient planning and unclear guidelines.
2. Poor strategic management during the implementation phase.

Case studies reveal a direct correlation exists between the extent of planning and the degree of success achieved (Belanger & Jordan, 2000; Lau, 2000; Minoli, 1996). Picciano (2001)

identified the following four elements to successful planning in a review of educational planning processes:

1. Comprehensiveness.
2. Collaboration.
3. Commitment.
4. Continuity.

Jennings and Dirksen (1999) describe a "diffusion of technology" planning process used at the University of Northern Colorado to implement Web-based learning in the School of Education which utilizes three of Picciano's successful planning elements. Jennings and Dirksen (1999) observed that collaboration and commitment by administrators and faculty directly influences the success or failure of the process. However, their concluding remarks were that planning for any technological change must be viewed as a continuous process and "not as one single event."

Researchers insist that to understand the impact distance learning can have, one must understand what is happening in the external world that may impact on the institution and its activities. The subsequent sections discuss the importance of dealing with change.

Change

Government, business, and communities are increasingly focused on competition in the twenty-first century. Studies in this area have moved beyond investigations of individual businesses and industries to concentrate on the nation as a whole (Porter, 1990). For a nation to be competitive, it must first have a skilled and educated workforce. As the economy is being restructured, new paradigms of competition, organization, social relations, work, and education develop.

Drucker (1991) explains that due to emerging demographics in Europe, United States, Japan, and to supply factors, it is going to be increasingly difficult for university schools of management to recruit skilled candidates. Supply is affected by an attitude that technical and scientific skills are not valuable. Our society rewards athletes and vocal radical social spokespersons, but underpays and does not adequately recognized its teachers, engineers, manufacturing experts, and scientists. United State's youth are not motivated to study in difficult unrewarded subjects and schools are not keeping up in depth and rigor of mathematics and science education (Drucker, 1991).

Government deficits have become a major constraining factor as governments are facing expenditure growth not matched by revenue growth. A major roadblock in the United States is the public refusal to accept more taxes while demanding more social programs. Until this paradox is resolved, there is bound to be continued deficit funding (Drucker, 1991). Initiatives are being implemented without additional funding in education. For example, President Bush responded to societal demands with his Education 2000 program, which foresees the establishment of a series of new and innovative schools as pilot projects. Technology is perceived as a big part of these new schools. This begs the question, does this initiative mean new funding and, if so, where does it come from?

Implementation

Telecommunications and the computer have the potential to significantly change distance education when incorporated into the strategic plan and seen as a valuable component of the adoption and diffusion process. Each work independently to add to the quality process and each can be coupled with technology to enhance the learning process and diversify education to meet

various learning styles. Successful implementation of these two technologies radically changes the way the organization operates, leverages its effectiveness and opens up new horizons for the organization.

To deal with rapid change and complexity, the organization must become a learning organization. A plethora of materials is flooding the shelves of managers and others interested in creating and sustaining the learning organization. Techniques such as Total Quality Management, Just In Time Management, and Quality Function Deployment are the focus of these materials. Schauer, who serves as a National Examiner for the Malcom Baldrige National Quality Award as well as for the U.S. President's Quality Award, summarized this movement as a process that examines quality of activity in every part of the service. At the same time, these management techniques search for continuous improvements and strive to provide the service, or product, better than the competition (Irwin Schauer, personal communications, September 23, 2001; March 8, 2002). In education, the quality of what is provided to students stems from the quality of the learning experience, the content and process, and the support services necessary to assist students to become both independent and interdependent learners. It must be future-oriented to anticipate learning needs that students anticipate completing upon completion.

Continuous improvement tools are core provisions of the learning organization. Educational institutions world-wide are beginning to use these methods, models and frames as foundations for strategically reevaluating the operation of their infrastructure. Murgatroyd (1996) and Schauer (personal communications, September 23, 2001; March 8, 2002) state the learning organization must take a systemic view of its business and environment. Using strategic management and techniques such as cross-functional teams (Murgatroyd, 1996) for systematic outside-in thinking and continuous learning, allows the distance education organization to create new structures appropriate to changing realities. The literature reviewed repeatedly mentioned Mrs. Fields Incorporated, the Western Governors' University, the United Kingdom's Open University and Athabasca University in Canada as quality reformed learning organizations committed to strategic planning. A brief discussion of each follows highlighting specifics on how they dealt with change and reform.

Mrs. Fields Incorporated

Mrs. Fields Incorporated operates in the retailing sector by baking fresh cookies. A strong interrelationship exists between the people side of the business and the analytic and strategic functions. Walton (1989) notes the following two key competitive factors essential to attracting and retaining cookie store customers:

1. A pleasant and responsive store culture.
2. A high-quality product.

These two simple attributes separate Mrs. Fields cookies from the rest of the competitive market and create loyal customers.

Walton illustrates that among other initiatives to maintain high motivation among store managers and employees at Mrs. Fields has been the use of two types of advanced instructional technology systems. PhoneMail, supplemented by FormMail, answers the phone and takes, stores, replays and transfers messages, putting Debbi Fields' voice into every store. Debbi Fields has a standing promise to respond to managers' messages within 48 hours. Daily Planner helps managers plan each day's activities. For instance, it analyzes store historical data to predict hour by hour, product by product what is needed to meet the day's sales projections. It provides helpful suggestions when patterns depart from normal. However, it does not replace the manager's judgement; it augments his or her decision making with up-to-date information.

The Western Governors' University

In response to societal demands for learning organizations, ten western governors established the Western Governors' University in 1996. The Western Governors' University is an accredited, degree-granting institution that draws on the curriculum and faculty resources of numerous institutions (public and private, educational and corporate) to provide learners with broad access to education at a distance. Moreover, ranges of student services are provided through electronic and other non-traditional means. The most significant change to both students and traditional institutions is the shift from "inputs" to "outcomes" (Connick, 1997).

The Western Governors' University is not focused on the number of traditional credit courses a student accumulates, but rather on certifying the learning outcomes that one achieves, either in the classroom or on-the-job. Thus, a student may demonstrate competency in a variety of ways, such as through self-instruction or military training, in addition to traditional credit courses.

The United Kingdom's Open University

In 1986, the Open University reviewed their procedures for assuring academic standards. They concluded the following areas needed improvement (Evans & Nation, 1993): external examiner system; academic advisory committee; accreditation by external professional bodies; appointment procedures for full-time academic staff; and external involvement in the preparation of courses. Minimal emphasis in the 1986 report was placed on course presentation and student services or on the role of the regions and regional staff in maintaining academic standards. At that time, neither quality of customer service nor staff development was a prominent issue in the University.

Two major reviews followed the 1986 effort to improve the University, the *Long Term Review* and the *Strategic Academic Review*. These reviews investigated ways of producing materials more effectively through electronic publishing and methods of classifying courses to ensure that students progressed through increased independent learning (Evans & Nation, 1993). In practice, the *Long Term Review* resulted in minimal change in course presentation and student support areas. The *Strategic Academic Review* of the University's policies covered much of the institution's activities and led to a renewed burst of energy within the University (Evans & Nation, 1993).

A major product arising from the strategic review was the agreement of the University Senate to distribute the admissions process to regional centers. The aim was to gain more control over this process and ultimately provide better service to applicants and students. It came to fruition in the fall of 1992. This radical change was the forerunner of many developments, which emphasized student support services.

The strategic review also recommended a thorough review of the good practice ensuring the quality of services to students. This review encouraged a move toward improved quality in counseling services and emphasized a student-centered approach for anyone enrolled regardless of domicile or program. The review showed the Open University was lacking a clear system of collecting and using student feedback (Evans & Nation, 1993). The review concluded that an effective system begins with the customer, the student, and how they perceive aspects of the services provided.

Athabasca University

The Shamrock organization, which parallels the learning organization, consists of three leaves (Handy, 1989):

1. The core.

2. The contractual fringe.
3. The flexible labor force.

Each leaf of the shamrock must be managed differently, yet be a viable part of the whole. The shamrock core for a distance university would consist of a small productive group of academics, professionals, and support staff. Each is skilled in distance educational practice and an expert in a specialization. The core sets direction, develops the organizational vision, and provides the leadership in developing a cohesive and innovative curriculum. Research in both discipline and distance education is a primary function of the core.

Bates (1991) discusses the Faculty of Administrative Studies at Athabasca University as a core with 25 individuals. This group manages three-degree and five-certificate programs, as well as the courses, which in various combinations compose the programs. There are about 5,000 course registrations representing over 2,000 students. In addition, faculty is involved in a number of additional projects.

Five people support the office full-time. The core includes two editors, two academic personnel, and one instructional designer who reside in the office and support the program. The staff is becoming more mobile as they begin to manage contracts to free-lance editors. Telephone and email are the daily communication medium. A monthly faculty meeting brings everyone together; other meetings and retreats are scheduled as necessary.

In addition to having responsibilities in teaching and research, academic personnel at Athabasca also have managerial duties. They are responsible for contracted tutors and examination/assignment graders, as well as instructional designers who are writing other course materials. Academic personnel are also required to be familiar with distance education technology and learning theory.

Regardless of the composition of the core, the key concept is simple. A small, compact, and cohesive group carries out the central functions, while contractors and part time workers carry out the work of the institution. The contractual fringe includes academics hired for particular tasks in preparation of materials and for teaching, and instructional designers are contracted for specific projects. Other individual companies are hired for activities in accounting, computing, printing, media tasks, and consulting in program design. The components of the contractual fringe are integrated into and networked to the core through information systems and computer mediated communications networks.

The flexible labor force consists of individuals doing part-time tutoring, counseling, advising, secretarial work, and lab supervision. Peak periods in registration, exam grading, and other related activities require the use of a flexible part-time labor group to avoid adding permanent staff for those activities. The flexible labor force is networked to the core, and where necessary, to the contractual fringe, through the computer-mediated communications network and strategic information system.

Mrs. Fields Incorporated, the Western Governors' University, the Open University and the Athabasca University were involved in quality management projects for over a decade, and despite their success, their reforms have only scratched the surface of quality issues and provided a framework for future learning organizations. The process focused on line managers and the service quality initiatives made considerable impacts on the quality of products and services.

While these examples focused on quality management of individual institutions, there is a broader notion of quality, which emphasizes the importance of an integrated educational system (Evans & Nation, 1993). Joint academic programming and research, credit transfer between institutions, and reduction in residency requirements are some examples of cooperation and

integration in the name of quality and efficiency, which affect all educational systems (Evans & Nation, 1993).

Evaluation

There should be no illusion about the difficulties of implementing and sustaining quality management programs in institutions and there is no substitute for quality in distance teaching. Quality does not come inexpensively or easily, but it is critical that it is planned for, implemented and monitored, and continuously evaluated. This involves hiring and retaining highly competent, experienced staff, and providing sustained support for students as they struggle with learning at a distance. Reform is linked to the strategic plan and is as much about change in values as it is in structures and processes. Strong, consistent and sustained leadership is fundamental to organizational change (Evans & Nation, 1993; Schauer, personal communications, September 23, 2001; March 8, 2002). Ultimately, demonstrated commitment to service for students enhances the institution's commitment to research, scholarship and learning.

The quality in distance education is best measured by its impact on students—their experiences from the beginning, such as advising, counseling, and the learning experience (Evans & Nation, 1993). The process is the tools and procedures used in educating students, and the product is the student and the knowledge gained from the program and its application in society. Effective evaluation should also obtain metrics from industry on how their product is performing and how to improve the overall educational process. This step is essential to ensure the progress being made is meeting societal demands and are in line with the established organizational vision. Effective staff development is critical to produce quality student support. This requires value-driven leadership, which is prepared to plan and build for the long run. The cardinal test of a value system is not what leaders advocate but where they allocate resources (Evans & Nation, 1993). This leads to the fundamental question of whether quality can be improved while resources are reduced. While most educational institutions have found ways to do more with less, there is presumably a point beyond which it is no longer possible to preserve quality with diminishing resources (Evans & Nation, 1993).

This viewpoint suggests that it is not possible to operate a quality education system purely on market forces and likewise not possible to improve services to students, to widen access and to develop equal opportunity policies without having the necessary resources. It is not possible to maintain quality distance teaching materials if there are fewer staff available to develop them and to go through the processes of writing, working and learning together, which are essential to the production of high quality teaching materials (Evans & Nation, 1993).

As distance education in the United States increases in importance, evaluation continues to be a critical component of the process of improvement. Sweeney (1995) realized the importance of quality program evaluation and designed a model for distance education programs.

An Evaluation Model: AEIOU

Sweeney (1995) proposed an AEIOU approach for program evaluation, specifically for distance learning projects. The effectiveness of this approach has been demonstrated during its use in evaluating the activities of the Iowa Distance Education Alliance, Iowa's Star Schools Project (Simonson & Schlosser, 1995), a four-year statewide distance education activity. The AEIOU approach has two purposes as an evaluation strategy:

1. It provides formative information to the staff about the implementation of their project.
2. It provides summative information about the value of the project and its activities.

The AEIOU evaluation approach provides a framework for identifying key questions necessary for effective evaluation. Some evaluation plans use only parts of the framework while others use all components. Presented are examples of evaluation questions asked in comprehensive distance education projects. The evaluation components are as follows (Simonson & Schlosser, 1995):

- Accountability.
- Effectiveness.
- Impact.
- Organizational context.
- Unanticipated consequences.

Simonson and Schlosser (1995) discuss accountability as the first step in determining the effectiveness of the project. It is targeted at determining whether the project's objectives and activities were completed. Evaluation questions center on the completion of a specific activity and are often answered yes or no. Accountability information is collected from project administration records and centers on participants and activities. Project leaders are asked to provide documentation of the level of completion of the project's goals, objectives, and activities. Evaluators interview project staff to collect accountability data.

The effectiveness component of the evaluation process attempts to place value on the project's activities. Effectiveness questions focus on participant attitudes and knowledge (Simonson & Schlosser, 1995). Grades, achievement tests, and attitude inventories are measures of effectiveness. Raters are asked to review course materials and presentations to determine their effectiveness. Student evaluations are used to collect reactions from distance education participants. Standardized measures of achievement and attitude are used to determine program effectiveness. Surveys of students and faculty are used to identify perceptions about program appropriateness. Focus groups and journals provide additional valuable information on daily effectiveness.

During the impact phase of evaluation, questions focus on identifying the changes that resulted from the project's activities (Simonson & Schlosser, 1995). A key element of measurement is the collection of longitudinal data. Evaluators use follow-up studies to determine the impressions made on students. Distance education program participants are monitored and questioned by evaluators in subsequent courses and activities. Qualitative measures provide the most to the evaluator interested in program impact. Standardized tests, record data, surveys, interviews, focus groups, and direct observation are also used.

Organizational context consists of structures--policies or events in the organization or environment--which helped or hindered the project in accomplishing its goals (Simonson & Schlosser, 1995). Simonson and Schlosser (1995) purport this portion of evaluation determines barriers to the successful implementation of distance education systems. The focus of this component is on identifying contextual factors that contributed to, or detracted from, the project's ability to effectively conduct activities. Effective evaluation of organizational context requires the evaluator to be intimately involved with the project in order to increase awareness of the environment in which the project operates (Simonson & Schlosser, 1995). Organizational context evaluation uses interviews of key personnel, focus groups made up of those affected by a program, and document analysis that identifies policies and procedures that influence a program.

Evaluators report anecdotal information about the project, which provides a rich source of information about why some projects were successful. Interviews, focus groups, journals, and

surveys requesting narrative information are used to identify interesting and potentially important consequences of implementing new programs (Evans & Nation, 1993).

The key to strategic management of organizations and change is the development of people within the organization through the creation of a learning community. High performing organizations offering distance education may emerge from a variety of sources: educational institutions have no monopoly over the enterprise of learning. To be responsive, organizations need a focused service strategy, a simple relatively flat organizational structure, and challenging goals. These critical planning elements identified for industry transfer to academia.

The counterpoint is that it is highly unlikely that new resources are going to accrue to universities, at least not through the traditional route of government funds. The escalation of costs and demands upon municipalities, hospitals, and schools all compete with those faced by universities. While part of the answer is for universities to be more accountable, with their role and importance better understood by the taxpayer, it surely lies more immediately in the way they conduct themselves. Evans and Nation (1993) state is it critical to "find new ways to teach and learn, to conduct research and to harness the potential of new technologies" (p. 128).

Being clear about the instructional objectives, strategies, and outcomes required for system support is essential for planning, deployment and evaluation. Realizing objectives, such as having students acquire an understanding of and appreciation for human diversity or the virtues of public service, employing strategies such as classroom assessment or collaborative learning, or requiring demonstration of outcomes though student portfolios or competency testing, all place challenges on an information service system. Keys to strategic management are illustrated in Table 2.

Table 2

Keys to Strategic Management

- Creating a vision for the organization.
- Developing clear objectives, strategies, and outcomes required reaching the vision.
- Directing, supporting and the aligning business, organizational and technological strategies.
- Committing organizational to, and ownership of, the instructional technology system.
- Establishing internal support systems.
- Developing, training, and educating people within the organization.
- Producing a quality product.
- Devising metrics to evaluate the program.
- Encouraging continuous input-output improvement.

The subsequent section discusses distance education. It begins with a historical introduction, segues into strategic management application in an online learning environment that highlights planning for access and costs. A discussion on support services critical to implementation, distance learning technology tools, including digital libraries, online learning communities and interactivity follows. A discussion on institutional support services as they relate to organizational effectiveness concludes the section.

Strategic Management in an Online Environment

Higher education's current structure was created during the baby-boom era (Picciano, 2000). The great expansion of public higher education took place after World War II with the return of the veterans, the launching of the G.I. Bill, and the great baby boom of the late 1940's and 1950's. Across America, hundreds of new institutions expanded or were created. In 1950, approximately 90 percent of the students attending college were between the ages of 18 and 21. Campuses housed young and full-time students while providing access to a plethora of services in the 1960's and 1970's.

In the 1970's change was under way in American society. A service and information economy began to replace the industrial economy. Of significance for education, the number of 18 year-olds began to decline. To bolster enrollments, colleges began to recruit adults. In the United States today, only 52 percent of college students are 18 to 21, and fewer than 15 percent fit the profile of the residential student—young, full-time, and living on campus (Palloff & Pratt, 2001).

Planning

The origins of the changes in education in a remarkable short span of time indicate the speed with which a new educational culture is emerging. The question is not whether a new higher education paradigm will develop, but rather how fast will it occur? Although we cannot fully answer that question, we can begin to see an outline of higher education that is easier to access and more cost effective.

Access

Access to technology is an important issue globally. In the United States, concern exists regarding the evolution of a nation of information "haves" and "have nots." In countries like Brazil, Germany, France, Spain, and China, the cost of accessing the Internet is so high that a number of "cyberstrikes" have been staged protesting government policy and lack of intervention (Picciano, 2001). In the poorest developing countries, many do not yet have access to basic telephone services. Nations that cooperate and invest billions of dollars in building a space station need to exert the same effort in resolving the inequity that exists regarding access to what is increasingly being seen as important educational technology (Holmberg, 1995; Mambretti, 1999; Picciano, 2001).

In April 1999, The College Board and The Institute for Higher Education Policy released reports suggesting that policy makers proceed with some caution regarding implementing distance learning. The College Board's report, *The Virtual University and Educational Opportunity—Issues of Equity and Access for the Next Generation*, (http://www.collegeboard.org/policy/html/virtual.html), targeted access as its theme. Focusing primarily on Internet-based distance learning courses, the report argued that information "have-nots" are at a distinct disadvantage when it comes to taking courses online. A major barrier for the traditionally underrepresented in higher education—African Americans, and Hispanics—is

the lack of computer or online service both in the home and in elementary and secondary schools. For instance, three-quarters of households with incomes over $75,000 have a computer, compared with one-third of households between $25,000 and $35,000, and one-sixth with incomes below $15,000 (http://www.collegeboard.org/policy/html/virtual.html). The report recommends that institutions make access a fundamental goal when designing online courses and strike a balance between traditional and technology-based delivery. The report urges government policy makers to take steps to ensure equality in distance education, while suggesting that the communications industry look beyond the bottom line to increase access to technology for lower-income, less-advantaged citizens (http://www.collegeboard.org/policy/html/virtual.html).

A shift from measuring educational inputs to measuring student outputs and educational outcomes is inevitable. There is less emphasis on evaluating how well faculty taught and more on what was learned. In addition, the academic enterprise begins to move along a continuum from synchronous instructions to asynchronous instruction, thus placing more learning options in the hands of consumers (Connick, 1997; Drucker, 1991). Easy access to technology is one of the key factors in determining student satisfaction and success with a technology-mediated course. Providing equally easy access is difficult.

Doing more with less appears to be the major agenda of higher education in the future. As previously discussed, the labor-intensive and facilities-intensive current structure need to be reassessed, and the result is reorganization and downsizing in order to survive tight budgetary times. The technologically agile and outcome oriented competitive institutions are likely to succeed.

Cost Effectiveness

"Of all the aspects of technology that deserve examination, the financial implications come first. On the one hand, the level of technological development in a country is strongly correlated with its economic status; on the other, the amount of funding at risk increases rapidly with the degree of technological sophistication" (Semper & Coggin, 1976, p. 5). Economics plays a key role in diffusion, since it depends heavily on equipment and material profits (Semper & Coggin, 1976).

While the costs of specific aspects of distance learning are well known, little has been written about the total scope of cost analysis in distance degree programs. Even among colleges that are involved in distance degrees, differences exist in how costs are identified, what costs are considered part of the degree program, and where benefits of substantial value have accrued to the program from planning and purchases. The entire area of cost assessment and the development of cost models need future research. Answers should emerge from more experience and the involvement of many more institutions in the process.

Ascertaining accurate costs and benefits of information and service options is essential to properly allocating resources effectively. Many institutions do not have extensive experience or effective tools to do so. Although technology is often seen as a cost-saving device, that is not always the case. Conceptually, developing and calculating the true cost is the first and critical step in this process. Developing a program is the next and most complex process, and evaluating the effectiveness or benefits of technology for students is an even more difficult task. Those processes are beginning to be addressed.

FLASHLIGHT

The Annenberg/Corporation for Public Broadcasting is sponsoring a project called FLASHLIGHT aimed at developing a cost model that institutions can use to calculate the true cost of their educational technology implementations. In addition, this project produces an item

bank of questions for creating evaluation instruments to assess the effectiveness of the use of technology (Ehrmann, 1997).

RAND

A recent survey conducted by RAND (reported in *The Economist*, March 2-8, 1991) indicates that courses delivered using the Internet can help to cut central administrative costs while reaching out to more students who are beyond the confines of the university. The lower delivery costs afford universities the opportunity to maintain small class sizes without reducing course revenues. The survey further suggests that offering these types of courses is having an impact on the way universities are organized.

Faculty Compensation Study

Faculty are motivated to participate in distance learning programs when online classes are included in their teaching loads and not considered an add-on (Verduin & Clark, 1991). Motivation increased when faculty felt they were adequately compensated for the amount of work required. Faculty felt less motivated to teach in distance mode when they did not feel institutional support. The study stated that the amount of work required, coupled with the time involved to adapt instruction for distance delivery and to learn new skills associated with the technology, posed significant barriers to participation when added to an already heavy workload. Similarly, promotion and tenure policies that reward distance teaching on the same level as classroom teaching strengthened the credibility of distance teaching both among faculty member cohorts and within the institution.

The provisions of distance learning options may not be less expensive for the institution. Although the institution saves money on the use of classroom space, the costs of the technology, transmission, maintenance, infrastructure, production, support, and personnel all need to be factored into the mix. If the FLASHLIGHT, RAND and faculty compensation study are correct and the very nature of our academic institution changes as the result of the implementation of distance education, grappling with issues of cost, evaluation mechanisms, and compensation will not be a concern in the future.

Implementation Tools

Clark (1983) created a stir in the educational technology community and claimed there was nothing intrinsic to media that made a difference as to how well people learn from mediated instruction. He demonstrated that studies showing superior performance by students in mediated treatment groups were methodologically flawed or seriously confounded. Such studies were open to equally viable alternative interpretations. Clark concluded it was instructional methods that made the difference, and urged researchers and practitioners to focus on methodology rather than the media tools, which delivered instruction. Media may not affect how well people learn, but there is no denying that media greatly affect the efficiency with which instruction is delivered (Clark, 1983). Table 3 compares the advantages and limitations of various technologies, followed with a discussion.

Table 3

Advantages and Limitations of Various Technologies

Technology	Advantages	Limitations
Print		
Textbooks, Study Guides, Syllabi, Assignments, Workbooks	Easy to Use, Familiar, Spontaneous, Inexpensive, Portable, Self-Paced	Non-Interactive, Dependent on Learner Reading Skills, Passive, Self-Directed
Audio		
Audiocassette	Easy to Use, Portable, Inexpensive, Self-Paced	Non-Interactive, Passive, Self-Directed, Requires Printed Study Guides
Radio	Mass Distribution, Easy to Use	Non-Interactive, Requires Printed Study Guides, Non-Graphic
Audioconferencing	Interactive, Immediate Feedback	Non-Graphic, Development Time, Requires Printed Study Guides
Audiographics	Interactive, Immediate Feedback	Requires Printed Study Guides, Limited Graphics
Video		
Videocassette	Easy to Use, Self-Paced, Graphic	Non-Interactive, Passive, Self-Directed, Requires Printed Study Guides
Television	Mass Distribution, Graphic, Easy to Use	Non-Interactive, Requires Printed Study Guides, Development Time, Expensive
Videoconferencing	Interactive, Graphic, Immediate Feedback	Development Time, Expensive, Complex Technology
Computer (Digital)		
Packaged Software	Interactive, Multimedia, Self-Paced	Development Time, Expensive, Complex
Synchronous/Network	Interactive, Multimedia, Immediate Feedback, Participative	Development Time, Expensive, Complex
Asynchronous/Network	Interactive, Graphics, Self-Paced	Development Time, Expensive, Complex, Access to Technology, Rapidly Evolving

Source: Picciano, 2001, p. 49

Print

Print is the most commonly used technology in education, including distance education. Textbooks, journals, newspapers, syllabi, tutorials, assignments, tests and papers commonly consist of printed materials. While the demise of the printed word has been predicted as a result of the growth of mass media and the evolution of the electronic age (Belanger & Jordan, 2000), in education, the printed word continues to thrive. However, the typical correspondence course of a decade ago that relied entirely on printed materials, such as a self-study guide and tutorial, is just as likely today to include a videocassette, a floppy disk, a CD-ROM and/or access to a Web site. The movement and evolution away from printed material continues as more people gain access to electronic technologies (Belanger & Jordan, 2000).

Audio

Audio technologies rely on the spoken word and sound for instruction. Audio was the next logical step in the evolution of distance learning technology. Like print, it is familiar, depends on the nature of the application, and is relatively easy to use. The major drawback of all audio technologies is that graphics are either not possible or limited. Most audio technologies also require study guides and additional material to supplement content (Anderson & Garrison, 1995; Hardy & Olcott, 1995).

Videocassettes and Television

Videocassettes and educational television have been important vehicles for providing high-quality distance learning materials and activities for decades. Recently, interactive video technologies delivering high-quality stimulating class materials have emerged that allow learners to interact and participate in discussions and activities. The new interactive video technologies are presently complex and expensive but have established themselves as major distance learning delivery systems.

Computer or digital technologies incorporate most of the capabilities of print, audio and video while permitting a degree of user control (Anderson & Garrison, 1995). In distance learning applications this has important ramifications. Computer technology is often referred to as digital technology because all instructions, symbols, and information are stored as a series of electronic binary digits. Letters of the alphabet, numbers, sounds, and images are converted into a series of binary digit codes that are interpreted and executed by various types of computing/digital-based equipment. Printing, audio, and video have previously used mostly analog technologies that require continuous physical property such as voltage, airwaves, or frame processing. However, for media distribution, many formerly analog-based technologies are converting to digital technology (Picciano, 2001). Literature suggests the wave of the future is the domination of digital technology and digital libraries (Picciano, 2001).

Digital Libraries

There is currently a plethora of online information services, and, as access continues to grow at an exponential rate, so does its complexity. The challenge faced by distance learners is how to acquire the most current and relevant information to facilitate the process of transforming data and information into a shared body of knowledge. Teaching students and faculty how to effectively apply the increasingly sophisticated search methods available online is an important function of the digital library. For this reason, strong library instruction programs are critical (Bloch & Hesse, 1993; Gasaway & Wiant, 1994; Murray, 1995; Westin & Finger, 1991), as are innovative flexible librarians to keep up with the changing technology.

The role of the librarian has been transformed from the traditional search and retrieval role. Today's librarian has increased responsibility to provide guidance in the use of technology,

to access information from varied locations, to collaborate with faculty, and to develop learning opportunities for distance learners (Boch & Hess, 1993; Murray, 1995). Through technology innovation, librarians work closely with faculty and distance learners to provide materials and reference as well as instructional services. This collaboration contributes to the trend to develop academic teams of library personnel, faculty, and distance learners to facilitate online learning communities (Bloch & Hesse, 1993).

Online Learning Communities

Distance learners by definition are not in the immediate presence of their instructors, so essential interactions between teachers and students that help clarify information are critical. It is important that instructors facilitate the organization of learning communities (Verduin & Clark, 1991). Learning communities are groups of students who meet face-to-face or through electronic means. These groups provide opportunities for students to teach one another, to clarify course-related questions and assignments, to receive academic and social support, and to develop relationships that extend beyond the duration of the telecourses.

Faculty promote learning communities by creating reliable means by which learners may interact face-to-face and at a distance through study groups in specified geographic locations, or through listservs or electronic bulletin boards where students can interact freely through email. Questions, responses, or comments may be shared by email with all course participants, several particular participants or just one student, thus encouraging interaction.

Palloff and Pratt (1999) indicated that an introverted person might become more successful in an online environment, given the absence of social pressures that exist in face-to-face situations. Conversely, extroverted people may have more difficulty establishing their presence in an online environment. They go on to identify the following characteristics common to students attracted to online learning (Palloff & Pratt, 1999):

- Voluntarily seek further education.
- Motivated with higher expectations of learning.
- Self-disciplined and goal oriented.

The requirements of effective learner support vary depending upon the unique needs and characteristics of the learner and their learning style. One important factor to success appears to be motivation and confidence of the learner. Less confident learners may need more group support than more confident learners. Less motivated students may benefit by more interactions with the teacher. While students take responsibility for interactions in most systems, it appears that systems that which encourage interaction show improved retention.

Interaction

Garrison and Baynton (1987) bridge the interaction/autonomy gap using the concept of learner support as a source of learner power and control. This two-way communication enables learners to modify the learning environment to obtain the support, required to gain control over the learning process. Through an audio teleconferencing system a learner might seek out a study skills program organized by the institution or participate in an extemporaneous study group. The difficulty lies when the needed support systems have not been planned for or incorporated into the program.

Moore, as cited in Keegan (1996), describes the interrelationships between dialogue, structure and autonomy. Greater “transactional” distance requires more learner autonomy and provides less teacher control. This is illustrated in Table 4.

Table 4

Transactional Distance

Low Structure → High Dialogue = Learner Control Potential is High
High Structure → Low Dialogue = Teacher Control Potential is High

Saba (1988) incorporated systems theory into a theoretical framework to develop a mode describing the interrelationship between structure and dialogue through integrated telecommunications media. The level of structure and the level of dialogue are negatively related, so that as one increases, the other decreases. Thus, the instant two-way communications provided by the telecommunications technologies expedites the interrelationship between dialogue and structure.

Bates (1991) summarizes interaction by stating that the main advances in distance education stem from the technologies that increase interaction for the learner. Use of computer mediated interactive communication and instruction informs the learner and encourages control over learning. The educator assumes a different position in space and time in relation to the learner and to the educational organization.

The literature offers evidence supporting teleconferencing technology systems provide greater opportunities for learner control and tend to be higher in dialogue and lower in structure, thus lending credence to Bates' theory of integrated systems (Bates, 1991; Garrison & Baynton, 1987; Saba, 1988). The literature also suggests that two-way communication tends to be more responsive to institutional needs rather than to learner needs. Likewise it appears that in these systems the amount of dialogue and structure are a function of the teacher (Saba, 1988).

The essence of the implementation tools discussion lies in the concept of interaction, since two-way communication is one of the two features which characterize distance education, the other being distance. Figure 1 illustrates the two-way communication process.

Figure 1. The Two Way Communication Process

Source: Garrison and Shale, 1990, p. 33

The interactivity enabled by two-way technologies providing real-time exchanges of audio, video, text, and graphical information among distributed participant's serves as one of distance learning's primary identifying characteristics. The use of such technologies also contributes to perceptions of distance learning quality (Sherry, 1996).

According to Connick (1997), faculty should focus on the outcomes of interaction to improve student performance. In this context, interactions have two purposes:

1. Change learners in some meaningful way.
2. Move learners toward an action state of goal attainment.

He states that by emphasizing the outcome of an interaction, one can see the effect that an interaction has on learners. Those effects are listed below (Connick, 1997):

- Interactions allow learners to tailor learning experiences to meet their specific needs or abilities.
- Interactions enable clarification and transfer of new ideas to a mastered concept.
- Interactivity encourages learner motivation by highlighting the relevancy of new information and integrating it into their personal knowledge.
- Interactions enable active learner participation in the performance improvement process contributing to the overall effectiveness of the program.

The issue of interaction is significant to our understanding of learning because interaction is a vehicle through which we can observe thinking. Interaction is a requirement for learner control as explained by Garrison and Baynton (1987). Distance learning practitioners view interaction as the defining attribute of a contemporary distance learning experience (Belanger & Jordan, 2000; Hezel & Dirr, 1991; Lau, 2000; Minoli, 1996; Sherry, 1996).

Support Systems

The literature reviewed indicates that implementing successful counseling, advising and tutoring services for students can increase enrollment, thus improving the overall effectiveness of the program. These three components are critical to students and valuable in the evaluation process.

Counseling and Advising

In academia, counselors are people centered and focused on helping the student identify and achieve goals (Moore, 1989), while advisors assist students in finding answers to specific problems dealing with course enrollment, study skills and time management (Moore, 1989). Both jobs are critical to students entering a distance learning program through matriculation. Studies indicate that such services are most critical at the pre-enrollment juncture.

De Anza College Distance Learning Center offers student self-assessments prior to enrollment. This assessment titled “Are Distance Learning Courses for You?” ask probing questions in a survey format about lifestyle. It forces inquiring adults to assess their time and commitment to the program to determine if distance learning courses meet their needs. Many of the students who think they want to enter the program decide not to. This has proven to be a powerful evaluation tool due to increased matriculation rates (http://dadistance.fhda.edu/DLCQuestionnaire.html).

Moore (1989) states that high student dropout rates can be reduced through the use of counseling and carefully developed recruitment programs. Prior screening of adult secondary distance education students prior to enrollment is helpful (Moore, 1989). A study technique program to teach learning strategies was also found useful. He concluded that comparative dropout rates have little meaning unless a variety of factors are taken into consideration. High among those factors are admission policy, entrance qualifications, and enrollment. Increasingly the message of a variety of studies is that what happens at the earliest stage of recruitment, admission, and enrollment is important in determining the success or failure of students enrolled in distance education programs (Moore, 1989).

Athabasca University instituted a wide ranging program of pre-admission services including information dissemination, orientation, and self-assessment questionnaires designed to assist students enrolling into distance education programs analyze their reasons for returning to study and their commitment to it. Distance education institutions have a special responsibility to ensure that prospective students are not set up for failure by the promise of accessibility and flexibility (Bates, 1991).

Keegan (1993, 1996) noted the success of the Open University was primarily due to the student support services provided by the Regional Tutorial Services Unit. These services focused on reducing the student dropout rate by providing student counseling. Tutors interact with students in a number of ways, including written contact, characteristic of traditional correspondence study; phone contact; video, audio, and computer conferencing; radio communication; and face-to-face via technology tools. Computer conferencing technology permits tutorial activity, interaction among and between students and tutor/instructors, and provides a pacing element that facilitates assignment and course completion (Bates, 1991). Another aspect of tutorial services having a direct impact upon student success in the completion of distance education courses is pacing (pre-scheduled phone calls) which responds to registration, sending out materials, and receiving materials from tutors.

Bates (1991) reported on a project conducted at Athabasca where six different courses were delivered in two different modes: home study and paced package. Students in the home study course received tutorial support via the telephone and progress through the course was at the discretion of each individual learner. Students in the paced package course received tutorial support via the classroom instructor and progress through the course was instructor determined. Results showed that the completion rates for the paced package course were much higher and, therefore, more efficient.

Systems for providing campus-based students access to the information services they need through computer-based systems are progressing and many are becoming easily accessible though the World Wide Web. The University of Maryland's online student information service called Testudu is a good example (University of Maryland, 1996). As institutions increasingly recognize the value of providing integrated comprehensive and accessible student services, extending campus processes of service providing may prove to be more adequate for distance education. Another service institutions are providing is testing sites for faculty to design and extract testing materials for online courses.

Testing

Many institutions require distance students to take formal examinations on campus. In some instances, institutions operate testing centers, which are proctored sites where examinations can be taken days, evening, or weekends. Students are often given a week to take examinations on file in the testing center. In some cases photo identification is required for students to be admitted to the examination. If coming to the campus is impossible, many colleges allow students to arrange for someone to proctor the examination elsewhere, with instructor approval. Some colleges are experimenting with the use of telecommunications technologies for examinations such as via voice mail, facsimile machines, and online computer testing (Palloff & Pratt, 2001).

Educational providers need to validate the learning experience to fulfill institutional requirements. Testing on the Internet is becoming a reality and can be accomplished using traditional methods such as true or false, multiple-choice, and essay questions (Palloff & Pratt, 2001). Instructors can go online and create tests which learners can access at the convenience.

Because learners have the ability to collaborate with others, some instructors use online testing only for quizzes and not for examinations. However, this collaboration can be a very positive learning activity. When two or more learners get together to take a quiz, they are actually collaborating in a manner that would not have taken place in the traditional method. By collaborating, learners can get other viewpoints regarding a particular subject, thus enhancing the study group's learning (Palloff & Pratt, 2001).

The technology infrastructure represents only one dimension of networked learning environments. Equally important is the human infrastructure that provides support services to learners that includes counseling, advising, tutoring, library services, and access to online learning communities. The support services organization has a role like the customer services operation in a business enterprise. It provides administrative directions, emphatic listening, moral support, and conflict resolution services.

Learners expect the instructions they receive for course registration, course access, and evaluation to be accurate, efficient and trouble free. If they have trouble accessing or using the network, they expect someone to be available to help them. The more time learners spend trying to access the network, the less time they devote to course content.

The course of study itself must be well designed, with specific learner outcomes, supported by an instructional and support staff available to address learners' concerns. The support services staff should be in a position to return learner comments back to the instructor or course designer as well as be able to counsel learners and provide input to a quality control group that evaluates the overall program effectiveness.

New technology can provide not only a new communications environment but also a new human environment. Furthermore, these new environments involve active cognitive processes that fundamentally change the way messages are received, interpreted, and understood (McLuhan, 1964). Media is powerful, but so are the messages that it contains; without content, the medium is powerless.

A seamless networked learning environment that integrates voice, video, and at connections among learners, instructors, experts, virtual libraries, the Internet, and support services. At the center is the distance learner, connected with both synchronous (desktop video teleconferencing and interactive group video teleconferencing) and asynchronous (email, multimedia databases, virtual libraries, and the Internet) links to these resources as illustrated in Figure 2.

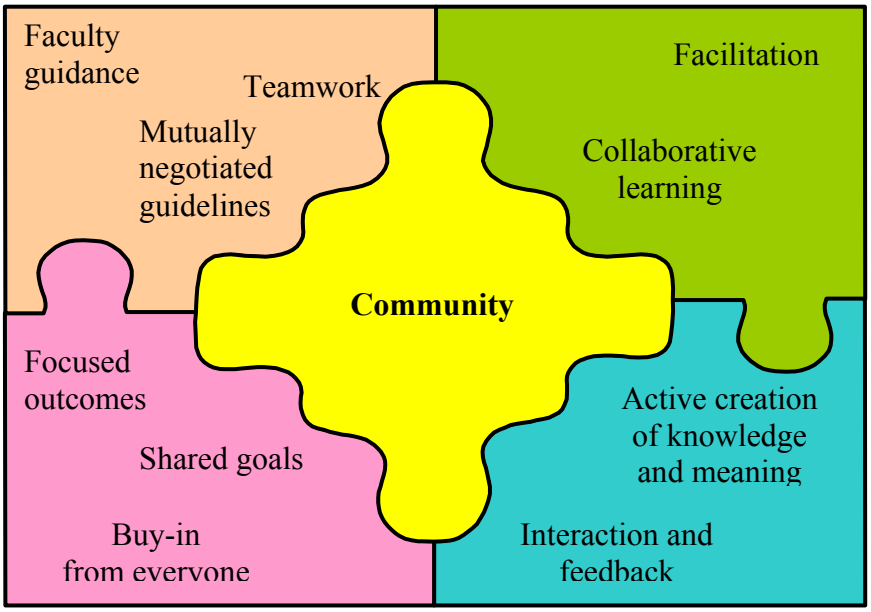

Figure 2. Seamless Networked Environment

Source: Palloff and Pratt, 2001, p. 30

Networked learning environments can make education and training more accessible, convenient, focused, effective, and cost-efficient for the learners and providers alike. The challenge is to implement the right combination of synchronous and asynchronous technologies to a networked learning environments consistent with the mission of the educational provider, learner expectations, and the delivery style of the instructor. The challenge of creating networked learning environment is to determine what learners truly need and how to reasonably accommodate their needs.

At a conference on distance education, participants were asked to make a true or false response to the following statement: "All students will succeed in a distance education class" (Wagner & Beaulier, 1991). The overwhelming response was "false." However, when the statement was modified to read: "Given adequate learner support, all students will succeed in a distance education class," the audience response was mixed and thoughtful. Educational technologies have long acclaimed the role of instructional systems design in the culmination of a successful learning experience. Surely the power of the twentieth century technologies coupled with the application of systems theory would move us from a mass education paradigm characterized by "education for all" to a new individual paradigm characterized by "education for each" (Cross, 1976).

As we approach the twenty-first century with expanded use of sophisticated telecommunications technologies in educational systems, we still operate from a nineteenth century, "education for all" paradigm. Individualizing the educational experience using instructional system design models is an expensive and still experimental endeavor. We have yet to translate what we know about learner differences into prescriptive designs for cost-effective technology based delivery.

Summary of Literature

Kershaw (1996) warns that technology can be seductive and institutions should focus on the means of change, rather than the technology itself, or the people using it, in order for meaningful change to occur. Due to the newness and rapid growth and expansion of distance education and supporting technologies, there continues to be many issues that surface and many unheard warnings waiting in the wings.

Numerous institutions have entered the distance learning arena because it makes economic sense. The hope has been to attract nontraditional students, as defined by age, marital status, or employment status, to the academic market. The attempt has been to capture a group of students who might not otherwise attend classes in a traditional setting. Strategic planning and technological adoption of educational tools was not a primary concern as revealed in the review. Until academic institutions begin to acknowledge that students are their customers and that their service needs comes first, quality programs cannot exist.

In today's global marketplace, organizational success is increasingly built on a foundation of skilled, self-motivated, and engaged individuals with the capacity for managing their continuous learning needs. Being able to think creatively, to solve problems, and to accommodate ambiguous situations is expected in addition to literacy and numeric skills. The evolving impact of technology on performance expectations adds to this dilemma. If information is now assumed to be available at one's fingertips, it is less important that students memorize facts and concepts when engaged in learning. Instead, the ability to access, interpret, and apply information becomes a reasonable goal toward which to strive (Wagner, 1994). The traditional educational model based primarily on the concept of the school and teacher in a classroom as stand-alone islands no longer generates competence in our competitive society. Mechanisms for adoption and diffusion of distance learning tools center on change and societal demands.

The educational opportunities created should be responsive to the demands of students and the world they work and live in. As globalization and the rapid exchange of information become a reality, the need for faculty, institutions, and students to respond to that reality expands. Increasingly, the corporate sector is attempting to shape education by offering incentives to academic institutions to provide educational opportunities that are more responsive to corporate need. Computer-mediated distance learning offers students a way to practice and acquire needed skills to compete in the twenty-first century information age.

To establish a distance learning program, standards must be articulated from the beginning and plans must be set in place for the regular assessment of their achievement. In developing a sound program evaluation process, many areas will need to be examined. It is important to identify those who will be participating in the evaluation such as faculty, administrators, current students, librarians, counselors, advisors, and industry on which the program has impact.

The range of technologies used to evaluate student's understanding of course content, progress in meeting course objectives and depth of knowledge has broadened. As in on-campus courses, individual faculty members determine the range of assignments they will make to assess students' progress and learning. These may include collaborative projects, research papers, quizzes, and other types of presentations in additions to formal examination.

When involved in an online course, in addition to knowledge acquisition, students learn about technology through usage. Through practice and tenacity, students learn the following skills (Evans & Nation, 1993):

- They discover their learning styles.

- They are able to focus on the message being conveyed because there is time for reflection.
- They learn how to collaborate with others in geographically distributed teams.
- They learn how to manage their schedules to accomplish their goals.
- They gain confidence in their abilities.
- They seek out the information needed for the task at hand.
- They experience significant changes in beliefs, attitudes, and knowledge transforming their ways of thinking.
- They feel empowered through the process of being one's own mature and autonomous person.

If the technology used to deliver an online class is transparent in the learning process, these skills will naturally develop and they are all transferable beyond the academic environment.

As research indicates, one person cannot create an online community. Although the instructor is responsible for facilitating the process, participants also have a responsibility to make it happen. The learning process in the electronic classroom is an active one and in order for students to be present in an online class, they must access the course site and make substantive comments. Instructors establish guidelines for minimal participation, making it more likely that students will engage with their colleagues and facilitating the community-building process. This expectation of participation differs from the face-to-face classroom, where one or more extroverted students can dominate the discussion. Research indicates that in this medium, introverts can blossom (Palloff & Pratt, 2001). The ability to think before responding creates a level of participation and engagement that is non-threatening and encouraging. As a result, ideas can be collaboratively developed as the course progresses, creating the socially constructed meaning that is the hallmark of a constructivist classroom in which an active learning process is taking place.

The ability to collaborate and create knowledge and meaning is a clear indicator that a virtual learning community has been formed. Such indicators are as follows:

- Active interaction involving both course content and personal communication.
- Comments are directed student to student rather than student to instructor.
- Sharing of resources among students as well as open, honest feedback.
- Expressions of support and encouragement exchanged between students.
- A willingness to critically evaluate colleagues work.

The development of a strong interactive learning community and not just a social community is a distinguishing feature of computer-mediated distance learning. Distance education is not the panacea that will cure the ills of education today. If implemented in a way that incorporates community into the process, it is a way to promote a generation of empowered learners who can successfully navigate the demands of a knowledge society.

Future Research

The researcher feels the answers to the questions and challenges posed here lie in a change of focus. To successfully accommodate the needs of a diverse body of learners and to make room for nontraditional online approaches, institutions should concentrate their efforts on what learners need, as well as what our society is demanding of graduates.

A more comprehensive theory of distance education must be articulated through additional research and evaluation to increase the awareness of others on the philosophy, adoption of methods, and efficacy of learning at a distance.

Research indicates society must continue to work to develop methods for identifying the students who need support and the types of support they need to develop a range of support services suitable for the varying needs of the students, institution, and faculty. More research should be done on the social, cultural, and economic factors as well as the psychological factors contributing to success, and student interactions in an online environment.

Research Issues

Many research issues were examined in the review of literature. Highlights of the review included literature on adoption and diffusion, organizational effectiveness, strategic implementation and evaluation of distance learning technology programs, components for successful distance learning programs, and importance of support services for participants. *Much of the current literature strongly suggests tying the purchase and use of distance learning technology to the vision of the institution, to conduct strategic planning, to implement the planned goals and objectives, and to evaluate the results.* A host of researchers including Belanger and Jordan (2000), Ely (1995; 1999), Kershaw (1996), Lau (2000), Murgatroyd (1990), and Picciano (2001) stressed the importance of strategic planning when looking to integrate distance learning technology.

Today's questions are different from tomorrows, but today's decisions critically influence the future. These issues centering on strategic planning from the literature review will be explored in Chapter III:

1. What strategic planning for the adoption of innovations did the university employ?
2. What are the overall educational vision, goals and objectives for the online distance learning program?
3. What problems were identified within the university leading to creating a non-residency distance learning program?
4. What support services were established for administration, faculty and students involved in the online program?
5. What evaluation mechanisms were developed to support the adoption decision?

Outcomes of the examination of an asynchronous distance learning program are not intended to propose a comprehensive solution to the distance learning dilemma today, but rather point towards methods for improved organizational effectiveness.

Chapter II discusses case study methodology including applicable advantages and limitations; research design including validity and reliability components; the identified institution under examination; the selected instrument for data collection including the three phases of collection, the triangulation of data, and concludes with data analysis and presentation.

Chapter II
Methodology

Introduction

According to the review of literature, there are numerous institutions implementing online educational technologies at various levels of ineffectiveness and some without basic strategic plans. Examining a mature asynchronous program may assist other institutions in effective implementation or improvement in existing programs. "The case study…is the method of choice for studying interventions or innovations" (Lancy, 1993). The essence of a case study is it illuminates why a decision was made, how it was implemented, and with what result (Cooper, 1984; Gay, 1987; Koul, 1984; Merriam, 1998; Yin, 1994).

Case studies are intensive descriptions and analyses of a single unit or bounded system (Johnson & Christenson, 2000; Merriam, 1998; Smith, 1978; Yin, 1994). A "system" is a set of interrelated elements that form an organized whole. Most systems are comprised of components, and it is important to understand how each component operates in order to grasp the entire system. "Bounded" emphasizes that the researcher must identify the boundaries of the system in order to determine what the case is and what it is not. Merriam's (1998) method of determining if a case study design is applicable includes determining how finite the data collection can be, "…a limit to the number of people involved…or a finite amount of time for observations." The proposed research was finite, both in terms of time and people.

Advantages and Limitations

Qualitative research involves in-depth immersion in the field, which lends credence to the researcher's claim to speak for similar groups or situations and the results culminate with a deep understanding of the case. Stake (1978) notes that "…case studies…may be…in harmony with the reader's experience and thus…a natural basis for generalization," and ultimately is related to what the researcher is trying to learn from the study. The researcher does not claim generalization in this study, however the information presented may be applicable to other distance learning programs.

The following advantages were applicable to this examination (Koul, 1984; Johnson, 1977; Johnson & Christensen, 2000; Merriam, 1998; Yin, 1994):

1. Research tries to understand the entity in-depth by examining the past and present status and future visions.
2. Research provides an opportunity to develop insight into adoption and diffusion and organizational effectiveness.

Even though the case data are as subjective as data collected by other research methods (Lincoln & Guba, 1985; Hitchcock & Hughes, 1989; Johnson, 1977; Johnson & Christensen, 2000; Koul, 1984; Merriam, 1998; Van Dalen, 1966), there were several limitations to the study, such as:

1. The researcher's personal biases and standards could influence the data analysis.
2. Data typically examines an entity in depth and detail or breadth and comparative information.
3. Faculty and student voices were minimal.
4. Interview data was primarily acquired through administrative and staff personnel discussions.

The researcher was acutely aware of the limitations to this methodology and incorporated reliability and validity tests into the research design to aid in accurate data analysis. Due to limited resources such as time, cost and location, this investigation focused on case study details.

Research Design

Ensuring validity and reliability in qualitative research involves conducting the investigation in an ethical manner. A research design represents a logical set of statements and tests (Yin, 1994). To ensure validity and reliability these tests, as discussed by Yin (1994) were incorporated into the study as shown in Table 5.

Table 5

Case Study Tactics for Validity and Reliability

Tests	**Case Study Tactic**	**Phase of Research**
Validity	Data Triangulation	Data Collection
	Member Checking	Data Analysis
Reliability	Data Triangulation	Data Analysis
	Use case study protocol	Data Collection
	Develop case study database	Data Collection
	Audit trail	Data Collection

The researcher used "member checking" as a validity check throughout the process, whereby the researcher had the original informants review the interpretations and descriptions of the experience for accuracy (Johnson & Christenson, 2000, p. 319).

According to Yin (1994), research design is the logic that links the data being collected and the conclusions drawn from the initial questions of the study. A research design is an action plan for getting from here to there, where here is defined as the initial set of questions to be answered, and there is some set of conclusions, or answers, about these questions (Yin, 1994).

An instrumental case study design was applied so the researcher could focus on *how and why* a mature asynchronous program dealt with the diffusion and adoption process through an examination of historical documents, syllabi, academic support, procedures, faculty and fiscal allocations. Internally the researcher examined the context of the organizational climate to better describe and explain the functioning of the case (Hitchcock & Hughes, 1989, p. 214).

Embry-Riddle Aeronautical University's online distance learning program in Daytona, Florida, was identified for the study and approved as the project examination site. Their online distance learning program fits the profile of a mature, asynchronous and evolving program based upon the review of literature, additionally, the researcher has a personal interest and appreciation

for science and aerospace research. A detailed investigation of the project site is presented in Chapter III.

A review of literature suggested that examining a mature asynchronous distance learning program could prove beneficial to organizations and educational institutions that want to incorporate such technology. Merriam (1998) notes the value of examining successful cases, "First, since such data are rare, they can help elucidate the upper and lower boundaries of experience. Second, such data can facilitate…prediction by documenting infrequent, non-obvious, or counterintuitive occurrences that may be missed by standard statistical approaches…" (p. 190).

Instrument

In this descriptive study, the researcher was the instrument for gathering and analyzing data. Lincoln and Guba (1985) suggest that the researcher is the best instrument because it would be impossible to devise a non-human instrument adaptable and flexible enough to adjust to the variety of situations. This required the researcher to take advantage of unexpected opportunities, to identify personal biases and to acknowledge the influence of those biases on the data collection and resulting data analysis. Merriam (1998) suggests researchers have tolerance for ambiguity, sensitivity to context and data, effective communication, writing and listening skills. The researcher cultivated such skills through assistantships, educational courses, workshops and on-the-job teaching.

Data Collection

Lincoln and Guba (1985) argue that rigor in qualitative research is provided through the trustworthiness of the data and its subsequent analysis. Techniques they recommend for ensuring trustworthiness are as follows: credibility, dependability, and confirmability. Three kinds of data were collected and analyzed providing a means for determining the trustworthiness of the data. In addition, data was collected from both faculty and administration, providing the informants with opportunities for supporting the credibility, dependability and confirmability of the study.

Wolcott (1990) states that data collection is about asking, watching, and reviewing to physically obtain data from informants (Merriam, 1998). There are three methods of data collection used in this study, combined with one unobtrusive site visit to the physical facility. The methods of data collection are shown in Table 6 (Johnson & Christensen, 2000; Merriam, 1998; Yin, 1994).

Table 6

Data Collection

Sources of Evidence	Strengths	Weaknesses
Secondary Documentation Review	▪ Precise and quantitative ▪ Stable-can be reviewed repeatedly ▪ Unobtrusive-not created as a result of the case ▪ Exact and specific ▪ Broad coverage over time, events and settings	▪ Retrievability-can be low ▪ Biased selectivity ▪ Accessibility
Interviews	▪ Focused on case study topic ▪ Insightful-provides perceived causal inferences	▪ Questioning/Response bias ▪ Inaccuracies-poor recall
Archival Records Review	▪ Precise and quantitative ▪ Stable-can be reviewed repeatedly ▪ Exact and specific ▪ Broad coverage over time, events and settings	▪ Retrievability-can be low ▪ Biased selectivity ▪ Accessibility

Source: Yin, 1994, p. 80

Methodologist advocates using multiple methods and data sources to help understand the case and answer the research questions. Data collection methods occurred in three phases and included:

1. Public domain documentation examinations.
2. Face-to-face consentual interviews, including one direct unobtrusive observation.
3. Archival record review.

Simultaneous data collection and analysis transpired both in and out of the field.

Phase One: Public Domain Documentation Examination

The examination included a variety of existing documents such as syllabi, announcements, written reports of events; public records including financial documents and other internal documents; and studies of the same "site," including relevant mass media articles. The usefulness of these and other types of documents was not based on their accuracy or lack of bias, but rather in their corroboration of evidence from other sources. In addition, archival records, such as survey data and data previously collected about the site, were used in conjunction with other information to provide a clearer picture of the case study.

Informants were faculty and administration personnel involved in Embry-Riddle Aeronautical University's asynchronous distance learning program. Initially, the researcher identified personal contacts through a review of literature, community and private organizations

with successful distance learning programs, newspaper advertisements, public postings and referrals from person-to-person contacts. Through these endeavors two key informants were identified and guided the researcher through the plethora of materials: the Department of Distance Learning Chairman, William Herlehy III, Ph.D., and the Department of Distance Learning Manager, Jim Gallogly. Herlehy provided the researcher with full access to the entire program except personal email exchanges between faculty and learner.

Coding categories were suggested by the data. Once patterns emerged, the data was sorted according to these categories: setting and context codes, definition of the situation codes, process codes, strategy codes, relationship and social structure codes, and method codes (Bogdan & Biklen, 1998).

Phase Two: Interviews

Fifteen informants were interviewed via 30 to 45 minute, face-to-face individual interviews to provide information about the distance learning program. The informants included:

- The Distance Learning Chairman, William Herlehy, Ph.D.
- The Distance Learning Manager, Jim Gallogly.
- The Circulation and Media Services Manager, Melanie West.
- The Media Services Coordinator, Carl Burkhart.
- The Enrollment Director, Linda Dammer.
- The Instructional Designer, Jerry Norris.
- The Media Producer, Kevin Norris--who included a tour of the media facility.
- The Department of Distance Learning Secretary, Patricia Ward.
- The Institutional Research Center Specialist, Maria Franco.
- Three faculty.
- Three students.

Appointments were made via the telephone or in person. Signed consent was not necessary for this project.

The researcher created an interview instrument using three components:

1. Issues highlighted in the review of literature.
2. Guidelines provided in the following books and article:
    - Chute, A. G., Thompson, M. M., & Hancock, B. W. (1999). *The McGraw-Hill handbook of distance learning*. New York: McGraw-Hill.
    - Connick, G. P. (Ed.). (1999). *The distance learner's guide*. Upper Saddle River, NJ: Prentice-Hall.
    - Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information systems research*, 2 (3), 192-222.
3. Situations presented at the case study examination site.

To ensure data triangulation and corroboration of data sources, "member checking" was incorporated into instrument development. The Department of Distance Learning Chairman, William Herlehy and the Program Manager, Jim Gallogly reviewed and approved the instrument for the scheduled interviews. Virginia Polytechnic Institute and State University approved

research involving human subjects at the case study examination site. See Appendix A for the "exempted" IRB approved form.

Questions evolved during the personal interactions and as a result of record reviews. See Appendix B for a complete list of planned interview questions for the administration, faculty and students. Face-to-face interviews were analyzed for common points, or themes, in the words of the interviewees. The final report relied heavily on these narratives. The intent was to locate behavioral patterns by sorting and coding collected data and following up with on-going interviews to refine these patterns.

Anonymity and Confidentiality

Instructional designers, technical support, administration, faculty, students, and media specialists verbally provided consent and agreed to forego anonymity. Each interviewee was offered opportunities to review the interview document and make content changes. Dr. William Herlehy, Chairman of the Department of Distance Learning, approached each participant personally to ensure they wanted to partake in this project. No one was under any obligation to participate.

Risks and Withdrawal Procedures

The interviews posed no risk to the participants other than what they would experience in everyday activity. Interviews were documented on paper and incorporated into the document. Tape recording or video taping did not occur.

Interviewees could verbally decline an interview at any time. If an interviewee wished to withdraw, they were provided with contact information and instructed to reach Jim Gallogly, the Department of Distance Learning Manager. However, no one declined.

Unobtrusive Direct Observation

One unobtrusive observation was made of the media center's video studio where the instructional videos were produced for distance learning students. The Media Producer for the Department of Distance Learning provided a personal tour while the studio was not in use, so as not to interrupt taping or real-time lessons. The researcher gained insight, as opposed to substantive information, into the technology used to support the distance learning program as well as video taping protocol, through this endeavor. Environmental conditions served as another source of corroboratory evidence in this case study. Data was transcribed and coded for analysis.

Phase Three: Follow-up

Movement between the phases occurred when new questions surfaced from the context of the answers provided. This allowed the researcher to pursue contradictions and/or similarities that become evident throughout the process. By using a combination of interviewing, secondary document analysis, and archival record review, the researcher triangulated data sources to validate and crosscheck emerging findings.

Data Analysis and Presentation

During data analysis, the researcher looked for significant statements with particular relevance to the phenomenon being studied. After constructing the lists of significant statements and meanings, the researcher searched for common themes and insights in the data and described the fundamental structure of the case under examination.

Following analysis, the collected data was presented in Chapter III as answers to the research issues discussed in Chapter I. Components of the data presentation include faculty, student, and administration interviews coupled with lessons learned based on the data, regarding

implementation of distance learning programs. The final Chapter III report includes a description of the study, a discussion of the findings, future implications extrapolated from the review of literature and case study examination.

Summary

Table 7, which is on the following two pages, summarizes the cases study methodology used for this examination and notes the specific public domain documentation examined and the people interviewed.

Table 7

Data Collection Methodology

Sources of Evidence	Data Collection
Secondary Documentation Review ▪ Coded and analyzed for themes. ▪ Corroboration of evidence. ▪ Data triangulation.	▪ McCollister & Davis (1996). *The Sky is Home*. New York: Jonathan David Publishers, Incorporated. A historical account of the university. ▪ The Embry-Riddle web site, http://www.ec.erau.edu/ddl. ▪ Syllabi for undergraduate and graduate courses. ▪ Demonstration course sites for prospective students. ▪ Public records including degrees awarded, administrative data focusing on faculty credentials, ratios of full-time and part-time faculty, faculty course loads, class size, full and part-time undergraduate and graduate enrollment data, student course loads. ▪ Public financial documents pertaining to financial aid, tuition and fees, revenues and expense data. ▪ Mass media articles including written reports of events and announcements discussing the program and published for the university, were: ▪ Embry-Riddle Aeronautical University News Releases in the *ERAU Communications*, from August 16, 1995, through January 11, 2002. ▪ *The Congressional Record*'s tribute to Embry-Riddle on January 29, 1997. ▪ Embry-Riddle University's Alumni Magazine, *The Leader*, from the Spring of 1997 to the Fall of 2001. ▪ Embry-Riddle Aeronautical University's magazine, *Beacon*, from February 2000, through November 2001.

Table 7 Continued

Sources of Evidence	Data Collection
Interviews ▪ Consentual. ▪ Anonymity was not a concern. ▪ No risk. ▪ Withdrawal procedures were depicted during scheduling. ▪ Scheduled 30 – 45 minute, face-to-face sessions on campus or over the phone. ▪ Coded and analyzed for themes. ▪ Informants checked the descriptions for accuracy and suggested content changes for accuracy. ▪ Corroboration of evidence. ▪ Data triangulation.	▪ The Distance Learning Chairman, William Herlehy, Ph.D. ▪ The Distance Learning Manager, Jim Gallogly. ▪ The Circulation and Media Services Manager, Melanie West. ▪ The Media Services Coordinator, Carl Burkhart. ▪ The Enrollment Director, Linda Dammer. ▪ The Instructional Designer, Jerry Norris. ▪ The Media Producer, Kevin Norris--who included a tour of the media facility. ▪ The Department of Distance Learning Secretary, Patricia Ward. ▪ The Institutional Research Center, Maria Franco. ▪ Three distance learning faculty. ▪ Three students.
Archival Records Review ▪ Coded and analyzed for themes. ▪ Corroboration of evidence. ▪ Data triangulation.	▪ Survey data on the program, tuition and fees, matriculation, placement statistics, full-time faculty, staff, student employees, and financial aid. ▪ Commission on Colleges of the Southern Association of Colleges and Schools Reports from 1990 to 2000. ▪ Minutes from the Commission on Colleges of the Southern Association of Colleges and Schools meetings from 1990 to 2000. ▪ The strategic plan for 2000-2010 including the vision, mission, goals, objectives and evaluation mechanisms for the overall program.

Note: The faculty and student interviewee names do not add value to the report and have been omitted.

The subsequent section discusses the project site including the university's history, strategic plan for 2000 – 2010, how they planned for diffusion and adoption of distance learning technology, implementation strategies for the distance learning program and measures for success.

Chapter III
Case Study Examination
Embry-Riddle Aeronautical University

Introduction

In its most fundamental form, education is an interaction among teacher, student, and subject matter. This complex transaction depends upon sustained two-way communication, which provides for the transformation of information into knowledge. Historically, distance education has been characterized as an independent form of study due to limited communications technology. Learners wanted the opportunity to interact and began to question the quality of the independent study experience. Today, distance educators realize that distance education must be responsive to interaction, access, and support issues.

New directions in the practice of distance education depend upon a strategic vision articulated within a framework and disseminated through the organization. Based upon the information presented in Chapter I, it is arguable that such a framework exists in distance education. Before education can integrate theory and practice, distance education must be viewed as education at a distance.

The framework presented in the following case study examination of the Department of Distance Learning program at Embry-Riddle Aeronautical University emphasizes interdependence through mediated two-way communications technology. It specifically describes how this university implemented their distance learning program. The first section provides a context of the historical background of Embry-Riddle and the development of their distance learning program, highlighting quantitative information on degrees awarded, enrollment, campus growth, financial assistance, tuition and fees, concluding with faculty and staff data. The subsequent section discusses Embry-Riddle Aeronautical University's strategic plan including:

- The mission of the University.
- Their vision for the future.
- Their specified goals and objectives.
- Their implementation strategies.
- Their evaluation tools for program effectiveness.

Chapter III concludes with a case study summary and lessons learned from the examination stemming from the researcher's experience during this process.

Background

Embry-Riddle Aeronautical University is an independent, non-sectarian, non-profit, coeducational university established in 1925, when John Riddle and T. Higbee Embry founded Embry-Riddle School of Aviation at Lunken Airport in Cincinnati, Ohio. Embry-Riddle School of Aviation's mission was to train airplane pilots and to capitalize on the post-World War I interest in flying. After World War II began in Europe, the demand for aviators and mechanics soared. Allied nations sent more than 25,000 young men to Embry-Riddle to become pilots and aviation technicians. During the Korean War the United States Air Force contracted with Embry-Riddle to train airmen in the fundamentals of airplane maintenance.

Under the leadership of John McKay, Embry-Riddle expanded its international outreach and strengthened their academic programs. In 1965, with Jack R. Hunt as president, Embry-Riddle consolidated the flight training, ground school and technical training programs to

Daytona Beach, Florida. Within three years of the consolidation, the Commission on Colleges of the Southern Association of Colleges and Schools accredited Embry-Riddle. Two years later, Embry-Riddle became a university with a diverse curriculum delivered through traditional mediums on two campuses, one in Daytona Beach, Florida and the other in Prescott, Arizona. The residential student body was primarily working males, 18-25 years of age, military personnel, attending class full-time. Independent study courses through the U.S. postal service were also offered during this time (McCollister & Davis, 1996).

The Department of Distance Learning

With the advent of technology and the growing demand for education and training, Embry-Riddle adopted new educational strategies to meet the needs of working adults interested in continuing their education. The College of Career Education was established in the 1970's, and offered distance learning programs to students through web-based computerized instruction linked to the Daytona Beach campus. The establishment of such a program served an untapped niche of customers who were unable to attend classes in a residential campus environment. Classes were planned and designed for independent study allowing individuals to study via self-teaching texts, individual counseling, and computer-aided programs via distance.

The distance learning market possessed the greatest potential for meeting the needs of non-military aviation professionals. "Distance learning is extremely important to this era of the rapid changes in education," said Jacobson, vice president of academics at Embry-Riddle Aeronautical University. "…Education no longer ends with the granting of a diploma; it is a life-long need. This new emphasis of Embry-Riddle [the Department of Distance Learning] caters to those of us in a mobile society" (McCollister & Davis, 1996, pp. 149-150).

In 1991, the first academic term of the program, 39 students were enrolled. Today, the program has undergone significant change, growth, and evaluation, including their technology platform. The department originally began the distance learning program with an in-house Skytalk program coupled with email and three years ago switched to a WebCt platform on CompuServe. The following bar graph depicts the enrollment trend.

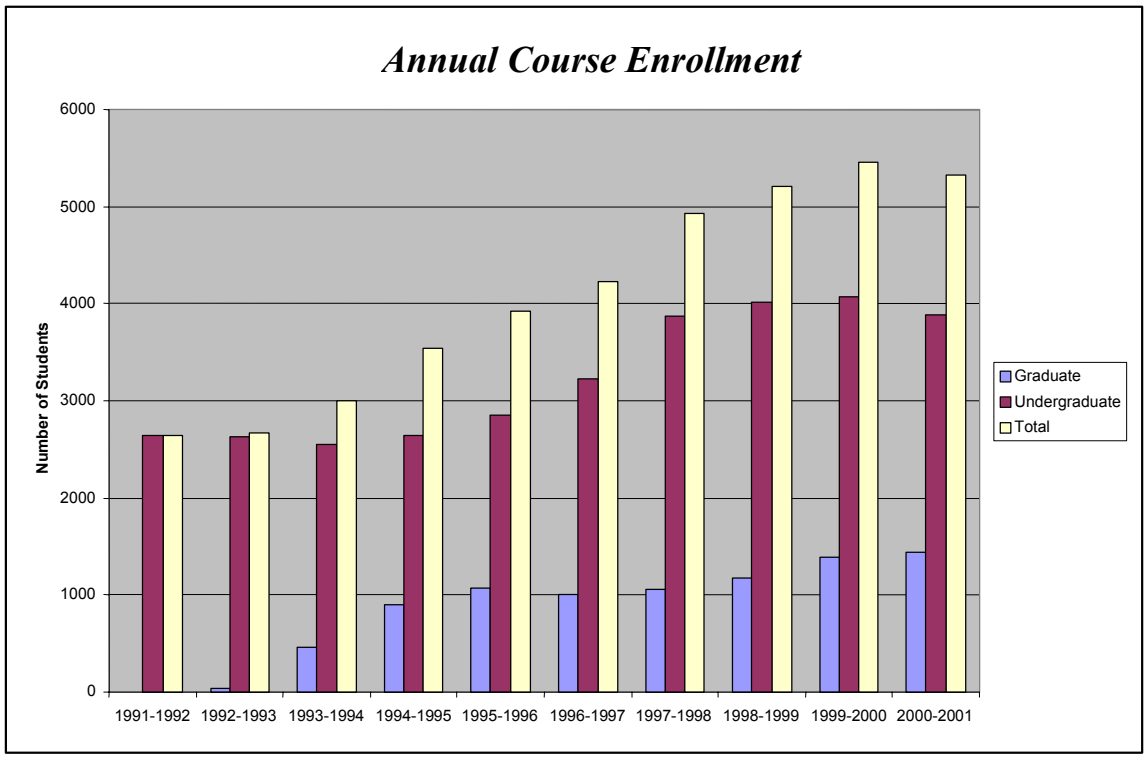

Figure 3. Annual Course Enrollment

Source: http://comm.db.erau.edu/u_info/factsfigs/factsfigs.html

The department projects 10 percent growth for the 2002-2003 academic year for both programs (Jim Gallogly, Department of Distance Learning Program Manager, personal communications, November 11-15, 2001). Presently, there are four distance learning Master of Aeronautical Science degree programs:

1. Aviation/Aerospace Management.
2. Aviation/Aerospace Operations.
3. Aviation/Aerospace Safety Systems.
4. Human Factors in Aviation Systems.

In addition to the graduate degrees, there is one Bachelor of Science in Management of Technical Operations offered, which began in September 2000. Students may transfer credits from another institution, or earn credit for experiential learning, military and professional training as evaluated by the American Council of Education, or pass the University's standardized national testing program such as CLEP or DANTES.

Military personnel, commercial pilots, aircraft technicians, operations and support personnel working in airlines or aerospace companies, government employees working in aviation oriented agencies and local airport authorities compose the online student body. The average student is a full-time employed 35 year old male (Jim Gallogly, Department of Distance Learning Program Manager, personal communications, November 11-15, 2001).

Financial assistance is provided through various grants, scholarships, cooperative education employment, internships, loans, waivers, and sponsors. Approximately 8 percent of distance learning students receive financial assistance (http://comm.db.

erau.edu/u_info/factsfigs/factsfigs.html).

Tuition and fees for the 2001-2002 academic year for the distance learning program are approximately one-third less expensive than the identical degree earned on the Daytona Beach or Prescott residential campus, comparing only tuition, fees, and books. Table 8 shows the annual cost incurred by a full time graduate and undergraduate distance learning student.

Table 8

Department of Distance Learning

Academic Year 2001-2002 Tuition

	Graduate	**Undergraduate**
Tuition and Fees	$ 5,670	$ 3,480
Books (estimated)	$ 600	$ 800
Total	$ 6,270	$ 4,280

Source: http://comm.db.erau.edu/u_info/factsfigs/factsfigs.html

Teaching assistants are not used in any courses (Jim Gallogly, Department of Distance Learning Program Manager, personal communications, November 11-15, 2001). Classes are scheduled to accommodate the needs of adult students. Undergraduate courses are scheduled for 12 weeks, beginning on the 15th of every month, excluding December. Graduate courses are scheduled for 15 weeks, 6 terms annually, beginning on odd months. Classes are composed of a maximum of 25 students per faculty member and a minimum of eight.

The University's faculty compensation falls within the top 80 percent of the national average for a 10-month contract without publishing requirements. Full-time faculty is salaried, part-time faculty compensation is through course stipends or based upon enrolled headcount (http://comm.db.erau.edu/u_info/factsfigs/factsfigs.html). Part-time faculty earns $110 per enrolled student for online courses.

The department provides assistance to faculty members for professional advancement through tuition waivers, tuition reimbursement, advanced study loans, and graduate course tuition waivers for educational support. Temporary release time for professional activity, including research, course development, special departmental tasks, and special campus or university activities are accommodated. The department also sponsors membership in professional organizations, subscriptions to professional journals, and provides funds for travel to professional meetings, conferences and seminars. Additionally, faculty members can improve their computer and technology skills at no expense by enrolling in any Embry-Riddle course.

Faculties are connected through a variety of departmental communication links that include email, Internet, facsimile, telephone, express mail, and overnight mail. Telephone numbers and addresses of faculty are published and distributed to all departmental employees to provide access and information sharing to faculty in the network. This includes faculty, staff, course authors, course monitors, administrators, deans, the Chancellor, the Provost and any officer of the University.

The staff is a team of various backgrounds, education, experiences, and talents and includes the following members (Jim Gallogly, Department of Distance Learning Program Manager, personal communications, November 11-15, 2001):

- Three test control specialists.
- Four faculty support specialists.
- One instructional designer.
- Two computer support specialists.
- Two audio visual support specialist.
- One secretary.
- One program operations manager.
- One department chairman

Figure 4 illustrates the departmental organizational chart.

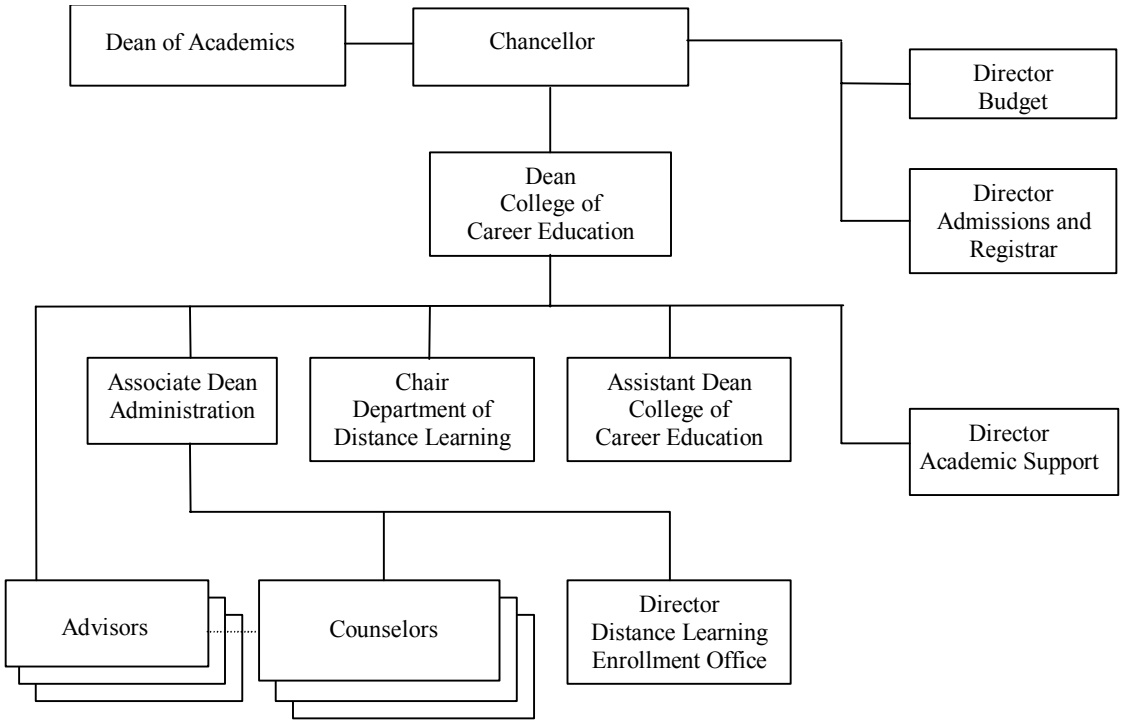

Figure 4. The Organizational Chart

Source: http://comm.db.erau.edu/u_info/factsfigs/factsfigs.html

The following section discusses Embry-Riddle's strategic management plan that includes their vision, mission, goals and objectives specifically for the Department of Distance Learning, implementation of the distance learning program, and evaluation metrics.

Strategic Planning in an Online Environment

Embry-Riddle Aeronautical University is the world's oldest, largest independent aeronautical university and the only accredited aviation-oriented university in the world to offer undergraduate and graduate online degrees without a residency requirement. The University is continuously trying to improve through planning, monitoring, and evaluation of programs.

The Strategic Plan

The University's Strategic Plan 2000 – 2010 has a vision, mission statement and specific goals and objectives. Additionally, the University has developed *Vision 2010,* including specific areas of improvement to work toward. *Vision 2010* provides a clear picture of where the University is headed in the future and how the Department of Distance Learning fits into the plan. Figure 5 illustrates the cyclical planning process.

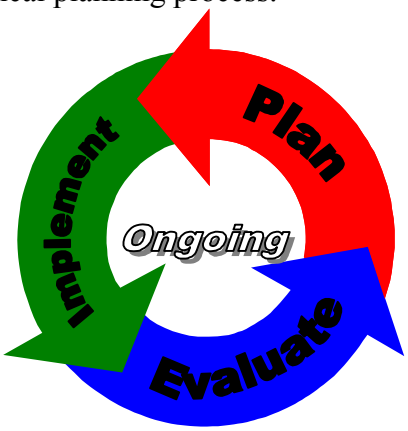

Figure 5. The Cyclical Planning Process

The University's purpose and goals flow from top management through traditional and non-traditional campuses to the academic units that implement the goals. A critical component of this process is that the lowest academic level, including industry stakeholders, has input into the creation of the strategic plan. The strategic planning process identifies new initiatives and sets action plans in motion for accomplishment (http//raptor.db.erau.edu/spa/plan/infrastructure.html).

Vision and Mission

The vision of Embry-Riddle Aeronautical University is to shape the agenda of aviation and aerospace, and lead in the education and development of its professionals.
The mission is to provide a comprehensive education to prepare graduates for productive careers and responsible citizenship with special emphasis on the needs of aviation, aerospace, engineering, and related fields.

Purpose

The purpose of the university is to concentrate on academic excellence by preparing students for immediate productivity and career growth, recruiting and developing faculty, delivering adult education programs at off-campus locations, encouraging research, service and related activities.

Strategic Goals

To meet market demand for the design, development, and implementation of distance learning courses, the institution developed a strategic plan in 1993, and reviewed it semi-annually to measure progress and to establish needed course corrections. The current Strategic Plan 2000-2010 identified two strategic goals to support the implementation of distance learning technology.

The first goal was to use technology to improve educational delivery (http//raptor.db.erau.edu/spa/plan/infrastructure.html). The application of new computing and

communication technologies result in greater understanding, sharing of knowledge, and using resources more efficiently. Strategic objectives identified to accomplish this goal follow:

- Integrate the use of evolving technologies, including the Internet, in the delivery of academic programs, training programs, research activities, and student support services.
- Operate in a networked, integrated technological environment for academic and administrative processes.
- Ensure students, faculty and staff has the training and equipment accessibility to benefit from technological resources.
- Engage in the electronic storage and retrieval of information to improve administrative processes and services.

To accomplish these strategic objectives, the university adopted a common standard for both hardware and software for ease of use and consistency in application. Standard software includes the complete suite of Microsoft products including Office 2000, Outlook, Internet Explorer, NT, Visuals Studio and Project as part of the Campus License Agreement. The University also has partnerships with Oracle, Dell, Blackboard, Microsoft, Sun and Talon corporations.

The second identified strategic goal to support the implementation of distance learning technology was to create learning communities committed to the open exchange of ideas in a virtual learning environment (http//raptor.db.erau.edu/spa/plan/infrastructure.html). Members of the online community partake in team building, networking, and building personal and professional relationships. To achieve this goal, these strategic objectives were identified:

- Recognize the needs of faculty and students in establishing online communities.
- Provide opportunity for networking, mentoring, counseling, tutoring, and the use of computer technology to encourage responsive online communities.

To accomplish these strategic objectives, the University supports faculty and student interactions through well-designed and evaluated courses and integrated support services.

The success of a distance education program that is part of a traditional campus-based institution depends upon if the institution views the program as an integral part of its activities. Reform focuses on changes in value and sustained respected leadership. Figure 6 illustrates planning and assessment at Embry-Riddle.

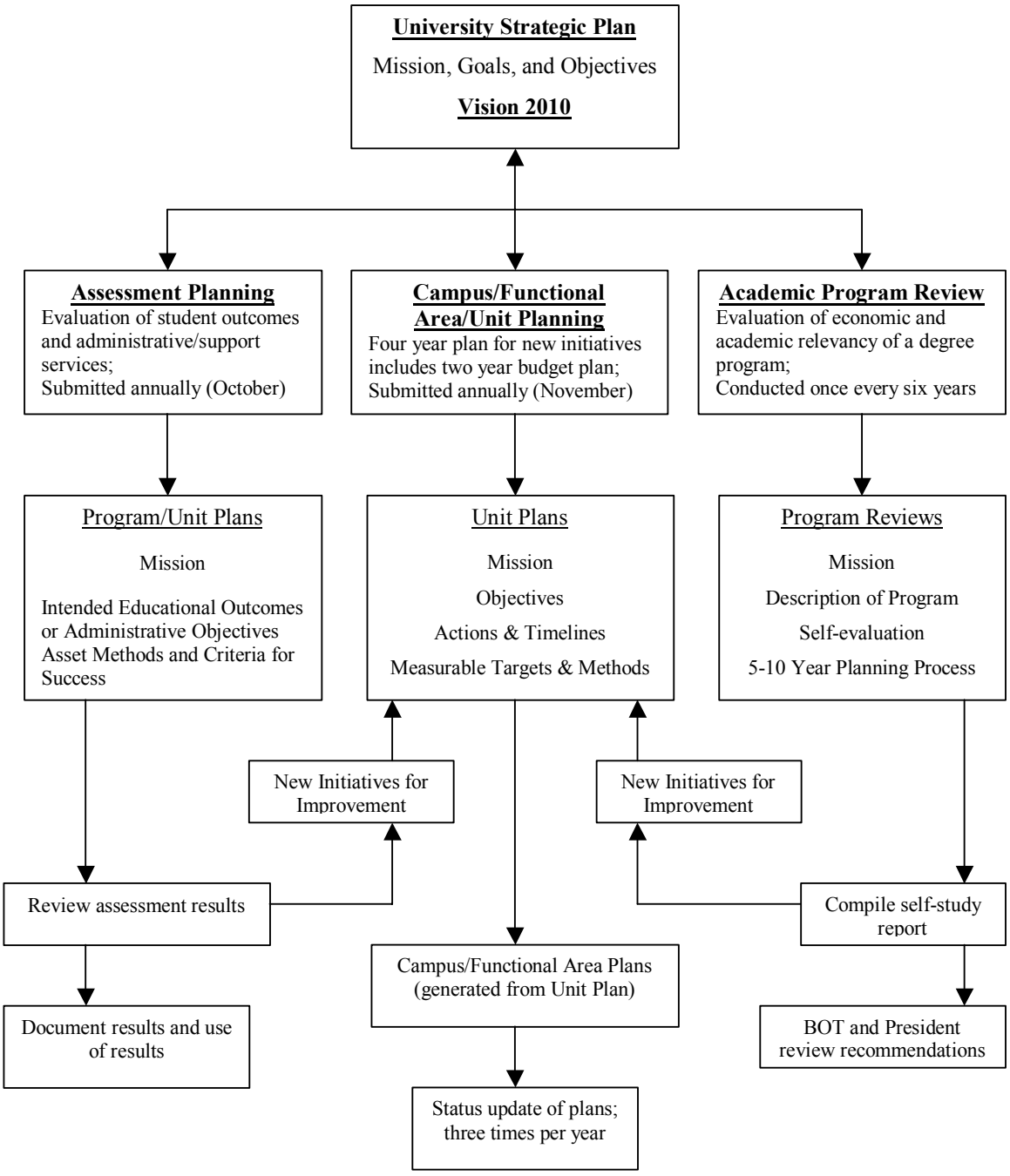

Figure 6. Planning and Assessment at Embry-Riddle

Source: http://www.comm.db.erau.edu/u_info/factsfigs/factsfigs.html.

The following section discusses how the Department of Distance Learning integrated and implemented their distance learning program based upon the strategic plan.

Strategic Implementation in an Online Environment

Implementation in the planning process of online programs is critical. This includes policy development, goal setting, and evaluation of new methods. The most important component of implementation of distance learning technology is defining a need for it (William Herlehy, Department of Distance Learning Chairman, personal communications, November 15, 2001).

The Department of Distance Learning identified two conditions necessary for successful implementation of distance learning technology. These conditions are in conjunction with a strategic plan, support, and the alignment of institutional and technological strategies. They are as follows (William Herlehy, Department of Distance Learning Chairman; Jim Gallogly, Department of Distance Learning Program Manager, personal communications, November 11-15, 2001):

- Competence demonstrated through mastery by the faculty, staff, and students.
- Commitment to, and ownership of, the distance learning technology system.

The following section examines course design as it relates to these conditions noted for successful distance learning technology implementation.

"Interaction Equals Satisfaction"

The department's motto is "interaction equals satisfaction" and they design courses to maximize two-way communication and interactivity. Online learning focuses on interactions between learners as the primary method of acquiring knowledge. This approach encourages self-pacing and learner control through decision making in the knowledge acquisition process. Promoting interactivity encourages community building, dialogue, and flexibility while augmenting a variety of experiences in the learning process (William Herlehy, Department of Distance Learning Chairman; Jim Gallogly, Department of Distance Learning Program Manager; Jerry Norris, Department of Distance Learning Instructional Designer, personal communications, November 11-15, 2001).

Interactivity is a key element in the online learning environment. The department incorporates a combination of print materials, audiotapes, videotapes, and online instruction to meet individual learning styles. WebCt allows designers to create learning programs directly on the Web without investing in their own tools or infrastructure (Rosenberg, 2001). The department uses a WebCt based electronic platform coupled with asynchronous learning techniques, the program supports and connects learners through a community space, online support groups, chatrooms, bulletin boards, email discussions forums, online help desks, online bookstores, and the digital library, fostering a sense of community. Faculty and staff make personal calls, to students, to enhance connectivity.

Faculty and student participation is monitored by support specialists who document the number of times participants enter the course discussion web site. Faculty and students are required to login a minimum of three times a week per course.

Aligned to the University's purpose of preparing graduates for productive careers and responsible citizenship in aviation and aerospace industry, the department identified honesty, responsibility, trust and mutual respect as environmental factors critical to the "interaction equals satisfaction" motto. Each of these environmental factors is essential to the successful outcome of

an online learning experience. For participants to connect with each other, there must be a sense of safety and trust so that posting encourages feedback and discussion. Honest feedback is critical to the development of an online learning community. The importance of collaboration in achieving learning outcomes depends on the group's ability to collaborate (Student, personal communications, February 12, 2002). The formation of online learning communities is what makes this medium unique.

Students indicated that community building in the online learning environment generated deeper levels of understanding. They also learned critical thinking skills and the art of how to write feedback on the assignments. As active learners, students were expected to participate within minimal guidelines, interact and engage with one another, and take responsibility for the information of the online learning community (Student, personal communications, February 4-8, 2002; March 5-6, 2002).

Faculty described this medium as an equalizer eliminating the boundaries between cultures, genders, and ages. Faculty interviews disclosed that they frequently learn as much from students in an online course as the students learn from them. The ability to remain flexible and approachable in the virtual classroom is characteristics essential for successful instructors and learners in this medium (Faculty, personal communications, February 18-22, 2002; March 5-6, 2002).

Course Components

The department formulated goals and articulated how distance learning courses were to be developed and delivered. These goals are consistent with the university's purpose and conform to the *Distance Education: Guidelines for Good Pra*ctice, developed and published by the American Federation of Teacher's Higher Education Program and Policy Council (William Herlehy, Department of Distance Learning Chairman, personal communications, November 15, 2001). The academic standards and academic policies are consistent throughout the University. The following section discusses components of course design and development, including course authoring, syllabus construction, course guidelines, online web site construction, and participation.

Course Authors

All web-based online courses were developed and taught by qualified faculty, selected based upon credentials and expertise, known as authors, who are certified through technology training to facilitate the course. In addition, each course author has taught the course at least twice in a traditional classroom setting before it is eligible for an online environment (Jim Gallogly, Department of Distance Learning Program Manager; Jerry Norris, Department of Distance Learning Instructional Designer, personal communications, November 11-15, 2001).

The author is preferred to teach the online course the first time, since they are the content experts. However, if authors do not teach the course, appropriate faculty is selected for delivery based upon their skills and credentials. Each author is required to update the course materials annually (Jim Gallogly, Department of Distance Learning Program Manager, personal communications, November 11-15, 2001).

Every course in the distance learning program has a course monitor who serves as a faculty advisor for the author or instructor. The course monitor is responsible for monitoring course content, approving textbook changes, and maintaining a course outline. Course monitors receive feedback from authors, faculty, and students. The monitor sorts course feedback by instructor to be used during the professional development evaluation (discussed in the evaluation

section). Monitors incorporate recommendations, curriculum changes, and instructional material modifications to improve the overall process.

During the course development process, each author is assigned a subject matter specialist who reviews the syllabus, instructional materials, assignments, supplements, and examinations for appropriateness in an online environment.

All graduate courses and most undergraduate courses include videotaped lectures prepared by the author. The Media Producer refers to the videotape as a "talking head" whereby the student sees and hears the author disseminating information. Despite all the departmental advancements in distance learning technology usage, the program relies on the antiquated "talking head" approach for course supplements.

Videos are produced on the Daytona Beach Campus in the media center. Final products range from 30 minutes to 3 hours, depending upon the topic and author (Kevin Norris, Media Producer, personal communications, November 15, 2001, through March 27, 2002).

During an unobtrusive observation of the media center's videotaping studio several interesting elements were noted. A complete and extensive library of all course videos were housed in the media center from 1992 to 2002 depicting the evolution of the supplemental video. It originated as only a "talking head" course supplement and has now incorporated the computer and video projector as enhancement tools.

State-of-the-art equipment, video cameras, whiteboards, conference rooms, and televisions were in the media production facility. Separate facilities house equipment for editing and producing videotapes, and university support within the media center. Offices were located on the studio perimeter.

The studio itself was plain with clean lines, sparse furniture, and a plant. Using a traditional university office style layout, the studio consisted of a massive, light colored-wooden desk, with a sunken center to house notes and supplies, placed in the center of the studio, with a wireless laptop computer on the right desk corner. The computer was connected to an overhead projector directly in front of the desk and slightly off to the right. The projector was used for slide presentations, to show supplemental information, or as a chalkboard. Individual cameras were focused on the computer screen and overhead projector for seamless integration of information, from the "talking head" author, to the computer, and to the overhead projector. Behind the desk was a light-colored matching wooden chair, a non-flowering, medium-leafed, five-foot artificial plant, and bookshelf complete with authentic books, placed on the back studio wall and used as a backdrop. There was also a screen projector available for slide use.

The setting was deliberately plain so as not to distract the distance learner from the message being delivered. While the studio was small, the technology available affords faculty the opportunity to use various instructional technology tools to meet different learning styles. Faculty was encouraged to bring props, notes and other items to taping. Videotaping occurs at various hours by instructor appointment. Each instructor is provided with tips on what to wear, how to articulate and disseminate information, visuals, and gestures to make the video more appealing and interesting to the viewer (Kevin Norris, Media Producer, personal communications, November 15, 2001, through March 27, 2002).

Course Development

The creation of an online course involves a paradigm shift regarding the course material delivery mode. Courses are designed to achieve the final outcome. The department has one instructional designer who develops and enhances courses for the online environment based upon the authors course design. Online courses are piloted in a traditional environment (discussed in

the previous course author section). Assignments, collaborative efforts, interactions, and course materials are selected to support the objectives and course outcomes (Jerry Norris, Department of Distance Learning Instructional Designer, personal communications, November 11-15, 2001).

Online course objectives mirror the development of face-to-face course objectives. Frequently, the same objectives for the identical class work, whether face-to-face, or online. The difference is in the flexible structure of the course syllabus.

Objectives are broadly defined so students can take courses in unanticipated directions, based on their own interests and needs (Jerry Norris, Department of Distance Learning Instructional Designer, personal communications, November 11-15, 2001). The online course demonstration syllabus for the Graduate Research Project can be viewed at, http://wwwec.erau.edu/ddl.dem/htm.

Once the objectives are determined, the next step is creating an effective syllabus. The syllabus is designed for flexibility, allowing students to develop new ideas, exercise critical-thinking, and develop research skills (Jerry Norris, Department of Distance Learning Instructional Designer, personal communications, November 11-15, 2001). Through trial and error, the department determined that a topic-driven course syllabus, or a weekly class schedule, including a discussion topic for the week, coupled with specified readings selected to initiate topic discussion, was the most successful course design. Instructors provide supplementary material on video, CD-ROM or through library reserve, which students respond to online.

Concise guidelines for acceptable participation are critical to course success (Jerry Norris, Department of Distance Learning Instructional Designer, personal communications, November 11-15, 2001). Faculty often assumes course elements to be understood by students, but in reality they were often misinterpreted. For example, stating that participants must log on twice a week is vague. It does not clarify what students are expected to do during online log-in sessions or the length of time expected for a login.

During an interview, one student shared he was not posting to the discussions, but faithfully logging in and reading the postings. He felt this was fulfilling his log-in requirement for the course (Student, personal communications, February 13, 2002). The department was able to track his presence on the web site through software and verified he had been logging in. However, without making contributions to the discussion, it was difficult to determine his grade for course participation.

Examples like this forced the department to clarify exactly what an online session consists of and what is expected of students when they post to a discussion. Random examples extracted from undergraduate and graduate online course guidelines are as follows:

- Attendance and presence are mandatory for this class. You will be required to log on to the Virtual Classroom that has been set up a minimum of one time for each day the class has been scheduled to meet. During each logon session, you are required to make a posting, message, or interaction to the ongoing dialogue that is relevant and substantive. Logging on and saying “I agree” or “I concur” is not acceptable without supporting statements.
- Students cannot pass this class without participation and substantive comments.
- Assignments, including papers, will be posted online. Students are expected to comment on and provide valuable feedback on peer products throughout the course.
- Students can call the instructor regarding any issue, at any time.
- Use good “netiquette” such as focus on one subject per message and use pertinent subject titles; be professional, thoughtful, and careful with your online interaction;

cite all quotes, references, and sources; warn readers at the beginning of the message if it is a lengthy post; do not forward someone else's message without their permission; use humor carefully--the absence of face-to-face cues can cause humor to be misinterpreted as criticism or flaming (angry, antagonistic criticism).

Although guidelines provide a framework from which to operate, the online course web site provides the organizational structure through which participants can engage with the course material being investigated. These elements are designed into all course web sites:

- A welcome area, which includes a place for important announcements, guidelines, or questions that can be posted by any group member.
- A community area where group members interact on a personal level, apart from course material.
- A course content section organized based upon syllabus construction.
- An area devoted to reflections on learning through electronic means.
- An area devoted to evaluation of the class, which can be posted initially or added to the course web site as the course progresses.
- A separate area for assignments and exams or for posting assignments as discussion items.
- An online gradebook to track individual progress.

The subsequent section discusses the Department of Distance Learning support systems for faculty and students and includes a discussion on library, advising and career services.

Support Systems

The case study corroborated with the review of literature, indicating that technology, counseling and advising services for students increases program effectiveness. Through trial and error and continuous program evaluation, four components were deemed critical to Embry-Riddle distance learning students and valuable to the overall program assessment process (William Herlehy, Department of Distance Learning Chairman; Jim Gallogly, Department of Distance Learning Program Manager; Linda Dammer, Director of Enrollment; Melanie West, Circulation and Media Services Manager, personal communications, November 11, 2001, through March 27, 2002). These components are:

1. Technology services.
2. Library services.
3. Advising services.
4. Career services.

Creating an efficient support system involves orchestrating the interplay of physical environment; human resource; technological and programmatic constraints coupled with departmental values on service and knowledge acquisition (William Herlehy, Department of Distance Learning Chairman, personal communications, November 15, 2001). Information and knowledge are increasing exponentially and the department find themselves challenged to distribute the wealth of information quickly, thus increasing their value through organizational learning.

Technology

The technical support team provides support for the technological WebCt platform used to deliver and receive instruction. This support provides advice about hardware and software usage or assistance with technical problems. Technical support is accessed through a contact number for the University computer support that is available 24 hours a day. The technical

support staff is responsible for all web site related problems; they do no support individual computer problems, this is an area for future development.

The Information Technology Resource Department monitors and protects the confidentiality and integrity of academic and administrative systems and networks. Additionally, the department provides technology training for faculty and staff and implements a Tech Refresh Program through which training is provided on updated and/or replaced equipment, software, and other technology applications. This department facilitates the adoption and diffusion process of new technologies.

Library

Access to learning resources is a critical component to the success of distance learning courses. Research assistance for the Jack Hunt Library on the Daytona Beach campus is provided for the online community through Library Services. The following two departments provide assistance via distance:

1. The Access Services Department assists students who have already identified materials. If the Jack Hunt Library owns these materials they can be loaned to students. If the materials are not owned by the Library, they can be borrowed from another library through Inter-Library Loan.
2. The Reference Department assists students who have not identified a particular item and are just beginning their research.

Reference Librarians communicate with distance learning students via phone, email, facsimile, or the U.S. postal service to provide instruction in accessing and using the electronic catalog and databases, help in formulating search queries, and assistance in conducting literature searches.

In addition to the Library's catalog Voyager, enrolled students have access via the Web to magazine and newspaper articles, aviation newsletter articles from the Aviation Week Group, aviation and aerospace research citations through Aerospace Database, and selected Web sites through the ERAU Internet Research Tools.

The Jack Hunt Library at Embry-Riddle has over 120,000 books and an extensive collection of periodicals, microfiche, microfilm, as well as CD-ROM materials, government document collections, and specialized electronic databases including: Air university library index to military periodicals, applied science and technology abstracts, aviation week group newsletter, books in print, EI compendex, modern language association bibliography, newsbank global newsbank, ERIC and other traditional databases (http://www.ec.erau.edu.ddl/resources.html). The institution's focus on aviation and aerospace requires learning resources to emphasize periodicals, reports, and database access due to the rapid and ongoing changes in this industry. This is the primary way of obtaining information. The University invests in reports, databases, proceedings and other online systems for students to acquire current information (Melanie West, Circulation and Media Services Manager, personal communications, January 8, through March 27, 2002).

Library materials are accessible using the online catalog. Their web site contains system and multimedia requirements for navigation, frequently asked questions, an overview of the services provided including tips for evaluating web sites, and practical advice for searching the web (http://amelia.db.erau.edu/irt/public_html/searching.html). The library also participates in the Online Computer Library Center, which facilitates interlibrary loan services. The Jack Hunt Library has over 35 agreements with various consortia and other arrangements with institutions worldwide so distance learners have access to the information they need to complete the program.

The purpose and scope of the library are clearly presented in the mission statements and are regularly evaluated. For example, based upon the recommendation of the Southern Association of Colleges and Schools visitation team in 2000, the library employed surveys to evaluate its effectiveness. These internal assessment surveys are randomly administered online to library users assessing if their needs are being met. The survey results are monitored and modifications are made as needed. Respondent examples of recommendations made for the library recently include:

- Added online instruction and instructional brochures to facilitate use of library resources, identified through student surveys.
- Added full-text online resources and a web-based online library system, identified through student surveys.
- Began library web- based document delivery program and electronic reserve service, identified in part through student surveys.

Advising Services

Distance learning students consist of full-time working adults with intensely different support needs than traditional students. Through course evaluations, students expressed a need for services to focus on course advising and career counseling. The Department of Distance Learning established 24 hours a day, 7 days a week, 365 days a year, asynchronous access to these services through a secure computer system.

Career Services

The University's worldwide network of more than 42,000 alumni, who work in areas of aviation and aerospace, assist Embry-Riddle's Career Services office by offering their expertise and internship opportunities to students. Alumni participate in recruitment and retention programs, attend two annual college fairs and support the Alumni Sharing Knowledge (ASK) program. The University participates in trade shows, such as Oshkosh, the Paris Air Show, Asian Aerospace, and the United States Air and Trade Show, and sponsors the Embry-Riddle Industry/Career Expo in an effort to provide networking opportunities among the industry, alumni, and University.

Cooperative Education

The Department of Distance Learning encourages cooperative education opportunities through Career Services for course credit. Such opportunities afford students the ability to bridge the gap between learned theories, concepts, and practical application of the acquired knowledge by--

- Providing students with practical work experience, which applies, develops, and expands knowledge gained in the program.
- Promoting student awareness of the aviation and aerospace industries to develop career goals and plans.
- Providing students with experience in a professional work setting.
- Developing student self-reliance, personal style, values, ethics and beliefs.

Undergraduate enrolled students who have completed their freshman academic requirements with a cumulative grade point average of 2.5 are eligible for the cooperative education program, as are graduate students who have completed at least 12 course hours with a cumulative grade point average of 3.0. These students occupy positions with organizations throughout the United States and overseas, in state and federal agencies, with major corporations, global airlines, airports and locally owned companies. Additionally, students are encouraged to develop new positions with other companies in their geographic area.

Positions vary in scope and responsibility and depend upon student qualifications. Cooperative education opportunities and internships are scheduled to parallel distance learning course terms. Career Services posts established positions online and updates the web site during the term. The department provides counseling to students regarding the applicability of course credit to student degree programs, administratively qualifying students for participation and authorizing registration for the appropriate courses. The department also performs community outreach with employers to establish new positions (http://www.ec.erau.edu/cela/GENERALinfo.shtml).

The cooperative education experience reinforces skills learned in the asynchronous environment, aids students in defining career goals, and provides income, while concurrently providing a networking foundation for future career paths. Most importantly, distance learning students can "work" for credit near their home (http://www.ec.erau.edu/cela/GENERALinfo.shtml).

There was no evidence that students enrolled in distance learning classes secured better positions than traditional students. However, there was a noticeable difference in salary. The Alumni Survey of 1999 graduates assessed the average salary of distance learning graduates. Figures 7 and 8 illustrate the trend of average annual salary by degree type and compare it to traditional on-campus student rates.

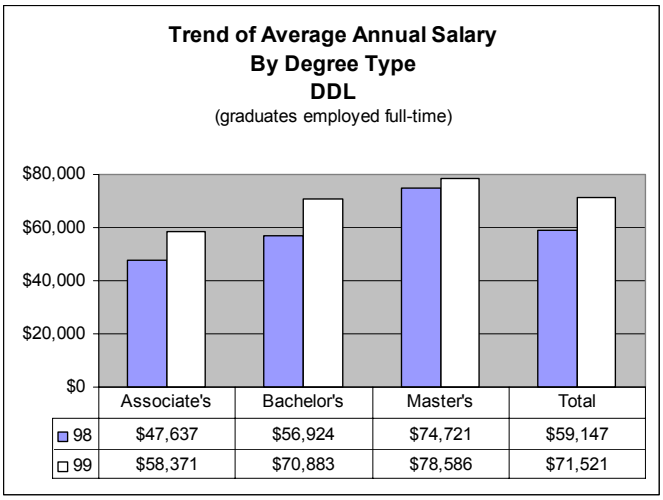

Figure 7. Trend of Average Annual Salary By Degree Type DDL

Source: http://comm.db.erau.edu/u_info/factsfigs/factsfigs.html

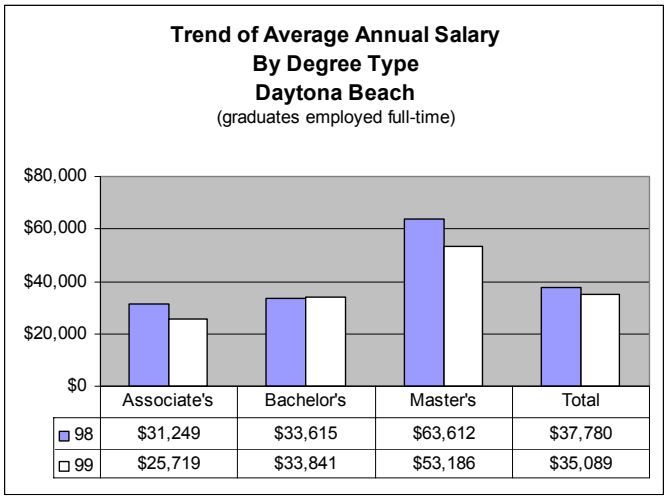

Figure 8. Trend of Average Annual Salary By Degree Type Daytona Beach

Source: http://comm.db.erau.edu/u_info/factsfigs/factsfigs.html

It is important to note the demographics for distance learners are primarily goal-oriented males, 35 years of age, who are employed full-time in the military or aviation industry, pursuing professional enrichment.

Residency

Residency requirements are not typically a part of the undergraduate experience. However, graduate degree programs traditionally included an on-campus residence component to socialize students into the field of study, and to provide them with access to a variety of formal and informal learning experiences.

The department circumvented this socialization program component by capitalizing on communication technologies. They developed policies and guidelines meeting the residency objectives (Linda Dammer, Director of Enrollment, personal communications, September 23, 2001, through March 27, 2002).

For example, a common element of the residency experience is to provide access to information experts and instructional resources such as libraries. The objective of this element is to offer students educational experiences beyond what individual instructors can provide. This objective was met through online seminars and workshops, video teleconferencing, audio conferencing, and computer conferencing that connected students directly to content experts around the world. CD-ROM's, online searches, and electronic connections to the Jack Hunt Library offered access to collections of data and information. Homepages offered course-specific resources for students to related sources of information.

Interactivity focuses on the attributes of the technology systems employed in the distance learning program. Course satisfaction is correlated to interaction, sharing, knowledge acquisition and real-world application. "Interaction equals satisfaction" involve behaviors where individuals and groups directly influence one another.

Through the use of distance learning technology, support services are provided effectively and efficiently (Jerry Norris, Department of Distance Learning Instructional Designer, personal communications, November 11-15, 2001). Residency objectives such as out-of-class interaction

between participants, exposure to and socialization in the field of study, ready access to academic advising, career, library and support services are achieved through careful planning. Institutional policies reflect awareness and acceptance of this capability serve the interests of both the student and the institution.

The following section discusses formative and summative evaluation.

Evaluation in an Online Environment

Evaluation measures lead to a continuous process of planning, review and improvement. Course, faculty, and student formative and summative evaluations are completed to determine program effectiveness.

Formative Evaluation

Formative evaluation is a continuous process occurring at any point throughout the course; it can surface gaps in the course material or in learner's ability to grasp the material. It provides instructors a way to shift focus if the course is not proceeding according to plan. Formative evaluation helps determine to what extent instructors are successfully facilitating the course material. If instructors have successfully established learning guidelines, outcomes, and criteria for evaluating student performance, then establishing a formative process of student evaluation is natural. Such evaluations take multiple sources of data into account including the quantity of posts and the quality of online discussion participation. Performance on course assignments and other class exercises is considered.

Instructors also consider the needs, educational level, technology familiarity, writing skills and participation when evaluating. Using a learner-centered approach in the online classroom forces instructors to take into account how well the assignment met the needs of the participant. Requesting student feedback on the utility of assignments assists with the course formative evaluation.

Faculty typically does not comment on the mechanics of writing as they pertain to online posts. Most students compose their posts while online and mistakes are likely, especially if English is not their primary language. Encouraging posts without critiquing writing errors fosters spontaneity in the discussions.

Grading

Evaluating outcomes of the learning process and student satisfaction with the course is a complex process. To assist with awarding grades, students are frequently asked to submit a self-evaluation as part of the closure process for the course. They are asked how well they felt they met their learning goals and their overall performance. This is an important step in evaluation because students' self-assessment regarding the amount of learning gained and the achievement of their learning objectives is equally important to the instructor's evaluation of their work.

Instructors use examinations, projects, and/or research papers as part of the evaluation process. Feedback is delivered through phone conversations, email, or posted on the course web site for the group to see and review. Both the online community and the instructor evaluate collaborative assignments. Evaluation is a qualitative and quantitative process.

Proctored Examinations

In compliance with accreditation standards and the Commission on Colleges of the Southern Association of Colleges and Schools requirements, all online courses have at least one proctored examination. Any accredited university or Sylvan Learning Center can administer examinations.

During physical registration through specified registration centers, proctor information is provided and course materials are ordered for distance learning students. Registration and book information are processed overnight. Course supplements, videos and books are delivered within three days of registration. The department is planning to implement online registration in the future so that distance learners do not have to travel to registration sites to enroll. Students expressed a need for more convenient registration techniques in the assessment surveys.

Course withdrawals after the midterm point are not permitted. To drop an online course without academic or financial penalty, the student must contact their original registration center and drop within the first seven days of the term. Withdrawal requests must be made in writing via email, facsimile, or U.S. postal service. Extensions are granted for up to 90 days past the end of term date, at the instructors discretion.

Online Testing

The department incorporates courseware that creates online tests and quizzes. Instantaneous feedback is provided on correct answers and the results of these tests and quizzes are stored in an encrypted data file accessible to the instructor. In this format, the instructor knows the student did not alter any answers. However, this does not guarantee faculty that the name assigned to the test was in fact the person who took the test. Fingerprint recognition for testing may be in the future to eliminate the opportunity to cheat on tests (Jim Gallogly, Department of Distance Learning Program Manager, personal communications, November 11-15, 2001).

Summative Evaluation

Summative evaluation helps the university know how well the instructors have achieved the goals and learning outcomes established at the beginning of the course. This evaluation assesses the completed course and follows the model of evaluation used on campus. This form of evaluation is a measure of student satisfaction with the course and instructor. Standardized evaluation forms are used as a tool in summative evaluation and can be viewed at, http://backoff.pr.erau.edu/sacs/Campus_Compliance_Reports/Extended_Campus_R…/index.html.

Through surveys on student satisfaction by the Institutional Research Office and individual departmental staff, student feedback is monitored and archived. The results are promulgated among the campus leadership and the feedback enables campus leaders to determine the future goals and desired outcomes from student perspectives. This information also helps allocate financial resources. Many of the surveys used to assess program effectiveness are benchmarked against national data responses to depict how the University is doing compared to their competition (Maria Franco, Research Institute Specialist, personal communications, January 8-9, 2002).

The tools used for analyzing program effectiveness include the following:

- Student Response Survey to Instruction.
- Student Survey.
- Faculty Recommendation Form.
- Alumni Survey.
- Employer Feedback Survey.

Survey results are filed and used in the subsequent planning processes. A description of each survey follows.

Student Response Survey to Instruction

This survey is provided to students online as part of the evaluation process used for each course offered. The emphasis of this survey is on instructional delivery. The form can be completed and submitted anytime during or at the completion of a term. The completed forms are reviewed by departmental staff and kept on file for faculty annual review. This survey can be viewed at, http://www.ec.erau.edu/apps/cdl/CourseEval/CourseEval2.cfm.

Student Survey

An online student survey developed by the Institutional Research Office is randomly administered to students, during each course term, to assess course content and how well the university infrastructure supports distance learning. Recent implemented recommendations from this survey and informal feedback from the field are as follows:

- Replacement of under performing staff.
- Shortened response time to evaluate student admission packages.
- Increased graduation confirmation dates from five to twelve annually.
- Purchased software to print diplomas in-house.
- Reduced the time for graduates to receive their diploma via U. S. postal service.
- Reduced transcript delivery time.
- Distributed alumni publications, such as the *Leader*, to increase morale.

This survey is kept on file for annual review and future revisions.

Faculty Recommendation Form

An online faculty recommendation form, filled out by the instructor each time a distance learning course is taught, is another program effectiveness tool. This form emphasizes course and supplemental materials, as well as the administrative support of the department of distance learning during the term. The department chair reviews the survey when received, and files it for annual review and future revisions. Recent implemented recommendations from this survey and field feedback included:

- Increase the number of computers for administrative staff.
- Create an electronic faculty pay voucher.

Alumni Survey

Random graduates are asked to complete this survey approximately one year and 6 months after completing degree requirements. The emphasis is on the appropriateness and usefulness of the degree program in the workplace and on the delivery system the graduate experienced.

This survey is used to improve both the academic and student development services by ascertaining how well prepared the alumni feel they are as a result of attending the distance learning program. The results are compared to the Employer Survey.

Employer Survey

The University Institutional Research Office conducts annual surveys sampling the employer's assessment of graduate performance approximately one year and 6 months after graduation. Each online degree has at least one general education course required from humanities/fine arts, social/behavioral sciences, and natural sciences/mathematics, in addition to specific courses in reading comprehension, writing, and composition, oral communication, fundamental mathematical skills, and the basic use of computers. Figure 9 illustrates competence of distance learning graduate versus other graduates at general skills.

(Percent responding "excellent" or "very good")

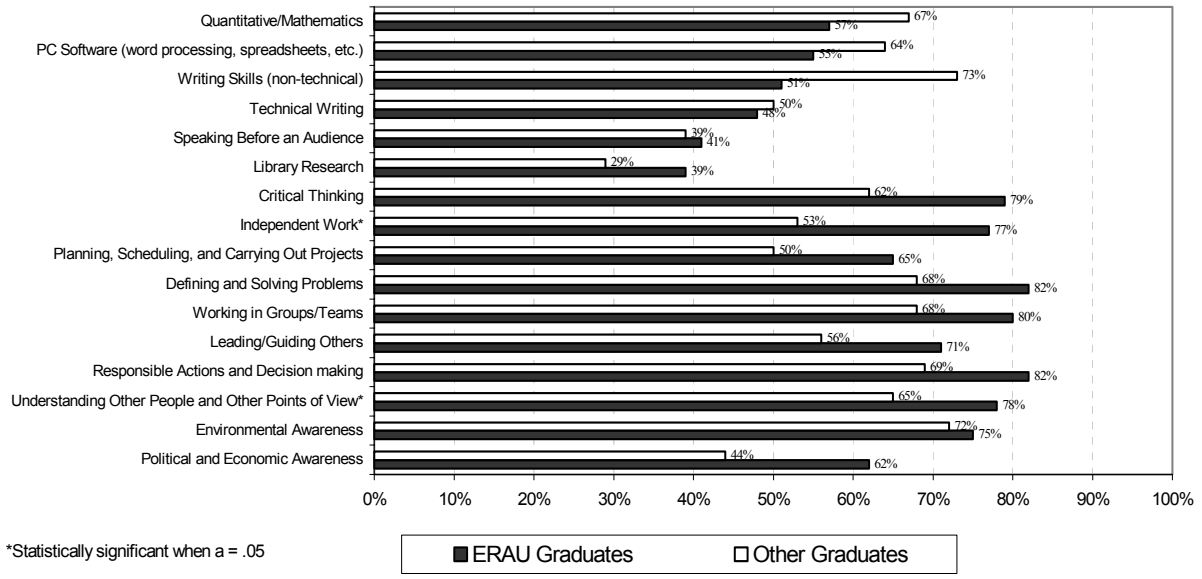

Figure 9. Competence of the Department of Distance Learning Graduate versus Other Graduates at General Skills

Source: Battistoni (September 2000). Institutional Research Office, Employer Feedback Survey

The following skill rating differences were statistically significant for distance learning students:

- Independent work (p = .034).
- Understanding other people and other points of view (p = .046).
- Combined general skills of distance learning graduates (p = .030).

The department determined there is no significant difference in the achievement of students in well-designed distance learning programs and the achievement of those in traditional face-to-face programs, based on standard performance measures (William Herlehy, Department of Distance Learning Chairman, personal communications, November 15, 2001).

It is important to note that reported statistical data from the Alumni and Employer Surveys are 18 to 24 months outdated when published by the Office of Institutional Research. This is due to the fact that they do not send out the surveys until graduates have been in the field for at least18 months.

Faculty

Faculty is regularly evaluated on scholarship, service and teaching effectiveness. The summative tool used for analyzing faculty effectiveness coupled with student satisfaction surveys consists of an annual evaluation.

Annual Evaluation

Full-time faculty are evaluated annually, while new part-time faculty are evaluated at the completion of the first two courses taught and annually thereafter. The evaluation is designed to accomplish a range of essential and practical objectives including:

- Reaffirmation of a mutual understanding of the expectations of the faculty member and those of the College of Career Education.

- Regular review of the faculty progress and development relative to a personal career plan and the interests and needs of the College of Career Education.
- Recognition of accomplishments and achievements.
- Identification of performance areas for development.
- Identification of performance shortcomings in need of correction.
- Awareness of problems and issues among faculty.
- Identification of professional development opportunities.

The major criterion for evaluation is teaching effectiveness. However, faculty is expected to engage in professional development and industry service activities, either that sponsored by the University or individually. Examples of University-sponsored development activities include local faculty development workshops and meetings, annual teaching effectiveness symposia, sponsored attendance at conferences and symposia outside the University. These components contribute to an environment of productive scholarship.

Evaluating the program itself is a critical component to continuous improvement. It is important to receive feedback from the institution, stakeholders, students and faculty, on the overall experience of working online to determine technology effectiveness. This is initiated in the planning phase and concludes with follow-up studies to determine the program's effectiveness. At its core is an attempt to determine the overall value of the program.

Summary

Media for communicating information has expanded from simple print, voice, and face-to-face communications to include fax, voice mail, computer-assisted instruction, email, video and other technologies. These technologies are central to the mission of education. Institutions have entered the distance learning arena with the intent of capturing and attracting nontraditional students, as defined by age, marital status or employment status, to the academic market. To capture this market, strategic planning and technological adoption of contemporary educational tools must be integrated throughout the organization.

Adoption and diffusion mechanisms focus on societal and customer needs. At institutions of higher learning, students are the customers and their academic needs should come first. The corporate sector is indirectly shaping education by hiring students who have acquired the skills needed to compete in the information age. Distance education must have an integrated strategic plan that successfully aligns all vital programs to support academic and societal needs. Students and faculty must have access to information resources, support services, policies and procedures for distance education.

Standards must be articulated from the beginning, and plans must be set in place for the periodic assessment of achievement. Dr. William Herlehy III, Department of Distance Learning Chairman, sums up their entire program in this manner, "the department found that appropriate services for its participants; a comprehensive and focused strategic plan; a well thought out service system; and being strategically positioned in the aviation and aerospace market place were vital components to successful program implementation" (personal communications, November 11, 2001). To develop a sound evaluation process, many areas need to be assessed, including the program participants such as faculty, administrators, students, librarians, counselors, advisors, and representatives of the industries to be served. Evaluation is essentially a periodic self-assessment process of all planned goals and objectives. The end of the evaluation stage is also the beginning of the next planning cycle, as illustrated in Figure 5, and the hallmark of continuous improvement.

This case study examined Embry-Riddle Aeronautical University's asynchronous distance learning program to identify characteristics critical to the diffusion and adoption process necessary for effective implementation of contemporary distance learning technology. Although the university operates as a model distance learning program, there was a disconnection between public domain documentation and data gathered during interviews. Problems were noted during the interview phase of the examination, but corroboratory data was not acquired through other interviews or documentation review. The following list depicts problems identified during the examination:

- Faculty online participation in discussions and number of weekly logins was not meeting course requirements.
- Course supplements were mundane and boring to read.
- Course orientations on technology usage and technical support for library resources, databases and reserve were not detailed enough for first time users.
- Technology support for individual computer/technology problems was needed but unavailable.

Many of these problems were discussed in the review of literature as barriers to implementation and were also evident at Embry-Riddle Aeronautical University.

Attributes extrapolated from the review of literature and case study examination are significant, since many educational institutions are implementing distance learning programs without benefit of a strategic plan. The following lessons learned by the researcher were derived from the literature review and case study examination and are offered as a springboard for institutions interested in improving or implementing a distance learning program.

Lessons Learned

Strategic plans were in place.

- The case study indicated that a strategic plan should specify how the organization intends to promote distance learning internally and externally. It must also describe program implementation and assess the program to ensure alignment with the organizational vision (Jim Gallogly, Department of Distance Learning Program Manager, personal communications, November 11-15, 2001).
- The literature review revealed that merely having a better alternative to traditional training delivery was insufficient to meet twenty-first century societal demand (Ely, 1995, 1999; Kershaw, 1996; Picciano, 2001). An organization must collectively develop a strategic plan to keep the faculty, staff and students focused on the vision, mission, and benefits of the distance learning initiative (Belanger & Jordan, 2000; Chute, Thompson, & Hancock, 1999; Lau, 2000; Minoli, 1996; Murgatroyd, 1990).

Cross-functional teaming was evident.

- Embry-Riddle's program was consistent with the literature in that all participants have a stake in the program and contribute to their overall success (Jim Gallogly, Department of Distance Learning Program Manager, personal communications, November 11-15, 2001).
- The literature review indicated that the success of a distance learning system required cross-functional teaming among stakeholders. This included a paradigm shift externally from industry and internally from students, support staff, instructors, and administrators. Those who have a stake in the success of the system must jointly identify and address concerns or issues relating to the training process and/or

technology requirements prior to program delivery (Drucker, 1991; Murgatroyd, 1990).

Commitment to change was articulated throughout the organization.

- The case study developed an organizational commitment to create and sustain the distance learning initiative. This commitment was tangible as well as ideological. The staff supported and perpetuated the organizational commitment and facilitated the integration of the initiative into the culture and infrastructure (William Herlehy, Department of Distance Learning Chairman, personal communications, November 15, 2001).
- The literature review stated that students, support staff, instructors, and administrators must understand the compelling individual and organizational needs driving the establishment of the distance learning system (Connick, 1997; Drucker, 1991; Murgatroyd, 1990; Porter, 1990).

Role models for diffusion and adoption of the distance learning system were present.

- The case study specified that there must be at least one person in a high-level leadership position within the organization who is a visible role model for the distance learning initiative. The role model must be able to inspire others to adopt the technology, support its use and diffusion through the organization, actively and visibly participate in the initiative (Jim Gallogly, Department of Distance Learning Program Manager, personal communications, November 11-15, 2001).
- The literature review discussed that change agents and peer opinions heavily influence individuals in the adoption and diffusion process. The role of the change agent was to provide verbal support to individuals who have adopted the innovation (Ely, 1999; Evans & Nation, 1993; Geoghegan, 1995; Jennings & Dirksen, 1999; Rogers, 1995; Sherry & Billing, 2000).

Reward and/or recognition processes were established.

- The case study showed that an organization must identify methods to recognize and reward technology adopters who contributed to the establishment of the new distance learning system. The department offered tangible awards to the most innovative faculty annually. Intangible incentives were offered through personal and professional technology development, tuition waivers or reimbursement, release time for projects and course development, and travel expenses to professional seminars and conferences (Jim Gallogly, Department of Distance Learning Program Manager, personal communications, November 11-15, 2001).
- The literature review stated that change was difficult. Tangible and intangible rewards helped to communicate organizational priority and to facilitate change (Jennings & Dirksen, 1999; Rogers, 1995; Sherry & Billing, 2000; Verduin & Clark, 1991).

Programs were designed for the distance learning context.

- Course authors and the departmental instructional designer, created and enhanced online courses aligned to the final outcome. Course assignments, collaborative efforts, interactions, and course materials supported the objectives as depicted in the syllabus. Content was embedded into every day life to facilitate knowledge construction. This was accomplished through discussion questions relating course material to the real-world, commenting on real-life situations, creating group assignments that dealt with common situations, and collaborative projects. Charts, graphics, case studies, and brainstorming were used to create a balance between

human interaction and technology. Courseware applications allowed instructors to request reports on posting frequency and site visits that helped assess mandatory participation and attendance requirements (Jerry Norris, Department of Distance Learning Instructional Designer, personal communications, November 11-15, 2001).

- The literature review stated that elements of the distance learning program, such as the learning objectives, instructional methods, interaction techniques, content, delivery technologies, and evaluation, must all complement each other to be effective (Bloch & Hesse, 1993; Clark, 1983; Gasaway & Wiant, 1994; Murray, 1995; Sherry, 1996; Westin & Finger, 1991).

Technology integration was supported by the technology infrastructure.

- The case study stated that it was critical to purchase technology that met the organization's infrastructure needs and was easy to use. Through trial and error, continuous program evaluation and growing enrollments, the department expanded their original in-house Skytalk program to a WebCt platform for ease of use and seamless integration of technology (Jim Gallogly, Department of Distance Learning Program Manager, personal communications, November 11-15, 2001).
- The literature review established that the organization's technology infrastructure plan must support program goals and activities (Belanger & Jordan, 2000; Brancheau & Wetherbe, 1990; Chute, Thompson, & Hancock, 1999; Ely, 1999; Kershaw, 1996; Lau, 2000; Minoli, 1996; Murgatroyd, 1990). The goal for technology adoption and diffusion was that it becomes "transparent" in the learning process (Palloff & Pratt, 2001). For technology to become invisible, the equipment should be accessible and easy to operate (Holmberg, 1995; Mambretti, 1999; Picciano, 2001).

Fiscal allocations were addressed in the strategic plan.

- The university examined a combination of economic factors, market circumstances, and cost drivers in their strategic plan (http://comm.db.erau.edu/u_info/factsfigs/factsfigs.html).
- The literature review indicated that the strategic planning process must address the needs of distance learning students and the institution. The cost-effectiveness of a distance learning system depends on comparative costs of traditional and distance learning systems, the purchasing and upkeep of technology, the potential for increased enrollments over a larger geographic area, and the overall educational value to the institution and its customers in implementing a program (Semper & Coggin, 1976). Overall educational value refers to the notion that the faster information and knowledge are disseminated throughout an organization the more opportunity for that information and knowledge to create additional learning experiences (Chute, Thompson, & Handcock, 1999).

Instructors were trained in distance learning presentation skills.

- The case study was consistent with the literature review and provided instructor training annually in the Tech Refresh program. The department learned that a beneficial byproduct of the training was that faculty voluntarily mentored others on technology usage and made recommendations for course improvements. Additionally, faculty had support networks in place for technological issues and troubleshooting. Despite having these processes instituted, the department noted this was an area for improvement (Jim Gallogly, Department of Distance Learning Program Manager, personal communications, November 11-15, 2001).

- The literature review indicated that instructors must be trained in distance learning presentation skills to be effective (Evans & Nation, 1993; Garrison & Baynton, 1987; Palloff & Pratt, 2001; Sherry, 1996).

Learning outcomes were appropriate for the medium.

- The case study was consistent with the literature in that programs were organized around demonstrable learning outcomes, assignments and interactions were driven towards accomplishing those outcomes. The department identified honesty, responsibility, trust, and mutual respect as environmental factors critical to the "interaction equals satisfaction" motto. Each of these environmental factors was essential to the outcome of the online experience. The department was not consistent with the literature with regards to placing less emphasis on evaluating and more on learning; they place equal emphasis on each (Jerry Norris, Department of Distance Learning Instructional Designer, personal communications, November 11-15, 2001).
- The literature review stated that courses must be well designed, with specific learner outcomes, supported by an instructional and support staff available to address learners' concerns. This was done by clearly articulating the instructional objectives, strategies, and outcomes required for system support in the strategic plan. A shift from measuring educational inputs to measuring student outputs and educational outcomes was inevitable (Connick, 1997). There should be less emphasis on evaluating how well faculty taught and more on what was learned. Faculty should focus on the outcomes of interaction to improve student performance (Belanger & Jordan, 2000; Garrison & Baynton, 1987; Hezel & Dirr, 1991; Lau, 2000; Minoli, 1996; Saba, 1988; Sherry, 1996).

Support services were established for distance participants.

- The case study provided online library, counseling, and advising services accessible 24 hours a day, 7 days a week, 365 days a year, to increase program effectiveness. The library offered research assistance over the phone, email, facsimile, or U.S. postal service to provide instruction in accessing and using electronic catalog and databases, help in formulating search queries, assistance in conducting literature searches and acquiring necessary materials. Advisory services were accessed anytime of the day or night through a secure computer system. Career assistance offered students expertise in job searches and personal development, as well as cooperative education opportunities. The department determined that tutorial services were not necessary since they had advisory and career services available 24 hours a day for students. Additionally, the department has not instituted services to help students troubleshoot individual computer and/or technology problems. During physical registration through specified centers, proctor information was provided and course materials were ordered for distance learning students (Jim Gallogly, Department of Distance Learning Program Manager, personal communications, November 11-15, 2001; Maria Franco, Institutional Research Center Specialists, personal communications, January 8-9, 2002; Melanie West, Circulation and Media Services Manager, personal communications, January 8, through March 27, 2002).
- The literature review disclosed that an organization must provide learner support services at least equivalent to those in a traditional environment. Support services should include access to digital libraries, student services, advising, counseling, registration, and technical support (Bates, 1991; Bloch & Hesse, 1993; Evans &

Nation, 1993; Gasaway & Wiant, 1994; Geoghegan, 1995; Moore, 1989; Murgatroyd, 1990; Murray, 1995; Verduin & Clark, 1991; Westin & Finger, 1991).

Multilevel evaluation assessment tools were utilized.

- The case study used multilevel assessment tools to determine program effectiveness. The following tools were used after each course was completed: the Student Response Survey to Instruction, a Student Survey and the Faculty Recommendation Form. Annually, an Alumni Survey and Employer Feedback Survey were administered to identify the support service needs of distance learning participants. These assessment tools were reviewed annually, modifications and/or corrections were made as needed (Maria Franco, Institutional Research Center Specialists, personal communications, January 8-9, 2002; Melanie West, Circulation and Media Services Manager, personal communications, January 8, through March 27, 2002). Annual evaluations were conducted for faculty on scholarship, service and teaching effectiveness. Teaching effectiveness was the major criterion for evaluation (Jim Gallogly, Department of Distance Learning Program Manager, personal communications, November 11-15, 2001). The Jack Hunt Library randomly conducted internal online assessments of participants to determine if their needs were being met; these results were monitored and modifications were made as needed. Faculty conducted formative evaluations by requesting feedback on the utility of assignments during a course term and incorporated the findings into the following course. Lastly, course authors annually evaluated and modified courses taking into consideration the comments made through other assessment tools.
- The literature review reported that institutions should evaluate how faculty and students reacted to the distance learning program, and how the program influenced the actual job performance through follow-up surveys on students, faculty and staff. The literature review did not reveal specific evaluation tools to use for this assessment (Belanger & Jordan, 2000; Ehrmann, 1997; Jennings & Dirksen, 1999; Simonson & Schlosser, 1995; Sweeney, 1995; Woodley & Kirkwood, 1986).

The following section extracted from the lessons learned, discusses possible use of the examination, concluding with recommendations for further study.

Possible Use of this Examination

Institutions could use this study to gain insight into the types of distance learning technologies and how they are being used in asynchronous programs, specifically a model program at a major university. In addition, while the scope of this research encompassed one university, the interview instrument could be used by institutions to assess the extent of distance learning technology usage.

Technology involves continuous updating of hardware and software, and therefore constant updating of skills in using hardware and software. How well the university addressed this issue has a direct impact on how such technology is utilized. The results of this study may justify hiring additional personnel dedicated to assisting faculty with using distance learning technology.

Faculty and students expressed a need to have increased technical support available to them for individual distance learning technology related problems. The growth of technology usage should be monitored and additional support personnel should be added in proportion to this growth.

Recommendations for Further Study

This examination could be replicated in institutions interested in improving or implementing a distance learning program. The interview instrument could be adapted to gather data about why these technologies are or are not being used, their effectiveness in the teaching and learning process, and implementation barriers. In addition, future research may include a follow-up interview study with graduates working in the field, to examine how they felt the program prepared them for their professional endeavors.

Recommendations for the Case Study

Recommendations for the case study encompass more course syllabi structure, increased interactivity from faculty and individualized support services for first time distance learners.

Dissemination of Results

In addition to normal dissemination of dissertation results, the findings of this research were shared with Embry-Riddle Aeronautical University's Department of Distance Learning Chairman, Dr. William Herlehy; the NASA Langley's Office of Education Director, Dr. Samuel Massenberg; and the NASA Langley's Office of Education University Affairs Officer, Mr. Roger Hathaway.

Conclusion

The researcher concluded after this examination that strategically developed distance learning programs could be cost-effective and implemented without bells, whistles and large instructional design teams, by contracting course authors for individual classes and piloting online courses in a traditional environment. While technology has had a dramatic impact on society, that in itself, does not suggest that technology based distance education is the solution to every educational challenge. But it does have its place in the contemporary curriculum, and it does significantly expand educational opportunities to new and distant audiences whose quest for knowledge would otherwise be hampered by time and distance.

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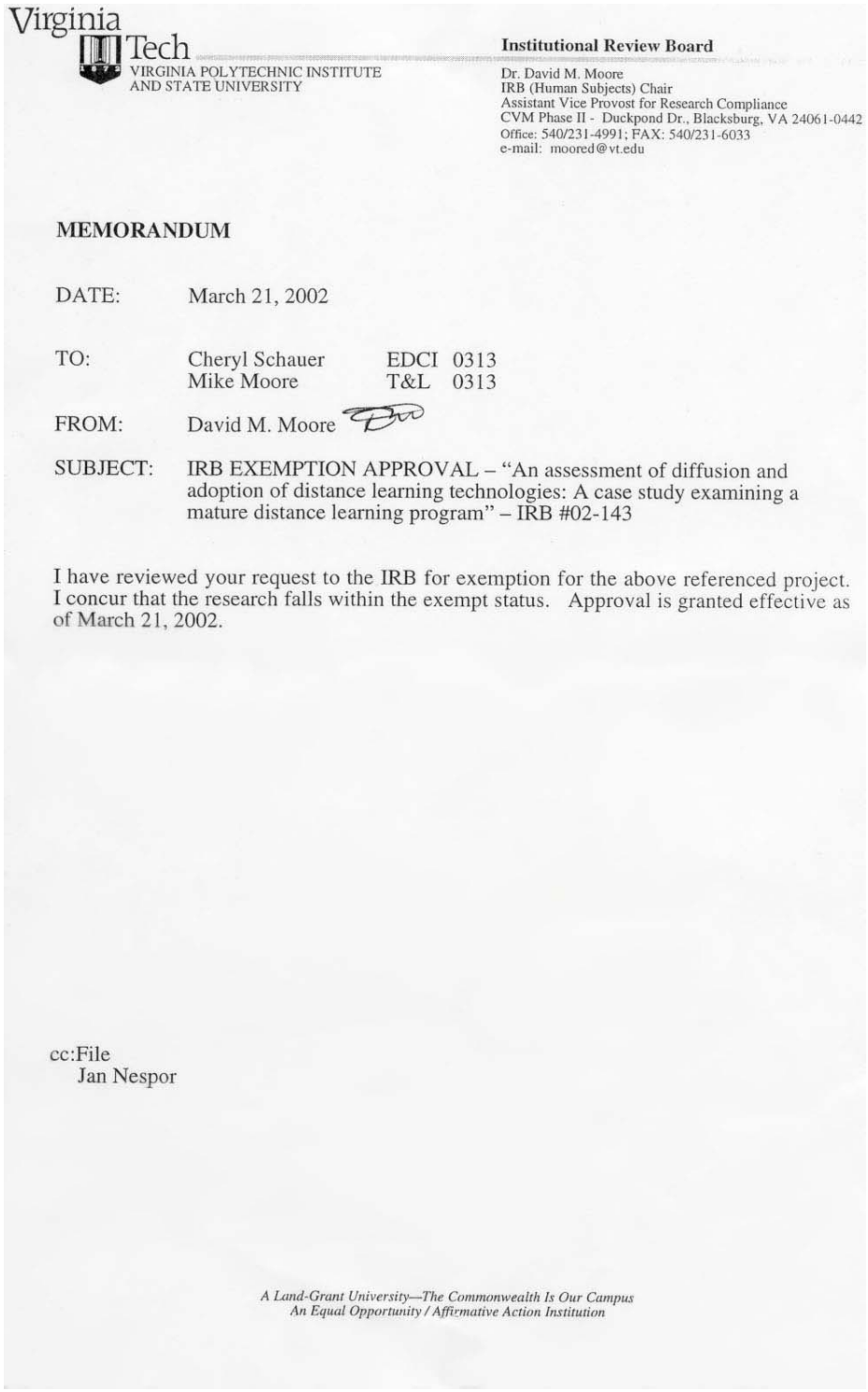
Appendix A

Virginia Polytechnic Institute and State University's "exempted" IRB submission form to conduct research involving human subjects at Embry-Riddle Aeronautical University.



Virginia Tech
VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Institutional Review Board

Dr. David M. Moore
IRB (Human Subjects) Chair
Assistant Vice Provost for Research Compliance
CVM Phase II - Duckpond Dr., Blacksburg, VA 24061-0442
Office: 540/231-4991; FAX: 540/231-6033
e-mail: moored@vt.edu

MEMORANDUM

DATE: March 21, 2002

TO: Cheryl Schauer EDCI 0313
Mike Moore T&L 0313

FROM: David M. Moore

SUBJECT: IRB EXEMPTION APPROVAL – "An assessment of diffusion and adoption of distance learning technologies: A case study examining a mature distance learning program" – IRB #02-143

I have reviewed your request to the IRB for exemption for the above referenced project. I concur that the research falls within the exempt status. Approval is granted effective as of March 21, 2002.

cc:File
Jan Nespor

A Land-Grant University—The Commonwealth Is Our Campus
An Equal Opportunity / Affirmative Action Institution

Appendix B

Interview Instrument

This interview instrument was developed for phase two of the methodology. Three components were integrated to develop this tool:

1. Issues highlighted in the review of literature.
2. Guidelines from the following books:
   - Chute, A. G., Thompson, M. M., & Hancock, B. W. (1999). *The McGraw-Hill handbook of distance learning*. New York: McGraw-Hill.
   - Connick, G. P. (Ed.). (1999). *The distance learner's guide*. Upper Saddle River, NJ: Prentice-Hall.
   - Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information systems research*, 2 (3), 192-222.
3. Situations presented at the case study examination site.

To ensure data triangulation the Department of Distance Learning Chairman, William Herlehy, and the Program Manager, Jim Gallogly, reviewed and approved the instrument for the interview process. The following questions were developed for the face-to-face, 30 to 45 minute interviews with 15 informants.

Questions for the Department of Distance Learning Chairman:

1. How did the distance learning technology developers break down the natural barriers of time constraints, equipment maintenance, human and fiscal resource allocation?
2. How long did it take faculty to institutionalize distance learning technology and fully implement it?
3. How did the university deal with time constraints, energy and costs involve in adopting a new instructional delivery medium and integrating technology into the pedagogy?
4. What support systems were established and how were they maintained?
5. How has learner performance been assessed?
6. What evaluation mechanisms support the adoption decision?
7. What consequences has the university encountered as a result of diffusion and adoption of distance learning technology (i.e. irrecoverable funding, enrollment losses, limited social interaction, and geographical dispersion)?
8. Were intrinsic and/or extrinsic incentives offered to faculty to accelerate the adoption and diffusion process?
9. What other incentives were used to acquire the most qualified faculty on campus (financial, reappointment, tenure, promotion)?
10. What types of training and support do distance faculty need?
11. Are instructional designers available to distance faculty?
12. How do you promote and disseminate the success and enjoyment that faculty experience?
13. On what credentials are distance faculty selected?
14. What degrees are offered to students?
15. Who participates in program evaluation?

16. With what frequency is the program evaluated?
17. How are the results disseminated?

Questions for the Distance Learning Program Manager:

1. What planning for the adoption of innovations did the university encounter leading up to the decision to adopt?
2. What are the overall educational visions, goals and standards for the online distance learning program and how will they evolve?
3. What is the purpose of the program?
4. What is the program's relationship to the institution of which it is a part?
5. How does the program define its audience and its understanding of their needs?
6. How was the program's mission communicated internally and externally?
7. What important problems were identified within the university leading to creating a non-residency distance learning program?
8. What is the management structure?
9. Are costs and benefits shared among departments and the institution?
10. What cost-related policy issues need consideration?
11. Is the cost of a particular course seen as a departmental responsibility or is the distance learning unit self-supporting with its own budget?
12. Is faculty provided release time for course development?
13. Does the program enable the institution to expand its curriculum into newer, cutting edge areas to serve government and other important community segments?
14. Is the program involved in partnering or consortiums?

Questions for the Circulation and Media Services Manager:

1. What library resources and services are needed by distance learners and how are they accessed?
2. What reference assistance, computer-based bibliographic and informational services, consultation services do you provide?
3. Are there user instructions for the distance learning community?
4. Does the library provide assistance with interlibrary loan services?
5. Is there prompt document delivery through a courier system or electronic transmission?
6. Do distance learners have access to reserved materials?
7. How do you promote the library services to the distance learning community?
8. What telecommunications technologies are used to provide distance students with access to library resources?
9. As an alternative to telecommunications access for students who can come to campus occasionally, are on-campus libraries open at times distance learners are available?
10. Can materials be placed at outlying sites, e.g., local libraries, community agencies, other educational facilities?

Questions for the Media Services Coordinator:

1. How do students obtain or access the necessary equipment and software?
2. How are students trained to use the technology?
3. What library resources do they have access to?
4. How do students know what resources are available?

Questions for the Director of Enrollment:

1. What is the residency requirement?

2. What is the typical class size?
3. Is a telecourse more or less tuition?
4. Are students charged an additional fee for books or videos to be used in conjunction with the telecourse?
5. How do students receive materials, books and supplies?
6. How is the program administered (through a continuing education department or through the same administrative unit as the on-campus program)?
7. What registration procedures do learners complete (mail-in registration, phone-in registration, payment by credit card, evening and weekend walk-in registration hours)?
8. What orientation programs are planned and how are they executed?

Questions for the Instructional Designer:

1. How are courses selected, adapted, or developed?
2. What is the role of technology?
3. Who develops online courses (faculty, instructional designers, outside resources?)
4. Is the course designed for asynchronously or synchronously delivery?
5. Is faculty provided with assistance on the effective use of telecommunications technology?
6. What print materials are used?
7. How do faculty and students interact?

Questions for the Media Producer:

1. Where will video segments be produced and at what cost?
2. How does faculty respond to creating a “talking head” video for supplemental materials?
3. Does faculty add pizzazz to the video on their own?
4. What equipment is used for video production?

5. How long does it take to produce a video?

Questions for the Department of Distance Learning Secretary:

1. How are support services made accessible to the distance learner?
2. How are students and faculty trained to use the technology effectively?
3. What counseling and advising programs are needed for students?

Questions for the Institutional Research Center Specialist:

1. Are longitudinal studies being conducted to assess changes in the program over time?
2. Do distance learning graduates secure better jobs than traditional students do?
3. What is the projected growth of the distance learning department?
4. What are the demographics of the distance learner?

Questions for Faculty:

1. How is distance learning students evaluated?
2. How are you evaluated?
3. How do faculty and students interact?
4. What flexibility do learners with time constraints need?
5. What challenges does teaching in this medium pose to you?
6. What challenges does teaching in this medium pose to your students?

Questions for Students:

1. What were your reasons for taking a telecourse?
2. What are your personal learning goals when taking a telecourse?
3. What are your greatest fears about completing telecourses successfully?
4. What instructor behaviors and teaching approaches make a difference in your learning?

5. What telecourse features (students, study groups, course study guides, computer listservs or bulletin board, email, etc.) significantly contribute to your learning?

RESUME

Cheryl Anne Schauer-Crabb, Ph.D.
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Objective

To obtain a challenging professional training and development position using integrated technology systems to enhance employee development and organizational effectiveness.

Programmatic Expertise

A diverse career highlighted by increasingly progressive positions requiring strong management, leadership and communications skills dealing with:

- Integrated electronic media systems
- Instructional design and curriculum development
- Employee education and training
- Program management

Career Highlights

Doctoral student at Virginia Tech majoring in Instructional Systems Design and Development beginning September 1996 to May 2002. Diverse coursework included: Multimedia Development, Web-based Instruction, Instructional Design, Distance Learning and Telecommunications, Advanced Instructional Technology, and Advanced Educational Psychology.

Volunteer Virginia Tech lab assistant, from September 1996 to May 1999, in the Instructional Technology Lab. Assisted faculty, staff and students with software applications, performed cross platform troubleshooting and software training.

Instructional design team member representing Virginia Tech, from January to May 1998. Competed in a college-wide instructional design event sponsored by the University of Virginia. This endeavor lead to participating in distance learning teleconferencing forums from the Fall of 1998 through the Fall of 2001 at the University of North Carolina at Charlotte.

Project director and instructional designer for Alliant Techsystems in Radford, Virginia, from January 15, 1997 to June 30, 1997. Designed functional, user-friendly interface, and technical design specifications, and system hardware requirements; negotiated contractual issues between Alliant Techsystems and Virginia Tech; facilitated client relations and schedules; implemented and facilitated an interactive CD-ROM for world-wide distribution. This multimedia project originated as a course and became a paid and published endeavor through project completion and was presented at the 1997 International Visual Literacy Association at Penn State.

Evening Dean and Business Instructor at Commonwealth College, Hampton, Virginia, from April 1994 to June 1996. Developed business curricula, designed and implemented a 2-year marketing program; supervised, trained and developed faculty and staff; provided on-going training seminars for adult education/professional development; performed budget allocation, advised/mentored faculty and staff, counseled and retained students. Taught a

minimum of 2 classes per quarter such as Human Resource Management, Advertising/Marketing Principles, and Marketing Management.

Lancome Representative for Profitt's Incorporation, Chesapeake, Virginia, from 1993-1995. Supervised, trained and developed employees, performed budget and inventory control, created and designed visuals for product promotion.

Teaching Assistant for the Department Head of the Occupational and Technical Studies Department at Old Dominion University, Norfolk, Virginia, from 1992-1993. Redesigned and developed course curricula for the Occupational and Technology program using principles of Total Quality Management and group dynamics; taught one course entitled Technology and Society; trained new teaching assistants; researched and assisted writing the reaccreditation of the Darden School of Education.

Clubhouse Manager, Marlbank Cove, Yorktown, Virginia, from 1987 to 1993. Organized, planned, and promoted events. Hired, fired, inspired, trained and supervised five employees.

Summary of Personal Information

Education Doctor of Philosophy in Instructional Systems Design and Development at Virginia Polytechnic Institute and State University, GPA 3.8, final dissertation defense April 11, 2002.

Master of Science in Adult Education and Training/Marketing from Old Dominion University, August 1993, GPA, 4.0; Bachelor of Science in Marketing Education from Old Dominion University, May 1992, GPA 3.3.

Skills Computer Software: WordPerfect 5.1, Microsoft Works and Word, Harvard Graphics, Desktop Publishing, Adobe PhotoShop, Lotus 1-2-3, SPSS, Excel, PowerPoint, Eudora Light, Director, Authorware, Hypercard, Timbuktu, Front Page Editor, Adobe PageMill, Claris Home Page, ClarisWorks, L&H Express, Dragon, and Telecommunications. Knowledge of multiple computer platforms.

Professional: Curricula development, instructional design using integrated electronic media systems, marketing/business content specialist, experienced one-on-one and group trainer as demonstrated through coursework and professional endeavors.

Honors Competitively selected for the National Aeronautics and Space Administration's Graduate Studies Research Program (GSRP) doctoral fellowship and the Langley Aerospace Research Student Scholarship (LARSS) in 1996; acknowledged on The National Dean's List, and in Who's Who in America; awarded instructor of the 1995 year at Commonwealth College; awarded instructor of the quarter, Fall 1994; Spring 1995; Fall 1995; Spring 1996.

Honorary Fraternities: Iota Lamba Sigma and Thespians.

Publications A Case Study of Adoption and Diffusion of an Existing Asynchronous Distance Learning Program, UMI Dissteration Publishing, May 2002. Visual Themes in Multimedia: "Real-World" Experiences in the Classroom, The IVLA Book of Selected Readings, released Winter 1997-98. Interviewing Readiness, Inside Edition, September, 1996. Successful Networking, Inside Edition, February, 1996. Interviewing Techniques, Inside Edition, February, 1995. Dress for Success, Inside Edition, September, 1995. Externships, Inside Edition, February, 1994. Networking and the Extern Experience, Inside Edition, June 1994.

Affiliations Association for Educational Communications and Technology (AECT), International Visual Literacy Association (IVLA), Virginia Society for Technology in Education (VSTE), American Society for Training and Development (ASTD) and The National Hispanic Association.

References Available upon request.