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ABSTRACT

Distance education makes use of the technologies of the Information Age to address the needs of a broader and more complex educational market than traditional methods. Because distance delivery does not follow the rigid structure of the traditional course, it can provide instruction to individuals whose location, personal circumstances, or family obligations would not otherwise allow them to take courses. Techniques and technologies used in distance education include print media via correspondence courses; audio-based instruction through radio transmissions, audio cassettes, and the telephone; video-based instruction, including television broadcasts, video conferencing, video cassettes, and video discs; and computer-based approaches utilizing electronic mail, electronic conferencing, electronic bulletin boards, and telecommunications networks. The goal of an integrated distance learning system should be to deliver effective instruction using whatever combinations of these technologies that are necessary. Further, programs must focus on three objectives: increasing access without restrictions of location and time, avoiding isolating learners from the benefits of the interaction with instructors and peers, and utilizing as many deliveries as possible to address the learning styles and needs of the target audience. Distance education will bring knowledge to the learner and technology will provide the means; educational institutions need only provide the platform on which to build distance education programs. (Contains 17 references.) (KP)

Distance Learning: An Alternative Approach to Education in the Information Age

A Presentation for the League for Innovation in the Community College

Technology Conference

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Introduction

Distance education has existed as an alternative to traditional classroom instruction since the mid-1800's. These early distance courses used the postal system for the delivery of printed course work. The range of correspondence courses that grew out of this movement reached many Americans isolated in rural areas providing them with an access to education that would not have been available otherwise.

The structure of distance education courses evolved in accordance with the trends and changes in traditional education. As audio-visual aides were added to the traditional lecture approach, distance education incorporated audio-visual components as well. Radio broadcasts were initially used to add audio to distance instruction. Later, television broadcasts on public networks added a visual dimension to distance learning. Today, the delivery of instruction over distances is accomplished using the many technologies that enhance traditional education including satellite links, computers and interactive communication.

This paper is intended to provide an overview of distance education as it is currently being delivered. The focus will be on the various delivery systems used by educational institutions and the issues generated by their use.

The Role of Distance Education

Distance education is a collection of innovative approaches to the delivery of the content of more traditional education. It is a process that uses a variety of technologies to overcome the separation of the teacher and the learner. Distance learning is the end result of participation in the distance education process. Distance education takes the value and objectives of traditional

courses and uses the technologies of the Information Age to address the needs of a broader and more complex educational market (Kelly, 1990). Distance education does require that educators creatively approach the individualization and organization of curriculum, but the content identified by the professional as worth teaching remains unaltered. Distance delivery of traditional education is an attempt by educators to free the learner from the constraints of time and place, and through this, improve access for more participants (Reed and Sork, 1990).

The broad range of approaches known collectively as distance education is growing in importance for education. This nation's social structure has undergone radical change over the past twenty years. Most families, out of economic necessity, have two working partners. Time for pursuits other than work and family responsibilities has become a scarce commodity. Yet, the nature of work in the Information Age has created a demand for workers who must be better educated and better trained than in any previous period. Many people are finding that the skills with which they left the educational phase of their lives are inadequate to compete and succeed. The Information Age has placed significant demands on workers to upgrade their skills (Kelly, 1990) without providing any time in which to do so. Higher education institutions cannot keep up with the demand for course offerings. Budgets cannot provide for schedules with so great a diversity in terms of location, time and necessary classroom space. Distance education has become a very viable solution to this real and present problem.

Because distance delivery does not need to follow the rigid structure of the traditional course, distance education can provide instruction to individuals whose location, personal circumstance or family obligations would not allow them to take courses otherwise. For whatever reason a learner can not attend an on-campus, scheduled class, distance education can provide an

alternative access to education. Using various technologies to deliver instruction over any distance and without the constraint of scheduled times, distance education affords individuals seeking new skills and information the means to do so. The house-bound individual, the mother with young children, the father already working overtime to make ends meet, can find a educational opportunity flexible enough to fit his or her needs. Education delivered in this manner provides a learner-centered alternative to the often teacher-centered traditional classroom. Allowing the educational experience to focus on the learner enhances the process, making the distance learning approach not only more convenient but more appropriate to the target audience.

Clearly distance education is and will continue to be a significant educational opportunity in the Information Age. For educational institutions interested in providing such opportunities to their communities, a review of specific distance education methodologies is presented herein.

Approaches to Distance Education

Print:

The oldest approach to distance education is the correspondence-type course. This method uses the postal system to deliver courses in print. Textbooks, study guides and assignments are mailed to the student, work is completed and then returned for grading. After being graded by the instructor, the work is returned to the student via mail. The advantages of this method are the cost and flexibility of print materials. Not only are printed materials relatively inexpensive, educators have become skilled at creating educationally sound, independent study curriculum using this method. In addition, both

the students and the institution can rely on the postal system for cost effective, accurate delivery.

The disadvantage of this method is its lack of depth as a teaching vehicle. Printed materials provide only one dimension to the subject matter. Learning would be improved if the multi-dimensional nature of a curriculum could be experienced. In fact, Verdun and Clark (1991) point out that print-only courses that do not use audio or video as an enhancement have a higher dropout rate than those that do.

An additional disadvantage of print as a primary delivery is the lack of timely interactivity between teacher and student. Students must wait for feedback for days or weeks from the instructor. Then, the interaction is one way and subsequent questions result in more delay.

A final disadvantage of print-only distance learning is characteristic of many approaches. The learner, at a distance from teacher and peers, experiences learning in isolation. The lack of real-time interactivity with the ideas of the instructor and other learners tends to diminish the learning experience. The information does not have the opportunity to be altered by the exchange of ideas and perceptions. Synthesis of the data by the learner is done without the opportunity to see the information broaden and grow as a result of its interaction with other's viewpoints. The lack of interactivity is, perhaps, the greatest cognitive drawback of a limited distance education environment.

Audio:

Radio is used by many institutions to deliver audio-based instruction. Verduin and Clark (1991) note that for areas with low literacy rates, it can be effective as a replacement

for print. Radio is a reliable medium and is easily accessible to most audiences. As a teaching tool it has both advantages and disadvantages. Unlike print, it can be easily updated to reflect curriculum updates. Radio alone, like most audio-based instruction, is not as effective a teaching tool as it addresses the relatively small group of learners whose dominant learning style is audio.

Radio also suffers from its incapacity for flexibility and interactivity. The learner must work at the pace dictated by the radio broadcast. And unless two-way radio instruction is used, there is little opportunity for real-time interaction using this method. Radio is a low cost and effective one-to-many approach to distance education. It is significantly less effective in overcoming the isolation this type of approach engenders.

The **audio-cassette** adds a self-paced dimension to audio delivery. This medium is a low cost, easily accessed means for providing instruction in a learner-controlled environment. The student can manipulate the pace, location and time of instruction. Unlike radio, a lesson presented via audio-cassette can be quite lengthy and varied in depth and breath. Curriculum presented via this medium can be organized into sections with discussion topics and review. The flexibility for both instructor and student make this low cost approach practical and viable.

A minor disadvantage of audio-cassette delivery is the need for playback equipment. This disadvantage has been overcome to a large degree by the decline in the cost of cassette players. They are becoming as readily available as television and radio. And in those cases in which individuals do not have access, public libraries often provide the use of cassette playback units to their patrons.

Audio-cassette delivery suffers from the lack of interactive capability characteristic of many approaches. The audio-cassette is another one-to-many approach with little opportunity for the interchange of ideas or cooperative learning scenarios.

The **telephone** is the audio delivery system that provides interactivity. It is the primary audio approach used by distance educators. The telephone is used by faculty to interact with students to discuss questions, give lectures or, if conference calling is used, hold group discussions. Burge (1990) notes that despite its simplicity, the audio-conference conducted through the use of microphones and phone lines can be an effective distance learning delivery.

Telephone delivery can be a single or multiple-learner delivery system. Instructors can leave prerecorded information for each students to access at their convenience or they can call each student individually. Using conference calling, the instructor can meet with the class as a group to promote discussion and broaden student perspectives. Using telephones, students can network with each other, thus reducing the isolation that too often accompanies distance learning.

Nugent (1987) indicates that audio-conferencing provides the capability of moving the meeting to the people involved rather than moving the people to the meeting. Students scattered across locations can meet via telephone conference at a convenient time and day for some aspect of their instruction. Feedback is immediate and constant.

A new twist to the use of the telephone in distance learning is the introduction of Voice-Mail. V-mail is a computer-based technology that turns sound into digital data and stores it on a computer disk for later use. A v-mail system allows students to access and

select specific prerecorded information relevant to them. Conway (1990) notes that voice-mail "bulletin boards" can successfully provide detailed answers to common questions. V-mail also provides students with the opportunity to contact their instructors outside of the constraints of posted office hours.

The disadvantage to all telephone approaches is the limitation of the information that can be communicated via this medium. The telephone is best for information that is reasonably concise. It will serve well to issue an assignment but it would be difficult to discuss the assignment unless previously sent in print. Also, when interacting via a telephone, the caller must interact quickly, without time to prepare a response. In a distance education program, the learner may be intimidated by the occasional but significant telephone contact. The factors causing so many individuals to become nervous when leaving messages on home answering machines are magnified in the distance education context.

Video:

Television, both broadcast and cable, has been an effective combination video and audio distance education medium. Using the national network of PBS stations and/or participating cable systems, video and audio instruction can be received by individuals or groups at remote locations. Additionally, microwave transmission of video signals provides access to non-wired viewing sites. Microwave broadcasting can provide local areas with video instruction that may not find a place in the PBS lineup. Microwave is particularly useful for transmission of video from point to point to relay TV signals for

rebroadcast or into closed circuit systems. When applied to distance learning, television broadcast, regardless of the method, provides a better approximation of real-life instruction. Unfortunately, such broadcasts do not provide the opportunities for interactivity characteristic of the live classroom.

Video conferencing partially addresses this problem. Ward (1990) suggests that two-way video such as used in interactive video conferencing provides the means to overcome the passivity of more traditional one-way video. Video conferencing requires that both the transmitting and receiving site be set up with monitors and video cameras. Each site can thus view and hear the interaction at the other site or sites. The constant presence of both video and audio from all locations enhances the learning environment (Hannu, 1990). From a distance education perspective, full video conferencing is highly desirable as a delivery mode. Courses are taught in a manner as close to live instruction as possible. However, while simulation of traditional instruction is achieved, video conferencing suffers from some of the location and time constraints typical of traditional instruction. Students must be at a given location at a given time in order to participate. For distance learners, one of the significant advantages offered by a distance education program is thus neutralized.

Video cassettes have added another dimension to the use of television in distance education. This packaged version of televised courses (telecourses) answer the need for flexibility in times and location of presentation, but lose the interactive advantage of video conferencing. In addition, video cassette playback units are required equipment if the learner is to take instruction from this medium. Even with these disadvantages, video

cassettes provide distance education with a low cost, simple medium for combining video and audio into a single distribution package.

Video discs provide a new packaging for video/audio instruction. Video discs, like their music equivalents, compact discs, are easy to use and very durable. Video disc technology also provides more opportunity, through the use of custom programs by educators, to create highly interactive instruction individualized to suit the learner. For distance education, however, interactive video's primary drawback is the cost and number of video disc players available at this time. Most homes and businesses have telephones, televisions and even video cassette players. Few have video disc players. Until this changes or until computer technology provides alternatives for accessing video disc from remote locations, this technology will be incorporated into the distance education scenario at a slower pace.

Computer-Based Approaches:

The preceding approaches can be enhanced through the use of computer technology. For example, a modified version of the video conference is a one-way video satellite link in combination with a keypad response unit. Webb (1990) describes a successful application of this hybrid. Live lessons are uplinked to satellite and downlinked to a number of remote locations. Learners at receiving sites are provided response units linked via computer and phone lines to the studio. The instructor asks questions and is instantly provided feedback from the learners. The live instruction can then be modified

in response. Computer technology enhanced the video by providing a facility for interactivity.

Personal computers can be used to promote interactivity and give depth to the flat nature of most distance delivery approaches. Using a modem and a phone line, computers at remote locations can connect to a "host" computer. All learners connected via their computers can then interact with each other and with the host. A distance learner using the keyboard or mouse can thus add real-time interaction with "on-line" instructors and/or other learners to the distance experiences. Such computer-based interaction via the phone lines falls into the broad category of telecommunications.

Telecommunicationscan overcome the consistent problem of limited interaction with instructor and peers. Regardless of the approach or combination of approaches used by a distance education program, participants may feel a sense of isolation and lack of opportunity for communication that students in traditional classrooms do not experience. These negative perceptions may serve to inhibit and impair the learning process. Computers provide several possible remedies via telecommunications.

Electronic mail, like voice mail, allows users to leave or receive messages from the instructor or peers. One-to-one communications are stored in personal electronic mail boxes until it is convenient for them to be "picked up" and "read". The advantage of e-mail over voice-mail is the ease of transmitting documents. With voice mail, the student might leave a message but not an entire term paper. With electronic mail, the student can "mail" the term paper to another student for review, find the corrected copy in the next day's e-mail and then send it off to the instructor's electronic mail box. Instructors can

"mail" assignments to students with electronic return receipts. In a distance education program, communications between learners and instructors is essentially instantaneous while maintaining convenience in terms of time and location.

Using **electronic conferencing**, a learner in physical isolation can connect via computer to one or more of his peers simultaneously. Together, this group can enter into a cooperative learning process, enhance their instructional experience and thus reduce the feelings of isolation. The teacher can create or join discussion groups or even hold the electronic equivalent of a traditional class. Hutcher (1990) notes that electronic conferencing provides a structured educational environment for learning. For many distance learning programs, this is a positive addition. Not all students succeed in an entirely independent format. The electronic conference can add a structured dimension to the program.

Electronic bulletin boards, like the manual community bulletin boards in post offices or libraries, provide a one-to-many communications platform. Assignments and course information can be posted, updated and retrieved at a time convenient to the user. The bulletin board provides an arena that facilitates the sharing and dissemination of information (Wolpert and Lowney, 1990). In a distance education program, learners can access relevant college or course information any time a question arises. And if the specific information sought is unavailable, an electronic question can be left on the board.

Telecommunications networks combine many of the preceding facilities into a single broad electronic service. Electronic mail facilities can be linked to other host computer facilities so that a user in one system can leave mail for a user in another system.

One of the most widely used academic networks is Internet. It is a collection of individual international networks of electronic mail (Solomon, 1990). Learners and instructors with access to telecommunications networks can interact with peers in other universities and/or other countries. Other telecommunications networks allow learners to access on-line services such as electronic library catalogs, national data bases and abstracting services (Johnsonn and Carr, 1991). Learners using a computer and modem can access resources far beyond what might have been available on the home campus. Academic isolation by virtue of location is reduced if not entirely removed through the use of this type of network. The distance education experience takes on an added dimension. It not only simulates the effectiveness and interactivity of the traditional classroom it surpasses it.

The disadvantages to computer-based approaches has been the cost of the equipment and its accessibility to learners at remote locations. This situation is changing. For most institutions, computer equipment is no longer a rarity on campus. The Information Age has demanded an investment in technology and institutions have responded. Cost continue to fall thus increasing availability of equipment for distance delivery. For the learner, however, the cost and access to a computer remains a barrier to computer-based distance education. However, with the growing number of computers in homes and offices, this barrier may well be temporary.

An Integrated Distance Learning System

Distance education provides instruction to learners at remote locations using a variety of technologies and approaches. Each approach addresses the learner's needs but from a number of different perspectives. Each technology has associated with it specific costs in terms of equipment and the expertise required to use it effectively. Institutions must weigh the approaches and the technologies that support them when designing a distance education program. A balance must be found between the benefits and costs of the possible approaches. Audio instruction is cost efficient, easy to use but not effective with learners who need visualizations. Video instruction is costly but better simulates the multi-sensory classroom. An institution deciding which of these two approach is best must try to maximize the educational effectiveness of the program within the parameters of budgetary constraints.

For every distance education program, the goal must be to deliver effective instruction using whatever is necessary and possible to accomplish the task. With this orientation, programs must focus on three objectives. First, to create a program that will provide increased access unrestricted by location and time. Secondly, to build a program that does not isolate the learner from the benefits of interactivity with instructor and peers. Finally, to use as many diverse deliveries as possible to meet the learning styles and needs of the target audience.

All distance education approaches contribute to the overall effectiveness of the program. However, an institution interested in implementing distance education must select and develop a primary delivery approach. Overall, the single distance learning approach that can best serve as the core of a distance learning environment is telecommunications. It is upon the foundation that this approach provides that an effective distance learning environment can be built. This mode of delivery allows the learner to be located in any city, state or country as long as a phone line

is available. It does not require that the learner arrange his or her schedule around pre-assigned meeting times. Telecommunications allows for interactivity with teachers, peers and outside academic sources. Using a computer, modem and phone line, anyone can access and interact with vast stores of information and with colleagues around the world. With telecommunications as the backbone of a distance education plan, the institution can meet two of the three program objectives.

The third objective requires the fleshing out of the distance education plan. With telecommunications providing interactivity and access, other approaches can be added to create a well-rounded program. An institution, in light of available resources, should add as many additional approaches as is economically feasible. Print and telephone will be included by all. Audio cassette is feasible for most. Video cassettes are typically within the reach of most institutions. The availability of television broadcast facilities will determine this approach's inclusion in a distance education program. Interactive television may, for the time being, be the province of just a few institutions. Regardless of the specific approaches selected, as many and as broad a range as possible should be included. Instructional designers and content specialists should create materials to use as many modes of delivery as the institution can accommodate. Creativity and innovation in the approaches to curriculum and learning environments must be encouraged. With the telecommunications as a backbone and as many distance approaches as possible filling the program out, any institution can enter the distance education arena and begin to meet the challenges of the Information Age.

Conclusion

Kurchan (1991) states that there has been an explosion of knowledge in this century. Over 2000 books are published daily. Further, she estimates that the total knowledge of mankind doubles every seven to eight years. The traditional classroom that has served education so well in the past cannot stand alone as the sole vehicle for education in the 21st century. Facts will continue to inundate the learner. Learning cannot be based on acquisition of fact alone. The learner must engage in the discovery and exploration of facts to find solutions to current questions and those questions yet to be posed. Educators must innovate and find new approaches to provide information and encourage learning consistent with the realities of a world community, interconnected through technology. Wulf and Rosenberg (1990) note that a new type classroom may need to take shape. It will be a combination of the collaboration made possible through technological connections and a laboratory for exploration and discovery. This *collaboratory* may well be a model for the electronic classroom in which distance education occurs.

Rogers (1986) suggests that it is time to move ideas around instead of people. This is the premise for distance education. It is time to bring the classroom to the student. It is time to redefine the classroom's parameters without regard to time and space. It is time to build the virtual classroom that provides the familiar interactivity between the learners and their teachers but without the constraints of physical reality. Distance education will bring knowledge to the learner, wherever he or she may be, whenever he or she can engage it. Technology will provide the means; innovative, proactive educators will provide the impetus. Educational institutions need only provide the platform on which to build distance education programs. In

this manner, any institution that has the conviction can address the needs of a changing society and move forward into the Information Age.

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