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Distance learning via interactive instructional television

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Abstract

Our information-based society places a tremendous amount of reliance on telecommunications technologies to move information quickly over long distances. Everyday sophisticated networks provide instant, updated data to businessmen, government officials and other professionals from coast to coast and from continent to continent. Our homes, schools, and work places are wired and equipped to receive long distance information by means of audio, video, and electronic data transmission (Brand, 1988).

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CHAPTER 1

INTRODUCTION

Our information-based society places a tremendous amount of reliance on telecommunications technologies to move information quickly over long distances. Everyday sophisticated networks provide instant, updated data to businessmen, government officials and other professionals from coast to coast and from continent to continent. Our homes, schools, and work places are wired and equipped to receive long distance information by means of audio, video, and electronic data transmission (Brand, 1988).

Only recently have educators and administrators begun to appreciate the enormous potential of telecommunications technologies in providing long distance education. The state of Iowa has recognized this potential by beginning construction of a fiber-optic cable telecommunications network. The Governor has equated the importance of the network for improving rural education to the Rural Electrification Act that brought electricity to the farms and rural communities of Iowa back in the 1930s (Woolson, 1991).

By definition, electronic distance education refers to instruction that originates at a site distant from that of the learners, and involves two-way communication by means of an interactive audio and video component (Meyers, 1989). What telecommunications

technologies do is connect the instructor with the student when physical face-to-face interaction is not possible. Consider the implications a telecommunications network, linking all education sites within the state, will have on small rural school districts and area community colleges (Jacob, 1986).

Problem Statement

Rural schools have traditonally faced problems unique to their size and geographic location. Most have trouble attracting teachers, particularly in such key subject areas as math and science. These school districts have turned to consolidation and sharing to increase resources and student population to expand educational offerings. Add to this the reality that rural school enrollments and resources continue to decline, and what the rural areas are facing is an educational access problem that continues to grow (Benson & Hirschen, 1987).

Technological improvements in data collection and manufacturing has radically changed the methods people use to complete tasks. Business and industry have turned to the educational community for retraining and continuing education of the work force. As the demand by non-traditional students has increased, the community colleges in Iowa have developed satellite learning centers to reduce the sometimes great distances between learners and the campus. A few of the community colleges in Iowa have developed telecommunications networks to their off-site learning centers to reduce the travel and personnel cost of operating off-site learning centers. As the demand for this type of

educational opportunity increases, a need to develop a telecommunications link of all community colleges exists in order for electronic distance education opportunities to be shared or consolidated to keep the increasing costs under control.

The needs and expense of a comprehensive and equally accessible education system are dramatically increasing. Both K-12 and higher education resources (both human and monetary) are being stretched to the limit to maintain a productive level of service. The response to the needs of education has focused on extending limited human resources through technology. Enhanced productivity in a delicately balanced equation characterized by a smaller human resource base and an expanded technological investment is the goal of educational telecommunication (Guthrie-Morse & Julian, 1989).

The realization of statewide telecommunication system in Iowa is on the not so distant horizon. This will give the general public, educators and administrators time to thoroughly examine the technologies involved, the benefits and the limitations an educational telecommunications system will provide.

A statewide interactive instructional television network is a complex undertaking. Questions will be raised as to ; (a) the equipment and technology needed to make it work; (b) how teachers and teaching will be affected by the networks; (c) who will benefit from implementation of an interactive instructional television network. By exploring these questions in-depth it will be possible to understand the total implications of a statewide interactive instructional television network.

Definition of Terms

Amplifier: A device used to boost the strength of an electronic signal.

Analog/Digital: Two opposite kinds of communications signals. In analog, information is transmitted by means of modulations of a continuous signal, such as a radio wave. The signal itself is "analogous" to the information it carries, so that an increase in a TV picture's brightness, for example, would be conveyed by an increase in the signal's voltage. Most radio signals today are analog. Digital, the communication method of the future, is based on a binary code inwhich the picture (or audio) information is sent as a series of "on" and "off" signals, it is more precise and less subject to interference than analog.

Bandwidth: The maximum frequency (spectrum), measured in Hertz or cycles per second, between the two limiting frequencies of a transmission channel; the range of frequencies that can be carried by a transmission medium without undue distortion.

Cable TV: In television, a single path or section of the spectrum 6MHz wide, which carries a television signal.

Coaxial Cable: A metal cable consisting of a conductor surrounded by another conductor in the form of a tube which can carry broadband signals by guiding high-frequency electromagnetic radiation.

Downlink: An earth station that receives satellite signals.

Facsimile, FAX Machine: A device that electronically transmits and reproduces

page copies and documents via a telecommunications channel, usually a telephone line; sometimes called a telecopier.

Fiber-optics: A technology that transmits voice, video and data by sending digital pulses of light through hair-thin strands of flexible glass.

Interactive: Those television technologies that permit viewer participation, such as two-way cable, videotex, or the optical video disc.

Interactive Video: A microcomputer tied to a videotape or disc player so that the learner can interact with still, motion, or computer-generated lesson material.

ITFS: Instructional Television Fixed Service - group of TV channels, in the ultra-high frequency range, set aside for educational use. ITFS is technically identical to Multipoint Distribution Service (MDS).

Laser: Acronym for Light Amplification by Stimulated E mission of Radiation - a highly focused beam of light, or the device that creates such a beam. The laser is used in fiber-optics and in the optical video disc.

Microwave: A high-frequency radio wave that can be used for the transmission of TV signals. Microwaves are distorted by trees or buildings in their path.

Modem: Modulator-demodulator; a device that modulates and demodulates a signal (varies its amplitude, frequency or phase) for transmission over a tele-communications channel.

Public Access Channels: Channels set aside for noncommercial use by the general public or nonprofit institutions.

Satellite: The space device used to accept and rebroadcast communication signals such as data and television programs. It is also used in the context of describing remote sites that receive and process students.

Switcher: A panel of switches that allows video material to be previewed and selected for creating a television program. A switcher usually incorporates special effects such as dissolves, wipes, inserts, and chrome key.

Two-Way: The capability of the receiver to send information back through the system. This may be as simple as using a keypad for numerical transmission or as complex as two-way color television so that participants can see and talk to each other.

Uplink: An earth station that transmits a signal to a communications satellite.

VCR/VTR (Videocassette or Videotape Recorder): Terms now used interchangeably except by professionals. A VTR can also include reel-to-reel machines.

Videotex (sometimes Videotext): More recently the term is used to encompass a style of communication where a premium is placed on random (usually interactive) access to many pages of information, which usually includes special graphic display techniques.

CHAPTER 2

LITERATURE REVIEW

How Distance Education is Delivered

A variety of equipment and support services may be utilized in establishing and maintaining an interactive television network. How these systems affect the educational setting depends on the types of technology used and their design. The technology at distant locations, including computers, video cassette recorders, FAX machines, television monitors and cameras, and the telephone are critically important. The equipment involved can be easily grouped into four categories: audio, video, transmission, and other supplemental equipment and services (Hudspeth & Brey, 1986).

Audio

The audio component and the ease in operation is critical to the success of a telecommunication network. Microphones and amplification for the instructor and students provide a two-way voice link for the off-site learning center and the on-site classroom. Interaction between the sites and the individual learners is greatly enhanced by the audio component and provides a bridge to close the distance gap between the on-site and off-site learners. Sound recordings can be incorporated to enhance instruction. Audio cassette players and other audio playback equipment can be interfaced within the audio technology component of the telecommunication network (Kearsley, 1986).

Video

The video component includes television monitors, television cameras, video tape playback machines and a classroom camera switcher/control device. Placement of the equipment should be incorporated in the overall facility design of both the origination and off-site classrooms.

Television monitors will enable the instructor to visually view the off-site learners and allow visual interaction between the sites. The monitors will also provide video playback of recordings to enhance the educational experience and allow the learners to view messages of text either written by the instructor (video chalkboard) or placed on the screen by the use of a character generator (computer display) (Kearsley, 1986).

Multiple television cameras need to be directed toward the intended subject to be displayed on the television monitors at any given time. The camera directed toward the instructor should be equipped with a zoom lens to allow a range of desired shots for close-up or full-view display. This camera should also allow for movement of the instructor, so that the style of delivery of instruction is not changed simply by the use of technology. The camera directed toward the learners should also be equipped with a zoom lens to allow for an overall classroom view (all learners), and a close-up view of an individual learner to enhance the interaction and bridge the distance gap. A zoom lensed, stationary camera should be directed to an area the instructor will use for the display of text or any examples of realia that may be needed for instruction (Jacob, 1986).

Video playback equipment (VCR or laser disk) allows the instructor to bring into the instructional process previously prepared television, film, or slide/tape programs. Control of this equipment needs to be available to the instructor in order to allow the instructor flexibility to interrupt the program for encouragement of discussion and reflection to compliment the outcome of the instructional intent (Dede, 1990).

Camera switchers and control devices allow the instructor to call upon different sites and control the view the learners receive. In some cases a camera operator will facilitate the switching and control for the instructor. This sometimes limits the instructor's flexibility to be spontaneous and detracts from the instructional setting by not allowing the use of technology to become as transparent as possible. The switchers and control devices are compact and becoming easier to operate so intructors should become more at ease in their use and the natural delivery style of the instructor should not be compromised (Jacob, 1986).

Transmission Equipment

Transmission equipment play a major role in the delivery of distance education. There are many ways to transmit a signal between points and generally the users are unaware of what transmission system is carrying the signal between the origination and off-site classrooms. A variety of transmission technologies (broadcast, microwave, Instructional Television Fixed Service, satellite and cable) will be interfaced to complete the telecommunications network (Curtis & Biedenbach, 1979).

Broadcast television signals consist of audio and video channels transmitted from a central point that can be received by anyone within range of the transmitter. The public broadcasting system has begun to offer via satellite various television-based courses produced by colleges and universities on its network service aimed at adult learners. Most educational programming broadcast over television does not allow real time interaction with the television teacher, but interactivity can be designed into live or recorded telecourses in a variety of ways, including the telephone or VCR. Broadcast reception could best be utilized within the telecommunication network by video recording the broadcast to be replayed within the network at a specified time and instructional situation (Curtis & Biedenbach, 1979).

Microwave systems can transmit audio, video and data signals from point to point and require a clear line of sight in a range of 5 to 30 miles. The clear line of sight requirement makes the system sensitive to terrain and buildings. Microwave transmission is not new and is currently being utilized in many situations across Iowa and the nation.

Instructional Television Fixed Service (ITFS) refers to a band of low power broadcast frequencies (20 channels) set aside by the Federal Communications Commission exclusively for the transmission of educational programming. ITFS allows the transmission of video and audio signals via relatively low-cost, low-powered transmission equipment, and can serve many schools over a single broad area of ten miles or more. Due to the system's limited range, optical line of sight is required between

transmitter and receivers. ITFS can serve as a stand-alone distance education delivery system by transmitting directly to local schools, but most commonly, ITFS serves as an intermediate link for rebroadcasting a signal to local subscribers of a local cable distribution system. This does not allow for the two-way video component necessary for quality instruction. The two way audio component is delivered via the telephone, or by microwave. ITFS is best suited to local applications (range of 10-20 miles); however, the scope and range of an ITFS system can be extended through connection to long distance transmission systems such as fiber-optic cable backbones or satellite (Curtis & Biedenbach, 1979).

Satellite transmission is an increasingly popular means of establishing long distance learning delivery. The satellite receives microwave signals from earth at a given frequency from a federally licensed "up link" dish. The signal is then transmitted back to earth at a different frequency and received by "down link" dishes. Two way audio and video capability could be accomplished by use of both an up link and down link satellite dish. This type of transmission is generally used regionally with local distribution on microwave point to point, ITFS or cable transmission (Capron, 1976).

Cable transmission offers one of the best technical alternatives for distribution for educational telecommunication. Commercial cable systems have wired virtually every home and building within their local operating area and have provided through public access two-way audio and video links between schools. This type of cable transmission

system utilizes coaxial (copper) cable and the quality of the signal reception is quite good over short distances (less than 50 miles) (Capron, 1976).

Fiber-optic cable is a promising alternative to current electronic transmission. Fiber- optic cable is made up of several glass fibers each carrying its own video signal. The analog electronic audio and video signals are digitized and along with digital signals from computer data are converted to light signals and transmitted along the glass fiber by pulses of laser light. Fiber optics offers almost unlimited speed and clarity for reception because the signals are much less susceptible to interference from weather and other electromagnetic "noise" (Carne, 1984).

Supplemental Equipment and Services

An instructional interactive television network will also utilize existing technology that are grouped into an area of supplemental or equipment and services. These technologies are involved in media production processes (graphics, overhead transparency, film, audio, video), telephone communications (fax machines), computer hardware and software, CD-ROM, laser disk, maintenance and test technologies will be called upon for successful operation of the telecommunications network (Keasley, 1986).

Improvements in telecommunication technology provides many options for delivering instruction to distant students and teachers. The capabilities of distance education will expand as telecommunication technologies continue to converge, as audio ,

video and data become easier to combine, store and use, and as various technologies and networks are linked (Graham & Wedman, 1989).

Policy and Regulation

A major factor in the advance of tele-communications technologies and services is the sometimes confusing regulatory structure in the United States. Regulations and policy regarding computer and telecommunications technologies have been largely promulgated with little consciousness of the needs and concerns of education. To protect rising interest and investment in educational telecommunications, the educational community needs a voice in determining how these policies are defined (White, 1989).

Telecommunications policymaking and regulation is spread across several agencies and levels of government. There is no single focus of or direction to telecommunications policy that can help educators identify the problems and opportunities for educational telecommunications (Jacob, 1986). With the proliferation of new technologies and new competitors, and in the absence of a national standard-setting authority, many interpretations of standards have emerged. Uncertainty about standards and compatibility may complicate schools' hardware and software decisions (Benson & Hirschen, 1987). Governmental policy options serving immediate needs and long-term goals for educational telecommunications should include: (a) to support technical assistance to schools and states planning distance learning efforts, (b) to review and shape Federal and State telecommunications policy to ensure a coherent use of communications

technology for education, (c) to support standards and protocols that promote the integration of different technologies and networks (Curtis & Biedenbach, 1979).

The future promises vastly more sophisticated telecommunications systems for education. These systems will generate new and different applications as the technologies advance and as students and teachers learn to use the systems more creatively and effectively (Carne, 1984). Technology has the capacity to do more than aid the exchange of information and ideas. If used properly, it is likely to alter the learning environment. How, when, what, and where we teach will change (Wood & Wylie, 1977).

Impact on Teachers and Teaching

Although it is the technology that removes barriers and expands opportunities for learning, it is the teacher who teaches. Distance learning has dual impacts on teachers: as a tool for teaching and as a means to upgrade their own professional development (Guthrie-Morse & Julian, 1989).

Teaching over television is a team effort. The instructor must learn to collaborate with other specialists in the use of the technology and design of courses for interactive television. Perceived credibility, communication skills, and an ability to collaborate therefore become criteria for selecting and training television instructors (Hudspeth & Brey, 1986).

> Just as every person in the world is not born to be a teacher, every teacher is not born to be a teleteacher. Being a good teleteacher calls for

> all of the understanding, experience, and skills of a live classroom teacher - and lots more. A good voice; pleasing appearance; stage presence; plenty of self confidence; a flair for the dramatic, artistic, creative; being comfortable with the use of the technology; and a willingness to go the extra mile are all vital qualities. Most important is an openness to become comfortable with the new technology and an ability to use its strengths to enhance teaching and learning (Hudspeth & Brey, 1986, p. 46)

The training of teachers for use of distance education should include not only the use of technology to operate the system, but also; (a)the amount of time needed to prepare and teach distance delivered courses, (b)methods to establish and maintain effective communication with distant students, (c)experience of other faculty members, (d) strategies for adding visual components to audio courses, (e)strategies for increasing interaction both among students and between students and faculty, (f)planning and management of organizational details involved in distance delivery , and (g)strategies to encourage group cohesion and student motivation (Wood & Wylie, 1977, p118).

Working with the teacher as a team member for the distance learning network is the off-site classroom facilitator. The facilitator is usually responsible for operating the receiving equipment, monitoring student behavior, evaluating or distributing homework and materials, supervising testing and assisting with educational activities as assigned by

the teacher. The facilitator can contibute to the students' learning experience by first having thoroughly discussed with the teacher the goals for the class and the teacher's instructional techniques. For example, facilitators allow off-site students to discuss and explain points to one another during class with the talk-back microphones turned off. This peer tutoring can greatly enhance learning without disrupting the rest of the class at other sites (White, 1989).

Whether a course is delivered live or prerecorded, considerable background work and development is done by various specialists before the teacher steps in front of the camera. The team of specialists operate within a management plan for delivery of courses via interactive television. The specialists include the subject matter expert, instructional designer, media specialist, and an evaluation specialist. Often the teacher becomes the subject matter expert and instructional designer. Media needed for the course is produced or selected by the media specialist and evaluation is done by the management area of the telecommunication network. Because materials for distance learning are much more accessible to review, they are scrutinized even more stringently than materials used in the classroom (Hewitt 1982).

Material is frequently adapted from courses at other institutions, and six factors can help a faculty member decide whether or not to adapt a given course: (a) fit with the curriculum, (b) appropriate content and level, (c) length, (d) diversity and completeness of media, (e) availability and lifetime, and (f) quality (Daniel & Forsyth, 1979).

Distance education will change the traditional role of the classroom teacher. More emphasis will be placed on the planning aspect of course development, and the collaboration between facilitators, specialists, and management. Distance learning technologies can bring the teaching profession into the 21st century. The very technologies that can bring better resources into the classroom to help students can also improve the quality of the teaching work force (White, 1989).

Teacher quality is a charged term, subject to debate as to what constitutes teaching excellence. This much is clear, however: we need to find ways to bring into teaching people who are better prepared, and to maintain and upgrade the skills and knowledge of those already in the classroom (Keen, 1986). To improve teaching via technology, enthusiasm and excitement for technology must be matched with careful attention to three critical factors: involving teachers in the planning and implementation process, accounting for how teaching with technology can change the nature of teaching and the teacher's role, and educating teachers to take advantage of these teaching tools (Tressell, 1975).

Distance learning, like most technological solutions, may instill initial skepticism and apprehension among teachers. Like the introduction of computers, some of this apprehension subsides once the technology becomes demystified. When teachers develop experience and an understanding of how to complement their own teaching, their out look changes (Dede, 1990). Teachers are aware that some schools may try to take educational

shortcuts by buying into distance learning as a way of reducing staff. Teachers also worry about the quality of instruction students will receive if distance learning systems are not well planned (Jacob, 1986). A realistic concern among teachers is that the responsibilities of distance learning will be added on to their regular teaching, with no allowance for the demands on scheduling, prep time and work load (Jacob, 1986).

Some districts that have not involved teachers in total system planning have experienced labor-management difficulties. Unions representing teachers want to ensure that teacher employment and responsibility levels do not decrease after the implementation of a distance learning network (Feasley, 1983). When teachers are involved in the development of distance learning systems they have been able to shape the systems to assure appropriate and high quality instruction and to help planners consider a broader range of services for the entire school community (Carne, 1984). There has been little research on the issue of how distance learning can affect staffing, or how new or desirable teaching models can be utilized, but alternative staffing arrangements and flexibility in collective bargaining issues can be negotiated (Feasley, 1983).

Technologies for learning at a distance will clearly affect the teaching force of tomorrow. Some will teach through these systems, others will use them to add resources to their classrooms, and many will receive professional education and training over them (White, 1989).

Who Benefits from Distance Education

All societies have problems that they believe can be resolved or ameliorated by education or training: (a) shortage of instructional materials and personnel; (b) the inability to cope with a rapidly expanding population; (c) the inadequate provision for education of certain groups, such as the physically handicapped, prisoners, ethinic and racial minorities,housewives, senior citizens and rural residents; (d) generally inadequate social services; (e)shortages of certain skilled manpower; (f) the demand for retraining because of new technologies or other changes; and (g) an increased need for citizens' participation in community life (Neil, 1981). Societal and technological changes and innovations have given educators a way to satisfy the demand for learning while reducing the strains on human, monetary and institutional resources. The link between technological developments and sociocultural trends is seen clearly in the automation area, automation in the factory, the office, the home, and in the classroom. Distance education and educational telecommunications are part of the automation trend in educational responses for the great demand for accessibility. Educators can now focus on the educational needs and wants of potential and current students in a broad populace that begins in the K-12 arena and continues throughout a student's life. Continuing education, professional development, degree work, and specific resource needs of the educational community have spurred the growth and development of distance education (Evans & Nation, 1989).

The impetus for K-12 distance learning has come primarily from rural areas. (White, 1989). Shifting economic and demographic patterns have left small rural schools with declining student populations and limited financial instructional resources. Solutions such as school consolidations and student/teacher transportation have often beem stretched to geographic limits; these approaches are also disruptive and politically unpopular. These small school districts have always had problems in hiring and retraining qualified teachers in critical need fields such as special education, mathematics, and the sciences. Distance education helps to alleviate the staffing shortages in these areas while allowing to expand curricular choices to the students and eliminating transportation cost (White, 1989).

Large urban districts are facing problems in hiring qualified staff in addition to problems in parental involvement, cultural relations, staff development, and training. These larger districts are looking toward distance learning networks to share resources between school buildings, increase curricular offerings, and provide an inservice communication network for a very large staff (Tressell, 1975).

Changes in technology have affected educational demands for workforce retraining and personal growth and development among adult learners. Most of these individuals must learn from a distance because of ongoing obligations, physical handicaps, or they live in geographically isolated areas that prevent regular classroom attendance (Feasley, 1983). Life long learning and learning on demand are becoming

possible by the use of distance education technologies and the further use of video taped lessons. Potential adult learners are trying to satisfy any of five distinctive needs: (a) help in understanding the changes in one's own body and behavior produced by maturation and aging, (b) help in understanding the rapid technological and cultural changes of comtemporary society, (c) skills for coping with the personal consequences of technological and sociocultural change, (d) new vocational skills required for a career change or pursuit of other new goals, and (e) guidance in finding meaningful and satisfying retirement roles (Schaie & Parr, 1981).

Colleges, universities, and institutions of higher education have been involved in correspondence and extension programs for a long time. Distance learning can provide direct access to the institutions within the framework of live or recorded instruction utilizing the same network available to the K-12 or community-based instructional sites (Keen, 1986).

One of the most significant implications of distance learning is that it could move education and training into more of a consumer environment. Distance learning networks are more often planned and managed by partnerships of academic and non-academic specialists. These considerable collaborations arise because planning and producing course materials for distance learning are more lengthy and the course expectations and goals are more clearly defined.

Consumers of education will have more choices and higher quality courses available, and they will benefit from the reduced difference between formal and informal experiences (Tressell, 1975).

CHAPTER 3

CONCLUSIONS

The potential to serve the increasingly growing numbers of students exists only within context of distance education technology. The need and numbers are real. The capability of the technology and its special ability to link groups is creating many educational and commercial activities. Whether distance learning works equally well for all students has yet to be determined, but through study, revision, and easier accessibility the ability of educators to meet demands is greatly enhanced through distance technology. The number of distance learning projects operating or planned has grown from only a handful to virtually every state of the United States. States are also beginning to look beyond their borders to share resources and respond to national programs (Evans & Nation, 1989).

The future of small and rural school districts will be intimately tied to the availability of appropriate and affordable distance learning technologies (Tressell, 1975). The important spur for the growth of distance education in K-12 applications, however, has been the needs of the education community itself (Evans & Nation, 1989). In addition to students' needs, educators recognize the role of distance learning technologies for staff development programs and inservice training. The time, effort, and expense of travel often limit opportunities for professional interaction (Kearsley, 1986). Parallel needs of business, government, and education create an opportunity to share costs. Even

more importantly, this paralleling of needs has stimulated an active marketplace for hardware and services that has brought industry and the private sector to the door of the education community (Feasley, 1983). The educational desire for technology resources comes at an opportune time. Educational requirements for infrastructure coincide with a growing demand for telecommunications capability and services coming from all sectors of society (Tressell, 1975).

The implementation and operation of comprehensive educational telecommunications network is no small undertaking. The acquisition cost of the system is only one component of recurring and often escalating annual operational costs. The technological linkage between sites, whether coaxial cable, microwave, or fiber optics, is a substantial annual cost. The cost of annual maintenance contracts is significant (Guthrie-Morse & Julian, 1989). Although start-up costs are high, the savings realized from the reduction in transportation costs, human resource costs, and instructional support costs, will eventually balance out those costs. Distance education will become much more prevalent in the future because society will place a higher value on reducing students' time away from home and on needless use of gasoline for transportation (Feasley, 1983).

The implications for long distance learning extend well beyond the parameters of what has been accomplished to date. While the needs of elementary and secondary schools are a major focus of the telecommunication technologies, long distance learning is

also capable of providing equitable learning opportunities for all citizens. Technology has created possibilities for learning that have no boundaries (Benson & Hirschen 1987).

The 21st century user-friendly telecommunications technology holds much promise for academic and non-academic organizations. It provides quality control of instructional delivery and enhances the ability to offer a wide variety of course offerings, which might otherwise prove prohibitively expensive. Although telecommunication technology is not a panacea, it is an effective and efficient delivery system that can advance educational goals and objectives (Guthrie-Morse & Julian, 1989).

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