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How telecommunications is assisting the United States in adult educational distance learning programs, telemedicine, and future applications

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Abstract

The future of telecommunications becomes more unpredictable every passing day. Products and services that were just dreamed of in the past, only six months to a year ago, are here and ready to be used in everyday life. Wireless service has been affected by PCS providers who are offering services to customers that are considerably cheaper. Voice recognition programs/applications were only being bounced around in 1997, but currently are being used at work places and homes. At the 1998 Comdex technology trade show six major software companies were promoting their voice recognition programs.

There are some glitches still. But as time goes by (perhaps another year) programs will be perfected and companies will have a new twist to their software. Computer processor speeds will steadily increase, while the prices will drop, spawning new applications in voice processing, multimedia, and imaging (Green, 1997). The regulations and laws of telecommunications need to be revised. Most of the dilemmas, laws and regulations, are in the hands of Congress and the courts, and unless they are solved promptly more problems will began to occur and further complicate matters.

How Telecommunications is Assisting the United States in Adult Educational Distance Learning Programs, Telemedicine, and Future Applications

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Introduction to Telecommunications

Telecommunications, can it be simply defined by one sentence that is universally accepted? Telecommunications has multiple definitions but all include the word "electronic" or mention some electronic device. One definition says telecommunications is, an umbrella term that covers broadcasting, electronic media, telephone, and computer technologies (Gross, 1995). Another definition says, the electronic movement of information (Green, 1997). Telecommunications is, communication by electronic or electric means, as through radio, telephone, telegraph, television, or computers (Neufeldt, 1998). Telecommunications can be systems, services, or networks (Neufeldt, 1998). Many devices/services used in telecommunications make it possible for people to choose where they work, live, and how informative information is exchanged. Examples would be video conferencing, voice recognition, satellite communications, wireless technologies, long-distance services, and computer applications--the Internet.

Distance Learning

Telecommunications can have many subcategories but one in particular is distance learning. Distance learning applies the concept of using electronic devices to teach

people in various locations the same information simultaneously. So, exactly what is distance learning? Distance learning is known by various names, including distance training, distance education, and open learning (Abernathy, 1998). Is there one particular definition that is used or does it have multiple meanings? What are corporations/businesses doing to integrate this concept into their systems of training or production? Is distance learning working for adults in the working world and will they continue to use it? And last, how could distance learning be changed, if needed, to help more adults in the future? These are the questions that to be answered in this paper.

Let us start with the definition of distance learning. It was difficult to find one specific definition that was used over and over again. But, here are a few definitions that best describe what distance learning is by criteria established by this researcher. Distance learning is the delivery of educational programs to off-site students through the use of technologies such as cable or satellite television, video and audiotapes, fax, computer modem, computer and video conferencing and other means of electronic delivery (Peterson 1997). This definition is not necessarily true because not all distance learning

programs/instructors use technology to reach their distance learner. Many people use distance learning and distance education interchangeably. So, distance education is any instructional situation in which the learner is separated in time or space from the point of origination, characterized by limited access to the teacher and other learners (Heinich, Molenda, Russel, and Smaldino, 1996). Both of these definitions put together sum up what distance learning is about. Distance learning is any type of education or learning taking place outside a normal class setting that may or may not involve some sort of technology.

Distance learning has evolved from an instructional methodology for rural people to an important training strategy for multinational organizations (Lohmann, 1998). More supportive evidence shows that corporations/businesses are opting for in-house training for their executives. We know this as "distance learning." "In-house" means employees would be learning at work and not leaving to go to other facilities, etc. From the information gathered thus far, corporations/businesses are leaning towards this approach for different reasons. This kind of training is bringing learning closer to the participants. Universities and corporations/businesses are forming partnerships to

help employees grow with the times, which in turn will help each corporation/business grow. But there are also professions that are getting involved with distance learning and using all the technology available. Even some trades, like automobile mechanics, are using distance learning as a way to keep up with the changing times and automobiles. Some that corporations/businesses are using this approach are to cut down or eliminate the cost of traveling, hotels and meals (Greco, 1997). If they save these cost, they are actually saving money in the long run. Very few corporations/businesses want their employees to receive second BA's or an MA; they just want them to learn more about a specific area without having to leave work. Burnett (cited in Greco, 1997), manager of business leadership development at Hewlett-Packard in Palo Alto, California agrees that, "Face-to-face learning is time out of doing your work" (p. 53). Burnett also said, "When you live in a high-tech world that is fast and volatile, you have to be able to deliver knowledge and learning anytime, anywhere" (p. 53). People want products to progress with the times but someone has to find out how to do that and this were distance learning comes into play. Without leaving the office, people can learn new information and have it faster than they would if they had to travel, bring

the new idea back, try it, then finally pass it on. Many corporations/businesses would agree with Burnett about losing work time, because when you leave your job it does not get done unless there is someone who can do your job or they hire someone temporaryly (Greco, 1997).

The whole purpose of corporations/businesses using distance learning is to train or educate employees by customizing and having control of what is being taught (Greco, 1997). One way to customize or have control over what is being taught is to collaborate with universities and colleges. Even though this kind of partnership does not meet the norm for a typical learning experience, it seems to be working. Two partnerships between corporations and universities that are using the distance learning concept will be described (Greco, 1997). First, let us begin with the partnership between Drexel University in Philadelphia and Conrail Inc. Conrail Inc. wants to train their high level staff in-house and have more control and customization over what is taught to their executives (Greco, 1997). This partnership is more than just training executives to earn an MBA without leaving their jobs. The MBA combines traditional and high tech teaching methods, live lectures via television (Greco, 1997). The adult

learner can also interact with the instructor/professor through e-mail. But right now this program is only offered to employees of CIGNA Corp., a division within Conrail the Philadelphia-based insurance giant. The second partnership is between IBM Corp. and New York University (Greco, 1997). Their partnership involves offering information systems courses over the computer networks to IBM and non-IBM professionals and managers (Greco, 1997). Participants who take the 30 on-line courses can receive seven graduate credits and non-credit certificates or a new Master of Science degree in management. The information on this partnership is limited thus, it is difficult to draw any generalizations.

Next, professionals in medical fields are getting involved with distance learning. The National Community Pharmacist Association has a satellite channel that has been reserved for a telecommunication training and consumer education network (Ukens, 1996). With this channel pharmacists can get information like legislative updates, pharmacy news, consumer information, continuing education, and other programs. One main aspect of focus is pharmacist care goals. These include working to provide the easiest way for pharmacists to receive information without traveling, reading magazines, etc. Dankmyer (cited in

Ukens, 1996), the NCPA's communications vice president said, "This idea is a major commitment" (p. 130). He also said, "Our goal is to advance the shift from live to distance learning and to let our members participate in certification programs without leaving the store. . . ." (p. 130).

There are many other companies that are becoming involved in this concept of distance learning for training. Automobile technicians and mechanics are getting involved in distance learning but it is designated as distance training (Weber, 1997). The Ford Motor Company introduced a new type of training, distance training, which would provide 350-400 hours of automobile industry related training by satellite television (Weber, 1997). One argument was that people still need the hands-on, "skill-based" training. Being an automobile technician or mechanic requires life-long learning and perpetual training. Automobile technicians and mechanics have two learning needs, the way things work and the theory of operation. Ford has been the pioneer in the development of satellite uplinks and dealership downlinks as a way to provide training to their employees. MCI uses its learning network extensively for employee training also. It enables MCI to put more than 100 people in one class for a

satellite broadcast rather than schedule four classes (Lohmann, 1998). MCI values the savings it is realizing because the development cost is about the same for distance training as the cost for classroom training. With the technology of distance training, MCI workers can take classes from their home office at a distance training instead of traveling to corporate headquarters in Richardson, Texas.

This concept of distance training appears to be working with the adults who are using it and will it continue to work for them? From what has been gathered it has been working for adults. They are learning to a degree that significantly and measurably improves their ability to help their employers improve profitability or reach other business goals (Sheridan, 1996). Sheridan (1996) said that for distance learning to be effective and work for adults there must be the right mix of instructional design, expert talent, and delivery media. Sheridan (1996) also said that high-quality programming using expert instructors and well-designed programs/materials are essential for training to be effective. There have been limited studies done to identify factual results that adults are learning effectively from distance learning (Sheridan, 1996). Thus far the only results about distance learning, that involves

adults as students, is that distance learners can learn 60 percent faster than conventional learners and the ability to participate live with instructors and other students increases participation and retention (Sheridan, 1996). Research on the use of prepackaged computer-based training for adults across a board range of settings has consistently found that those who learned at a distance on computers, learned as well as or better than those who learned in traditional classrooms (Capper cited in Potashnik and Capper, 1998). In some cases the former learned both faster at substantially lower cost than the latter (Capper cited in Potashnik and Capper, 1998). There is a down side to this growth of adult distance learning. Research has found that adult distance students learn as much as conventional students, studies of correspondence students have found that they are much more likely to dropout before completing their courses, with dropout rates ranging from 19-90 percent and an overall rate of 40 percent (Potashnik and Capper, 1998). High dropout rates are typically attributed to some students' sense of isolation when they study without peer or instructor interaction, insufficient self-discipline, or loss of interest or discouragement owing to slow feedback they receive in the form of graded assignments (Potashnik and

Capper, 1998). Other reasons include competing demands of jobs and family life (Potashnik and Capper, 1998).

The growth of distance learning has not slowed. Adult distance learning (especially) seems to be growing rapidly. But, is there really anything that can be done to improve distance learning or make it easier for corporations/businesses to invest in this approach? Right now corporations/businesses can get connected with some form of distance learning because it has become cheaper and signal capabilities have been improved with enhanced bandwidth. Distance learning is almost perfect right now for corporations/businesses because they do not need long term academic learning or training, they want a burst of short, highly focused mobile training. Distance learning will improve overall with corporations/businesses demanding to see these strategies helping profits. There are some things that could be done to make corporations/businesses want to keep working with the concept of distance learning. Sheridan (1996) suggests five factors that if combined effectively, employees will learn better and their employers will keep using this method of learning/training:

1. Establish a culture that accepts distance training so there are no internal barriers to implementation.

2. Thoroughly assess the customer's needs.
3. Match instructional design to performance and learning standards. Students should know what they're trying to learn. What their expected to achieve while learning. And when they have arrived at the goal.
4. Master teachers, people who are experts in their field as well as capable of working with distance training technology should be used.
5. Use evaluated outcomes to make sure the learner completes the course and then applies it appropriately in the workplace. (p. 17)

To really understand how distance learning works for adults, each learning style needs be assessed and be evaluated. By visiting different corporations/businesses and evaluating how distance learning is working for their employees and that individual's learning style. More research needs to be done on adult distance learning because it becoming so widely used with adults today.

Telemedicine

Just as adults in a business atmosphere are learning valuable information through telecommunications, patients are learning valuable information about their health through telecommunications with telemedicine. The

telecommunications market is similar to the computer industry; new products and services are introduced so rapidly that even the experts can not keep pace (Green, 1997). This is evident with the sudden appearance and rapid growth of telemedicine. What is telemedicine? This application has many different definitions. Telemedicine is a subset of the telehealth (the delivery of health care service or activities with time and distance barriers removed using technology such as telephones, computers, interactive video transmissions) category that can include many different medical specialties (Walker, 1997). Another definition of telemedicine says the electronic transfer of medical information (graphic, video, and voice) between distant locations (Horvitz, 1997). Telemedicine can be demonstrated, thanks to the Iowa Communications Network (ICN), to provide teaching tools for hospitals and finally reaching out to patients at home with pertinent health care information.

How is telemedicine being used? There are several applications of telemedicine. Most applications come to mind directly, whereas others are hardly known about. Of the nine applications mentioned, five are commonly mentioned and the other four are not commonly mentionen (see table 1).

Table 1

Commonly Mentioned	Uncommonly Mentioned
1. Supervision and consultation for primary care encounters in sites where a physician is not available.	**1.** Initial urgent evaluation of patients, triage decisions, and pretransfer arrangements.
2. Routine consultations and second opinions based on history, physical examination findings, and available test data.	**2.** Extended diagnostic workups or short-term management of self-limited conditions.
3. Transmission of medical data.	**3.** Transmission of diagnostic images.
4. Medical and surgical follow-up and medication checks.	**4.** Management of chronic diseases and conditions requiring a specialist not available locally.
5. Public Health, preventive medicine, and patient education.	

*adapted from Crump, Kottke, Perednia, Sanders and Forster, 1997.

More often then not people are using or being involved with telemedicine and do not know it. One prime example that happens to be the oldest, simplest and most popular form of telemedicine is electronic medical consultation, the telephone conversations between doctors and patients. But, the oldest form of telemedicine is teleradiology which was referenced in the medical literature and one the Food and Drug Administration (FDA) has been involved with since 1977, according to Greberman (cited in Larkin, 1997) of the FDA's Center for Devices Radiological Health. Teleradiology's process is sending x-ray by mail but with telemedicine the x-ray is received instantly.

Another form of telemedicine is interactive videoconferencing. This application permits two doctors and a patient to confer simultaneously while being at different sites. Telemedicine technology is being used for educational purposes, too. In Georgia the telemedicine network based at the Medical College of Georgia in Augusta, links the medical college with 44 sites throughout the state, according to Stachura (cited in Larkin, 1997)the network's executive director. This lets medical students in remote locations take classes at the university, doctors can earn continuing medical education credits and health information is being communicated to the public. The Medical College of Georgia is not the only college taking advantage, for financial purposes, of telemedicine technologies. John Hopkins University offers a managed care course, using video and computer technology, as part of its "Business of Medicine" certificate program (Potashnik and Capper, 1998).

How is telemedicine possible when it comes to regulations according to the law? The FDA's primary role, regarding telemedicine, is to review the devices, or hardware, before clearing them for marketing and to conduct post-market surveillance; which is to be aware of significant problems that occur after the devices are

marketed (Larkin, 1997). Also, certain medical software products that may be used for diagnostic purposes fall under the FDA's jurisdiction. Another issue involves laws and regulations in licensing. These laws and regulations involve doctors, nurses, and nurse practitioners. On the doctor's side the laws and regulations are dealing with out-of-state practicing. Telemedicine can cross-state lines. Some states could require an out-of-state doctor to get a license to practice, even though it would be telemedicine using interactive video connections, not face-to-face interactions. The licensing issue is further complicated by laws some states have passed that prohibit out-of-state physicians from performing telemedicine in their states (Stachura, cited in Larkin, 1997). Different agencies, for the medical professions, have purposed several licensure models dealing with telemedicine. The American Nurses Association (ANA) (cited in Walker, 1997) has seven proposals that are commonly proposed:

1. Consulting exception. Allows practitioners to practice in a state if the sole purpose is to serve as a consultant.

2. Endorsement. Enables state licensing boards to issue licenses to health professionals licensed in other states that have equivalent licensing standards.
3. Mutual recognition. Allows licensing agencies in participating states to accept the licensing policies of the practitioner's home state.
4. Reciprocity. Gives licensed practitioners in one state equal treatment and privileges in another state without having to obtain licensure from that state.
5. Registration. Instructs practitioners to inform the other state's authorities that they would like to practice in that state on a part-time basis.
6. Limited licensure. Limits the practitioner's scope of practice rather than the time period he or she may practice within another state.
7. National licensure. Eliminates state licensure and replaces it with national-level licensure. (p. 709)

But as of April 1996, the Federation of State Medical Boards adopted model legislation to regulate telemedicine practiced "regularly or frequently" across state lines

(Crump, Kottke, Perednia, Sanders, and Forster, 1997). This model is being considered in more than 20 states, which would allow a license for "regularly or frequently" practicing. Crump, Kottke, Perednia, Sanders, and Forster, (1997) suggest the model bill provides the following information given throughout the reading:

1. Physicians could practice telemedicine across state boundaries but could not physically come into that state to practice medicine unless they had earned a full and unrestricted license to do so.
2. State medical boards could deny telemedicine license to physicians who had a record of disciplinary action against them.
3. The practice of telemedicine would be subject to the Medical Practice Act of the state where the patient is located, although this would not limit a physician's home state from taking appropriate action as well.
4. Confidentiality of patient records would be governed by the provisions applicable in the patient's home state.

5. Telemedicine could be practiced without a special license if contacts occur less than once a month amounting to fewer than 10 patients per year, or comprise less than 1% of the physician's practice.
6. Informal physician consultations, conducted without exception of pay, would also be exempt, as would telemedicine provided in emergencies. (pg. 71)

The proposals made by the ANA are similar to the model bill the Federation of State Medical Boards is proposing. Both organizations state concerns about using telemedicine for consulting and practicing from state to state. As of November 1998 no standard laws and regulations have been issued that every state will follow.

Advocates of telemedicine believe that all this new technology for medicine is going to be crucial in the delivery of health-care that benefits people everywhere. With telemedicine, experts say, patients can benefit from the expertise of distant specialists and still receive treatment in the community (Larkin, 1997). Many doctors in the rural areas say they enjoy the availability of getting in quick contact via telemedicine with specialists but say it does not take anything away from their practice or

business for the communities. Most medical tests and prescriptions generated by specialists are handled locally. One major benefit that can be supported up to date is the way nurses are making home visits. On the average a nurse can make only four to five home visits a day but can assist up to 20 people through telemedicine (Horvitz, 1997). By setting up equipment in a patient's home, for patient monitoring, those who need face-to-face visits can receive more visits at longer periods of time. The cost set-up for standard home health telemedicine equipment in a patient's home is $800 to $900, or the cost of an oxygen tank (Jaspen, 1998). The standard equipment includes a camera, a 13-inch color television equipped with a phone, an automatic blood pressure monitor and a tympanic thermometer (Jaspen, 1998). An average in-home visit is $90, while it cost $35 for an average telemedicine home visit. In the long run it will benefit the individual to buy equipment and receive 25 telemedicine home visits than only receiving 10 face-to-face with a nurse, in-home, visits according to estimate costs. At-home monitoring can delay an older person's entry into a nursing home resulting in improved quality of life, as well as significant cost savings (Larkin, 1997). In turn this will also benefit that individual's family and other tax paying citizens. Another

benefit, as the technology becomes more widely accepted, would be the use of telemedicine for home-based follow-up care for the chronically ill (Horvitz, 1997). Some benefit examples are, a patient can be reminded to take his/her medicine via phone call rather than a visit from the nurse. Another patient forgets to eat, nurses can see that the patient is eating and that there is food in their home. There are other telemedicine applications that are under investigation, for example "mobile telemedicine testbeds." These transmit vital sign data and video images from ambulances to trauma centers, with the aim of improving patient care during the "golden hour" immediately after trauma and preparing emergency staff for the patient's arrival (Larkin, 1997).

Although this technology of telemedicine has benefits, there are still obstacles/criticism to overcome before being accepted in mainstream medicine. There have been some issues that are seen as obstacles/criticism that include lack of privacy/confidentiality, high demand of specialist care, legal risk, pressure for fast services, and current cost factors. First, the lack of privacy/confidentiality is going to be an issue that arises when any new technology comes along dealing with personal information. To receive instantaneous information about any patient from any

location, the telemedicine system requires large medical-record databases. How can people be assured that their personal information will be safe with no protection laws passed by Congress? There are various groups studying ways to keep records private/confidential. Encryption is one way being used to protect private/confidential patient information. Most institutions using telemedicine technologies are treating patients' privacy/confidentiality rights the same as they would with face-to-face meeting etc. For example take telecardiology. If there are 30 medical students in a room with a doctor when he examines a patient, the patient can not see them--the patient must give permission to allow the students to watch (Reich-Hale, 1998). Real clear rules need to be established so the patient knows exactly who is there and why (Reich-Hale, 1998). Sometime in 1998 standards for the tlemedicine system should be set (Frishman, 1997). And by the year 2000 it is expected to be up and running (Frishman, 1997). The high demand for specialist care is always going to be an obstacle but there are ways to get around it. Making sure that primary care doctors have access to experts but do not depend on experts (specialists) to be able to be there regularly when primary doctors call.

Next, legal risks can cause criticism from every level in the medical profession. When it comes to legal risks there is medical liability, malpractice liability, professional liability, and liability overall. Medical liability could involve a remote specialist who does not perform a hands-on examination and this would be regarded as delivering less-than-adequate care (Larkin, 1997). Malpractice liability would be if a physician consults with a patient in another state and it appears that a bad outcome may have stemmed from incompetence or negligence, which state laws apply (Frishman, 1997). Professional liability can be a combination of numerous failures that affect numerous people. Failure to use telemedicine technology or to select an appropriate application could expose physicians, medical institutions, and employers to new sources of liability (Tan, 1997). To reduce risk, caused by failures, practitioners should provide evidence of appropriate training and continuing education in telemedicine technology. Therefore, employers and physicians must make sure that malpractice insurance, especially if a policy is linked to an institution, provides coverage for out-of-state telemedicine encounters. Also, telemedicine activities need to have good documentation of everything that takes place--if they do

not, it would be the same as having poor hospital records for any other reason, thus opening physicians up to malpractice lawsuits (Reich-Hale, 1998). Overall, liability can involve various aspects of telemedicine. Liability can be a result of technical glitches, breakdowns, or inadequate image transmissions that result in diagnostic or treatment errors. To eliminate or control the onset of errors, contingency plans, back-up systems and ongoing maintenance should be a necessary part of all telemedicine programs. Other equipment-related strategies would include harmless agreements with technology vendors and requirements that suppliers and technology consultants carry errors and omissions and business interruption insurance (Tan, 1997). Pressure for fast service is not apparent because people are very reluctant to try telemedicine (Frishman, 1997). Some patients have fears of not understanding the physician or do not trust the physician because they have never seen this physician before. One American Medical Association representative suggests that the key to avoid patient discomfort or mistrust is for a healthcare professional--either a second doctor, a nurse or other clinician--be present during a telemedicine consultation to explain what is taking place and to fill any gaps that may have been left by the remote

doctor (Tan, 1997). Telemedicine started as video conferencing. Initially the experience with telemedicine was to be limited to handle slow data, which would be the transmission of still images (Fisk, Bower, Sepulveda, McConnell, and Gott, 1995). With the advances in telecommunications infrastructure the transmission of video and real time data was possible (Fisk, Bower, Sepulveda, McConnell, and Gott, 1995). So the United States (USA) decided to adopt the teleservice of the United Kingdom (UK). The UK was providing services in trauma advice to oil rigs and remote fetal diagnosis on underground images (Fisk, Bower, Sepulveda, McConnell, and Gott, 1995). The USA adapted this technology use to work for medical services in hospitals and rural areas. To do this, software to convert pictures into digital format was needed. A "codec", short for coder/decoder for video presentation was needed to see patient's pictures for diagnosis. The capital outlay for the codec remains the primary cost of the system, which is $30-40,000.00 (Fisk, Bower, Sepulveda, McConnell, and Gott, 1995). As the years go by new hardware and software should and will be developed to be cheaper and save money but still be effective. Telephone charges and the consultant's time are also part of the capital outlay. There will be money and time savings when patient and

doctor travel is reduced. There will also be savings from reduced patient anxiety and inconvenience. There are no concrete figures of how much telemedicine is costing individuals, doctors, and hospitals. Insurance companies are beginning to get involved when it comes to cost factors and reimbursement.

When it comes to current cost factors it becomes a big issue itself. Insurance companies are reluctant to pay too much money because then they will not make a profit from hospitals, individuals and individual doctors with private practices. Currently, the U.S. Health Care Financing Administration reimburse for limited services involving radiology and pathology analyses (Tan, 1997). Reimbursement for out-of-state telemedicine services may be less problematic in some managed care organizations because of contractual arrangements (Tan, 1997). The only insurance company to get seriously involved with telemedicine is Medicare. But they have not officially paid for a claim, by reimbursing, dealing specifically with telemedicine. Medicare has and will reimburse for teleradiology (Horvitz, 1997). But Medicare will not reimburse for interactive video consultations to date. Only nine states currently cover telemedicine through Medicaid, which does not require federal approval (Horvitz, 1997). As of January 1998,

Medicare must add pay for teleconsults starting in January 1999 but there will be tight restrictions and relatively low fees (Martin, 1998). The managed-care industry, insurance companies, are starting to accept this concept gradually. A study commissioned by an HMO showed savings of almost 30% of out-of-pocket cost per month for telemedicine participants. Fee-for-service providers such as Blue Cross, while less enthusiastic, are also looking seriously at telemedicine (Horvitz, 1997). The pioneer in telemedicine coverage of the insurance companies is Kansas Blue Cross. The volume of service is low, but at the present time there are only eight providers and 35 patients are covered for telemedicine charges in the state.

If this is to be the wave of future medicine in the USA, other states need to look at Oklahoma's telemedicine network. Oklahoma has the largest telemedicine network in the USA (Appleby, 1997). The network was established in 1992 and it now links 40 hospitals. The network was developed by Oklahoma City, OK-based InTelemed (Appleby, 1997). The network's future direction is to transmit electrocardiograms and carotid Doppler. Carotid Doppler is ultrasound images of the artery (Appleby, 1997). The state of Oklahoma plans to merge with OneNet, which is a community and four-year colleges in the state. By merging,

the network is looking to cut the cost of hooking up users. An example is Comanche County Memorial Hospital in Lawton. They paid $10,000 to hook up when the network started. After the merger and plans to expand the network Comanche will spend $750 per month which is cheaper than $4,000 for two hospitals and 41 clinics in 13 counties. Not all the Oklahoma hospitals use the network. There are 40 hospitals linked but only seven use the network on a regular basis, which are Comanche and six other rural hospitals. These seven facilities use the network to send and receive diagnostic images and to hook into conferences and seminars (Appleby, 1997). Three of these facilities conduct remote cardiac monitoring over the network (Appleby, 1997). The network is used for other areas in telemedicine: Continuing Medical Education, Staff Training, Long-Distance Therapy, and Diabetic Patient/Educator Meetings. As far as insurance is concerned Medicare and commercial insurers do pay for diagnostic images sent over the network (Appleby, 1997).

In Iowa telemedicine applications in rural as well as urban areas are becoming a significant part of specialized health services. This is true for both patients and doctors. The hospital system which includes doctors, nurses, and nurse practitioners is strengthening in Iowa especially in the rural areas. More patients can gain

access to medical attention for major and minor medical problems because of the use of telemedicine via the ICN. With patients and doctors accepting this new technology, telemedicine, insurance companies are next in line to accept this technology too. Telemedicine is not the answer to all the problems in the medical field/area, but it has the potential to significantly improve health care for patients and doctors. Important and exciting information is being discovered continuously in telemedicine area. To aquire more information about telemedicine in Iowa, visit the Iowa Telemedicine Resource Center at http://telmedicine.uiowa.edu/TRCDocs/whats.htm

Future

The future of telecommunications becomes more unpredictable every passing day. Products and services that were dreamed of in the past, for example six months to a year ago, are here and ready to be used in everyday life. Wireless service has been affected by PCS providers who are offering services to customers that are considerably cheaper. Voice recognition programs/applications were only being bounced around in 1997 but, currently these programs/applications are being used at work places and homes. At the 1998 Comdex technology trade show six major

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