Libraries, Schools, and Wired Communities in Rural Areas and the Changing Communications Landscape

By Kerry A. Kline

Abstract

This article is an update of the information presented in Steve Cisler's 1995 article titled "The Library and Wired Communities." It focuses on how technology has spread and developed since the original article was written.

The Past and Present: An Overview

In the 1990s, companies integrating data networks and the Internet into their business processes fueled an economic boom. However, smaller businesses lacked access to the technology that allowed larger companies to streamline and help the United States economy grow. The same is true for rural libraries. Steve Cisler (1995) writes that the future of libraries in rural parts of the country is "tied to the future of the communities they serve" (p. 176). It is still an unfortunate fact of life that not all small communities have secured the telecommunications technology necessary to compete in attracting and retaining sources of economic development because, as Cisler points out, it is "more expensive to build infrastructures in rural areas" (p. 176). Even in 2002, service providers of telecommunications prefer urban areas because costs can be spread over more customers.

To illustrate how rural libraries lag behind their urban counterparts, Cisler (1995) discusses the fact that something as basic as electricity did not reach some rural Americans until forty years later than their urban neighbors. He also discusses the importance of the TVA (Tennessee Valley Authority) of 1933 and the REA (Rural Electrification Administration) of 1935 in the early development of electricity in the United States. According to Cisler (1995), "The TVA was the most controversial of the two, and we are not likely to see any parallel effort to establish telecommunication projects in any area of the United States in the 1990s." (p. 177).

As Cisler (1995) suggests, "the history of the rural development of electricity is important because it parallels much of what is happening with the spread (or lack thereof) of telecommunications in urban and rural areas in our time." (p. 179). He bases his conclusion on the work of

Danish Historian David E. Nye. In *Electrifying America: Social meanings of a new technology*, Nye (1990) studied the social effects of the spread of electricity in the United States as he explored how electricity seeped into and redefined culture. Europeans treated electricity as a service whereas Americans treated it as a commodity (Cisler, 1995). Also, in *Consuming power*, Nye (1999) looks at how activities changed as new energy systems were constructed. He examines a number of systems that acquired and lost technological momentum over the course of United States History. Nye (1999) creates a thought-provoking panorama of technology fundamental to modern American life as he uses Muncie, Indiana, as a touchstone for his study.

Indeed, electricity was revolutionary. If Americans can begin to understand the changes in networking and computer technology, then perhaps, we can "comprehend what form the revolution may take in the 1990s" (Cisler, 1995, p. 179). It is evident today that even the basic infrastructure for high-speed telecommunications investments still does not exist. Many rural customers still do not have access to "the minimally acceptable basic local services" (National Center for Small Communities [NCSC], 2002). People in rural areas incur long distance charges even to make simple routine calls, and many rural residents still lack single-party touch-tone service. Rural analysts argue that competition is not coming as quickly to rural areas due to lack of competition among service providers (NCSC, 2002).

On February 8, 1996, President Clinton signed the Telecommunications Act of 1996 into law. This act updated the Communications Act of 1934. The odds are great that no one in 1934 foresaw inventions such as television, computers, and the World Wide Web. Although the original act has undergone numerous important changes, no major changes were needed until the 1980s. The 1996 revision was the first real attempt to overhaul the whole telecommunications law, and it represents the first comprehensive revision of the United States' communications laws in more than 60 years.

These changes were long overdue. Efforts to rewrite telecommunications legislation received bipartisan support for many years, but no action was taken. The Telecommunications Act of 1996 provides a "new national policy framework that relies on competition and market forces to advance the deployment of communications infrastructures throughout the country" (Benton Foundation, 1996b). This act includes provisions for public schools and libraries. It also covers communications such as cable television, telephone services, content programming on computer networks and television, and free, over-the-air broadcast television (Benton Foundation, 1996b).

The Telecommunications Act of 1996 promised that all Americans would be served by telecommunications systems and guaranteed that telecommunications services would be available to all at an affordable rate. According to the Act, a universal service package is to be established by the FCC and should "take into account advances in telecommunications and information technologies and services" (Benton Foundation, 1996b). It is the responsibility of the Federal Communications Commission (FCC) and state and local governments to ensure that the benefits promised of new information and computer technologies reaches everyone. As part of this concept of "universal service," the FCC was put in charge of creating a fund for Universal Service for Advanced Services by working with regional phone companies to collect fees to discount and subsidize electronic access rates (known as E-rates) for libraries, schools, and rural telemedicine sites (Oregon Public Networking, n.d.).

The Universal Section of this law will help libraries and schools obtain access to state of the art technologies and services at discounted rates. The FCC, through its decision making process, shapes the policy that will bring about this increase in access to technology. As mandated by the 1996 Act, the goals of Universal Service are to

> promote the availability of quality services at just, reasonable, and affordable rates; increase access to advanced telecommunications services throughout the nation; advance the availability of such services to all consumers, including those in low income, rural, insular, and high cost areas at rates that are reasonably comparable to those charged in urban areas (FCC, 2002).

The Telecommunications Act also included provisions for the Internet. As everyone knows, the Internet provides a variety of materials and information to its users. However, along with that information have come sites that are inappropriate to children. The federal government, pressured to regulate the Internet, has enacted three different pieces of legislation to do just that. The first was the controversial Communications Decency Act of 1996 (CDA). This act includes provision limiting minors' access to objectionable material on the Internet. CDA is controversial because libraries and schools could be held legally liable for making information available to minors because it "relies on a very broad definition of indecent" (Benton Foundation, 1996b). It is because of CDA that libraries had to include language in their Internet policy that prohibits using a computer to transmit obscene material (Benton Foundation, 1996b).

Because of the restrictions imposed by the CDA, groups such as American Library Association (ALA), People for the American Way, and the Center for Democracy and Technology challenged the provisions

of the CDA as unconstitutional and overboard. ALA supporters "argue that if libraries and schools are to reflect and transmit American culture in the digital age, they must ensure that their holdings and services reflect a diverse set of views, images, and experience" (Benton Foundation, 1996b). In a decision announced on June 26, 1997, the Supreme Court found the Communications Decency Act of 1996 unconstitutional.

The second act restricting the Internet was the Child Online Protection Act of 1998 (COPA), which was created for "restriction of access to minors to materials commercially distributed by means of the World Wide Web that are harmful to minors" (COPPA, 2002). COPA narrowed the restrictions of objectionable materials online to commercial websites and defined indecency a bit more specifically (Library Officials, 2002). Sites are now required to collect a credit card number or proof of age before allowing users of the Internet to view such harmful materials (Library Officials, 2002).

Several interest groups have argued in federal court that COPA is unconstitutional due to its restriction on free speech. The U.S. Supreme Court is in the process of making a decision about the constitutionality of COPA and is expected to make their ruling sometime this year. The Child Online Protection Act mandated a congressionally appointed panel in October 1998. Known as the COPA Commission, this panel gave its final report to Congress in October 2000.

The third piece of legislation currently being challenged is a 2000 federal law that requires schools and libraries to block pornography as a condition for receiving certain federal technology grants (Loviglio, 2002). This law, known as the Children's Internet Protection Act (CIPA), issues "restrictions on the use of funding that is available through the Library Services and Technology Act, Title III of the Elementary and Secondary Education Act, and on the Universal Service discount program known as the E-rate" (American Library Association, 2002). These restrictions take the form of requirements for Internet Safety policies and technology, which block or filter certain obscene materials from being accessed through the Internet. CIPA was signed into law in December 2000; however, its implementation was delayed until July 1, 2001 (Judges' Remarks, 2002).

Free speech advocates have made it their goal to convince a three-judge panel in Philadelphia, PA that keeping materials from children in libraries is unconstitutional (Library Officials, 2002; Lovigilo, 2002). These individuals are arguing against porn-blocking software and strategies mandated by the Children's Internet Protection Act of 2000. The plaintiffs, the Mutnomah County Library in Portland, Oregon and the American Library Association, advocate libraries' right to offer their

patrons a choice between unfiltered and filtered Internet access. Currently, libraries that do not filter or comply with CIPA by July 2002 could lose federal technology funding (Library Officials, 2002).

The testimony of the trial shows "wide-ranging policies toward online pornography divide libraries across the country" (Peterson, 2002, p. A5). The panel "openly voiced its skepticism over the law, which mandates filtering for libraries and schools that receive federal funding for Internet access" (Judges' remarks, 2002, p. 18). After two weeks, the federal trial to establish the extent of the government's right to protect children from pornography while using library computer ended on April 4, 2002. The three-judge panel will rule by early May 2002 on a plaintiff's request for a permanent injunction against the CIPA, which requires public libraries to install filtering software on all computers or lose federal technology funding (Reuters, 2002). No matter the outcome of the case, the ruling will be appealed directly to the U.S. Supreme Court.

Currently, Senate Bill 583, a bill in the Pennsylvania State Senate, threatens to require filtering of all Internet computers in Pennsylvania public libraries. It would also override local decision-making on public library Internet policies. The Pennsylvania Library Association has been asked to help with the language in this bill and is reluctantly cooperating with the Senate on the final draft of this radical bill.

In addition to the child protection aspects of the telecommunications Act of 1996, there were other objectives. By passing the bill, Congress also tried to deregulate the telecom industry while promoting competition in a market that had previously operated as a monopoly (Staihr, 2001).

To help rural healthcare facilities, schools, and libraries fund telecommunication improvements, a new federal funding program was created by the Telecommunications Act of 1996. Known as E-rate, this program was designed to create a way to "deliver millions of dollars in discounts on advanced telecom services to rural education and healthcare institutions" (Staihr, 2001, p. 1). E-rate is a federal program of the FCC administered by the Schools and Libraries Division (SLD) of the Universal Service Administrative Company. The SLD is an independent not-for-profit corporation established to administer universal service and provide affordable access to telecommunications services for all eligible schools and libraries, particularly those in rural and economically disadvantaged areas. The FCC is working hard to bring every school and library in America into the information age through E-rate by providing eligible K-12 public schools and libraries 20% to 90% discounts on approved Internet access, internal connections costs, and telecommunications. Because rural areas have been slow to gain access to new technological developments, Congress wanted to ensure that advanced

telecommunication services reached rural places so they could attract and then retain first-rate healthcare and quality education. Individual schools and libraries pay only a portion of the actual cost, while the rest is paid from a government fund. (Staihr, 2001, p. 2).

FCC requirements state that school and libraries must base purchases for E-rate on an approved Technology Plan. To help librarians meet these requirements, the American Libraries Association created a book titled *Wired for the future: developing your libraries technology plan* (Mayo, D., Public Library Association, & Nelson, S.S., 1999). Here, PLA offers a comprehensive, practical guide to preparing a technology plan. The authors also, provide the raw materials to build, implement, and evaluate a workable technology plan.

E-rate discounts are based on the number of students eligible for the National Free Lunch Program. Although the E-rate application process may seem difficult, every school and library should consider applying for E-rate discounts. Libraries and schools complete technology plans and receive bids on services (Staihr, 2001). Those who apply are awarded discounts based upon economic need, rural location, and the total amount of funds to be distributed for that wave.

E-rate funding helps libraries overcome a serious hurdle that has plagued rural America for years. It has made services affordable to institutions while ensuring that the provider will cover their costs. Since the E-rate's inception, three cycles have been completed; the fourth cycle is under way and will end in June 2002. Even though E-rate may be utilized by all schools in libraries, the FCC has "consistently emphasized that rural America is a key target of the funding program" (Staihr, 2001, p. 4). As the FCC points out, rural areas are indeed in danger of being passed over when advanced telecommunications services and technologies are deployed, so the FCC has made it its goal to help rural areas make these services affordable.

Although there are mixed reactions to aid given through the E-rate discounts, Staihr found that, "some of the most rural and isolated counties in the country have indeed received significant assistance" (2001, p. 2). Overall, E-rate has been successful. Millions of dollars in discounts have flowed to remote rural areas, and advanced services have become available in communities that might not otherwise have seen them. "But even if disparities remain," as Staihr (2001, p. 4) concludes, "that should not detract from what the E-rate has already achieved: a means of helping much of rural America keep pace with the rest of the country as it participates in the Information Economy of the 21st century."

While projects like E-rate have helped, rural areas still do not receive equal improvements in technology in comparison to their urban

counterparts. For example, fiber-optic cable was laid across the United States following the passage of the 1996 act, yet "97 percent of that fiber-optic backbone remains dark" (Kornbluh, 2002). Kornbluh (2002) argues that "overcoming this problem is no less important than was ensuring that critical infrastructures such as railroads, electricity, and highways were built and made accessible to all." Further, Kornbluh stresses that incentives must be created so that the 1996 TCA is enforced. In the future, Congress and presidential administrations should "free up more of the radio spectrum for 'third generation' broadband mobile wireless and experiments with existing unlicensed spectrum" (Kornbluh, 2002). Finally, more subsidies for low-income users or rural communities should be created if broadband becomes too expensive for them.

Instead of providing funding to allow Americans to utilize this resource, funding has recently been cut. In February 2002, the Bush Administration stripped over $100 million in public investments for technology grants in its FY 2003 Budget (Benton Foundation, 2002). Their message is clear; the digital divide is no longer the concern for the government. As justification, the Bush Administration based their decision on a nation-wide study on Internet and computer use in America (United States Department of Commerce [USDOC], 2002). This study, "A nation online: how Americans are expanding their use of the Internet," was released in February 2002.

A nation online gives the reader a look at how Americans are increasing their connectivity to information technology and how "these information technologies are rapidly becoming common fixtures of modern social and economic life, opening opportunities and new avenues for many Americans" (USDOC, 2002). The study found that over half the nation is online at home or at work and that the growth rate for Internet use is currently two million new Internet users per month in the United States (USDOC, 2002). In this context, the term "use" was based on Internet use at work, at school, and at home. The study provides an overview of expanding use of Internet and computers.

According to the Benton Foundation, "this latest report takes the position that the digital divide is no longer a major concern, a position belied by the facts" (2002). The Benton Foundation's analysis of the data reveals that gaps in access to technology among people of different geographic, financial, racial, and educational backgrounds are not abating. Further, compared to rural areas, twice as many urban households are connected to the Internet using high-speed broadband. This is an important statistic to realize because it is the rural areas that would stand to gain the most from the benefits of such high-speed connectivity (Benton Foundation, 2002). Clearly, these budget cuts potentially reduce

the ability of rural libraries and information centers to gain access to the technology.

According to Lawrence Gasman (1996), "the truth is that the Telecommunications Act of 1996 is a timid piece of legislation that barely acknowledges the competition that was emerging as the result of new communications technology." For some, the Telecommunications Act of 1996 may appear as the end of the road for communications policy reform. However, it is just the opposite; it is the beginning. Without necessary funding, though, this beginning will not reach its potential.

The Big Changes in Technology

A variety of technological changes are occurring. There has been great progress in the development of software and hardware. Cisler (1995) describes how CPU power doubles about every 18 months. Stewart Berlin, Internet Manager CSOnline in Seneca, PA, believes the single CPU power will continue to increase by some factor. It is not as clear, however, whether it will continue to double every month 18 months (S. Berlin, personal communication, April 3, 2002). Cisler (1995) argues that "the assumption is that the features of these powerful devices will be so attractive that the market will increase and the economies of scale will increase to lower the price of components" (p. 179). Although these changes are rapid and important, they affect rural areas only because these areas are denied access to them. Affordability and availability of high-speed networks does not change fast enough to allow rural areas to link up to these ever faster, ever-cheaper machines.

Technologically, all of technological services could be provided in most areas. However, cost makes them prohibitive in some areas. Providing any of these services usually requires a large investment of equipment by the local telephone company, and/or other service providers. Installation of several hundred thousand dollars of equipment necessary to make Integrated Services Digital Network (ISDN) or Digital Subscriber Lines (xDSL) services available to few people does not make good economic sense in most cases (S. Berlin, personal communications, April 3, 2002). Thus densely populated metropolitan areas get these new services first, and rural areas are added later. Today, most rural areas have some type of high-speed services available. ISDN, a system of digital phone connections allows data to be transmitted simultaneously across the world using end-to-end digital connectivity, and xDSL are typically mentioned their cost is usually less than other services (S. Berlin, personal communication, April 3, 2002). That is, one can now connect to the Internet through a regular modem, a local area network connection, a cable modem, or a DSL connection. Curt Franklin (2002) explains that

"DSL is a very high-speed connection that uses the same wires as a regular telephone line."

Recently, the U.S. Department of Commerce, National Telecommunications and Information Administration, the U.S. Department of Agriculture, Rural Development, and Rural Utilities Service (2000) published a report titled *Advanced telecommunications in rural America: The challenge of bringing broadband service to all*. In this report, they state that rural areas do lag quite far behind urban areas in broadband availability. It shows that only two technologies, DSL and cable modems, are being deployed at high rates. However, they are used less in rural areas for economic reasons. Statistics show that the "likelihood of receiving broadband service through DSL and Cable providers declines with population density" (USDOC et al., 2000). The report shows that suitability of various telecommunications technology is also dependant upon the characteristics of the rural area (USDOC, et al., 2000).

Several other components of broadband service such as fiber optic cable, multipoint multi-channel distribution systems, local multipoint distribution systems, and broadband data satellite systems are available (USDOC et al., 2000). Satellite systems offer yet another possibility for broadband service. Tachyon is one corporation that offers such a specialized system. It markets its services to Internet Service providers and offers to help Internet Service Providers (ISP) reach customers in more remote, rural areas.

One of the best-known satellite systems currently offering general Internet access to residents in the United States is DirecPC, which offers customers in remote areas the same quality of service provided to urban areas. The problem with such broadband service in rural areas lies with the last mile connection because it is the last mile that presents the real challenge to bringing broadband to all Americans (USDOC et al., 2000). As with everything else, deployment in urban and rural areas is not preceding at a comparable pace. However, many organizations are attempting to change this. For example, NTIA and the National Science Foundation (NSF) are trying to increase their support of research that could result in next generation broadband technologies for rural America (USDOC et al., 2000).

Because funding is one of the main hurdles to be crossed in bringing this technology to rural areas, there are several agencies that work to fund telecommunications in rural areas. Since Cisler's 1995 article, organizations have taken an active role in helping rural areas attain funding. Some such programs include the FCC's low-income assistance programs, Lifeline Assistance, E-rate for schools and libraries, grants

awarded by NTIA's Technology Opportunities Program, and the Economic Development Administration. The Rural Utilities Service Telecommunications Program also provides two sources of funding for advanced telecommunications infrastructure in rural America (USDOC et al., 2000).

Despite funding issues, there is now increased availability of local and regional ISPs in rural areas. In 1995, Internet access was not available or was just coming to a lot of rural areas. Today, however, it is much more common. Clarion, situated in Northwestern Pennsylvania, provides a good example of this trend. This little town has several ISPs from which residents can choose. CSOnline, Earthlink, Pennswoods.net, and USAChoice are all providers in this small town. With the growth of the Internet and increase of local ISPs, the availability of high-speed connectivity for schools and libraries has increased, states Berlin (personal communication, April 3, 2002). All of the libraries in Clarion County, Pennsylvania have or have available to them, some type of high-speed access.

Software is also more accessible and more advanced today. In terms of software, Cisler (1995) mentioned four important changes: "(1) digital compression; (2) intelligent agents; (3) better navigation tools; and (4) user configurable software" (p.180). Each of the four areas is important in software development and has shown significant improvements since 1995 (S. Berlin, personal communication, April 3, 2002). Even with all the changes in hardware, connections, and software in the past seven years, some of them still make little sense for rural areas because these areas lack the telecommunications infrastructure necessary to utilize them.

Community Networks and Network Systems

Cisler (1995) discusses in some detail the development of Rural Area Networks (RAN), a term that was first used in a 1991 Office of Technology Assessment (OTA) report. According to OTA, a RAN is
> formed around geographic boundaries rather than a single business or function, and it links as many types of users in a community as is possible: schools, libraries, businesses, government office, health clinics, and even individuals who want to publish information within the community or on the worldwide Internet (Cisler, p. 182).

This sort of network is built as part of a community effort rather than a single institution's effort.

The emphasis of a community network is on how the community can "provide information of interest to local residents and strive to reach a broad base of users with free or low-cost access" (Goldenstein, 1996).

Individuals without access to computers at home or at work can log on to the network at public terminals at the library or other centers. Community Networks cannot be imposed upon a community, so each networked community must be committed to making the network work (Goldenstein, 1996).

In *New Community Networks: Wired for Change* (1996), Douglas Schuler examines factors that are essential for the success of a community-based network by presenting a number of case studies such as the Big Sky Telegraph System in rural Montana. Because many people do not own a computer, easy access at bus stations, schools, senior centers and libraries must be provided for all. Since knowledge is power, more and more people can be empowered through the opportunities community networks can provide (Schuler, 1996). Since Schuler was at one time involved with the creation of a community network—the Seattle Community Network—he is able to discuss both long and short-term concerns involved in setting up such a network.

Cisler cites Telluride, Colorado as an example of a RAN. The city of Telluride was one of the first wired communities in the United States. This was made possible by a grant from the Colorado Advanced Technology Institute (Toasting Technology, 2000). A former gold and silver mining boom town, Telluride is now a thriving resort and ski community of about 1,500 to 2,000 people, many of whom are not natives. Telluride is a small town in the Rocky Mountains of southwestern Colorado. The town's population is "utilizing a very successful community network called the InfoZone" (McInnes, 1997). It was an odd place for the first wired community to happen because it is a town of a few thousand people truly in the middle of nowhere.

The InfoZone was designed to be of service to the diversity, health, and sustainability of the Telluride regional community. The first phase was implemented in 1993, and it provided a dedicated 56kb phone circuit connection through the Colorado Supernet to the Internet. There were also the beginnings of a community-wide education and information system (CWEIS) utilizing a BBS based Community Net with local access. This particular community network includes the public library, the school system, medical center, local governments, and consortium of community media (Lowenberg, 1995). Beginning in 1995 Telluride was tested for Tetherless Access, LTD's 128 kbt wireless MAN systems. Also, they began trials of two way interactive InfoZone services via the local co-axial cable TV system. Also, fiber optic trunk lines and various low-earth-orbit and microwave satellite bypass capabilities were put in place (Lowenberg, 1995).

The InfoZone was intended to "be a pragmatic vehicle for increased intelligence and opportunities in the Telluride Region, and it hopes to be an early model of "tele-community," that may be learned from by others" (Lowenberg, 1995). Interestingly enough, by the year 2000, Telluride no longer had the high-speed infrastructure it needed to support a lot of high technology companies. But, Telluride still maintains its reputation of being a center of high-tech culture (Toasting Technology, 2000). There are two reasons for this: Telluride's thriving technology and science conference business and the fact that a number of industry CEOs, who are also conceptual thinkers, live in the area (Toasting Technology, 2000).

Thus, Telluride is a good example of a community network. Community networks are "based in a physical place and their participants share a common neighborhood and city" (McInnes, 1997). Community networks link people with valuable information resources and each other. It is one way the national infrastructure idea can be taken to the individual and community level. They are usually nonprofit computer networks set up to serve the needs of a particular community.

Tetherless Access, LTD, who helped Telluride set up a wireless community WAN (Cisler, 1995), is one of several manufacturers of the unlicensed use of spread spectrum technology. Spread spectrum is a system in "which the transmitted signal is spread over a wide frequency band, much wider, in fact, than the minimum bandwidth required to transmit the information being sent" (Bible, 1999).

Spread spectrum technology began as a military communications system, but spread when "in 1985, the FCC (Federal Communications Commission) allocated three frequency bands for a radio transmission technique know as spread spectrum communications" (Spread Spectrum Information, n.d.). There are a number of advantages to spread spectrum technology, which include: that it does not require FCC site license, that it allows less interference, that it has multi-channel capabilities (Spread Spectrum Information, n.d.). Spread spectrum "cannot be said to be an efficient means of utilizing bandwidth. However, it does come into its own when combined with existing systems occupying the frequency" (Bible, 1999). The time has come to experiment with spread spectrum communications on a wider scale because of its unique qualities.

Tetherless Access, LTD also assists nonprofit organizations such as the Volunteers in Technical Assistance (VITA) to utilize Spread Spectrum technology in the dissemination of information. VITA's field projects are agriculture, rural rehabilitation, environment protection, enterprise development, and renewable energy. According to VITA's Homepage, they are the "world's first private voluntary organization to apply advanced microelectronics and space technology to the dissemination of technical

information for development and humanitarian purposes" (VITA, n.d.a). For example, VITA and Tetherless Access, LTD are collaborating "to blend spread spectrum and low speed satellite data communications for store-and-forward electronic mail in rural areas of the United States and developing countries without a good telecommunications infrastructure" (Cisler, 1995, p. 183).

VITA also participates in many other projects to aid in the distribution of information. To help people in developing countries improve the quality of their lives through the provision of information services, VITA has developed a global communications program (VITA, n.d.a). Various for-profit and nonprofit firms have launched networks of low earth orbiting (LEO) satellites that provide coverage for portable devices anywhere on this planet. Of course, this comes at a price. Since 1982, VITA has pioneered communication technology for rural development through its use of low earth orbiting (LEO) satellite access. VITA is now launching the VITA-CONNECT network, "which will provide humanitarian organizations and the communities they serve with an affordable solution for basic e-mail connectivity and a unique, low-bandwidth link to the VITA information services portal from anywhere in the world" (VITA, n.d.c).

VITA-Connect has been successful in meeting the communication and information service needs of community radio stations, schools, clinics, rural community and local government information centers, local development and humanitarian associations, and remote projection offices of international and national organizations. It is a sad fact of life that one quarter to one third of the world's population still lives in small, rural communities without affordable access to basic landline or wireless telecommunications services. In fact, a large proportion of these people will remain without this kind of access for another five or ten years (VITA, n.d.b). Working now with Wavix Inc., the VITA-Connect network is able to provide participating remote areas with data-only connectivity for annual cost share of only $495.00 (VITA, n.d.b).

Wavix sells data-transmission services with an emphasis on data-transmission to rural areas using proprietary satellite data communications systems. As stated on the Wavix web site, "Wavix has developed an inexpensive two-way satellite communication system specifically to support e-mail services and remote data collection" (Wavix, Inc., 2001). As mentioned earlier, Wavix works with VITA to provide technical and health support to people in remote areas and developing countries.

Other technology is important in rural markets. For example, Cisler (1995) discovered that there was also a growing interest in Frame Relay, a wire- and fiber-based service. Government agencies, Internet

service providers, and large corporations use frame relay, a fast growing wide-area technology in the United States. Frame relay helps decrease the cost incurred in connecting remote sites (Willis, 1996). Changes can be quickly programmed by the carrier, which saves the user high costs associated with running physical circuits and long installation delays (Willis, 1996). As Cisler (1995) suggested, frame relay offers a great deal in price for librarians planning networks because a single access line can support connections to many remote sites. Kitsap Regional Library in Bermerton, Washington was among one of the first libraries to make use of Frame Relay. Since then, Frame Relay has also been used to link other public libraries. An example of this is the Mississippi Information Network (MissIN), a statewide network connecting public libraries throughout the state, which was implemented in 1996 and finished by the end of 1997. They have six-frame relay "clouds" in the state (Mississippi Library Commission, 1997).

This technology that allows access in rural areas is an important component to the distribution of information. However, it is important to realize that not every library can be part of one of these cutting-edge systems. For other libraries, Cisler's (1995) suggestion that "most rural libraries should look to their state library for assistance in keeping up with the latest technology" (p.185), was a good one. In his article, Cisler (1995) interviewed a number of state agencies and telcomms and network workers. He asked them what technologies were exciting to rural libraries, what training options were available for isolated staff, any exemplary projects, and what the condition of rural communities and libraries was. His main discovery was that the state of the libraries varied greatly from state to state (Cisler, 1995, p. 185).

One state Cisler did not mention was Pennsylvania. When asked, Jim Hollinger, Public Library Advisor of the Commonwealth Libraries, responded to an e-mail by outlining some of the ways in which the Office of the Commonwealth Libraries (personal communication, 2001), has supported rural libraries in terms of access to the Internet and use of telecommunications technology. Hollinger pointed out that the federal Library Service and Technology Act (LSTA) provides a competitive grant program in which libraries can apply for funds. This act, signed into law by President Clinton on September 30, 1996, created a new federal-state-library funding environment that emphasized technological innovation, performance, and collaboration (McClure, C. R., & Bertot, J.C., 1997). Rural libraries often use LSTA monies to upgrade their automation systems, mount catalogs on the Internet, or access online databases (J. Hollinger, personal communication, February 6, 2002).

One example of a library utilizing this funding is the Clarion County Library System. This system serves a rural population of 49, 159 citizens in

five rural libraries. The system received LSTA funds in 2001 to set up an online Union Catalog. The money will be used to set up a Follett Web Catalog for Clarion Free Library, Foxburg Free Library, Knox Public Library, New Bethlehem Area Public Library, and Eccles-Lesher Memorial Library. Currently, Eccles-Lesher Memorial Library is the only library of the county system to have an online web catalog up and running. Clarion Free Library and Eccles-Lesher Memorial Library will be the only two to have live updates. The other three libraries will have to upload their records monthly. Also, the County Library System received a $50,000 LSTA grant to purchase technology-related books and software for the five libraries.

In addition to LSTA funding, there have also been advances in libraries' technology due to increases in State Aid in Pennsylvania. In the early 1990s, Commonwealth Libraries worked with Bell Atlantic to provide stand-alone computer workstations to be connected to the Internet and E-mail (J. Hollinger, personal communication, February 6, 2002). The project began in 1991 when the Health Services Libraries Consortia (HSLC) of Philadelphia were selected to begin "to provide text-based access to the Internet" (Fogarty, & Misiewiez, 1998). By early 1995, Bell Atlantic demonstrated interest in creating a project to provide Internet access to Pennsylvania Libraries (Fogarty & Misiewiez, 1998). Gary Wolfe, who has since become the Commissioners of Libraries, pursued Bell Atlantic because he was interested in bring the Internet to small rural libraries. Wolfe and Barbara Cole who is Director of Library Development, worked together to write a $750,000 grant proposal, which was approved and funded by Bell Atlantic (Fogarty, & Misiewiez, 1998). The Library Development Office received one hundred eighty-eight applications for the funding, all of which were accepted in 1996.

The Commonwealth Library's goals were: "to provide public access to the Internet through Pennsylvania's public libraries, to provide library users with timely information, [and] to ensure that trained library staff are available to help the public" (Fogarty & Misiewiez, 1998, p. 34). Further, an LSCA Title II grant for District Library Centers was written to provide matching funds as well as a parallel project to the Bell Atlantic Grant (Fogarty & Misiewiez, 1998). Twenty-eight District Library Centers received LANs and high-speed Internet connections as a result of this funding (Fogarty & Misiewiez, 1998). The Commonwealth Libraries hired the Schuylkill Intermediate Unit in 1996 to implement these two projects under the direction of James S. Fogarty (Fogarty & Misiewiez, 1998). By October of 1996, the pre-configured computers were sent to the libraries (Fogarty & Misiewiez, 1998). For some libraries, these computers meant their first access to the Internet.

To be awarded the computers, libraries had to agree to provide a dedicated telephone line to be used only for accessing the Internet, make the PC available to the public during the hours the library is open, publicize the project to the media, send at least one representative to training, pay start-up cost and monthly Internet access fees, [and] participate in the project for two years following the grant year (Fogarty & Misiewiez, 1998, p.35).

To help the Office of Commonwealth Libraries assess the impact of the Internet access in Pennsylvania public libraries, an evaluation of the project was completed. Charles L. McClure of Syracuse University and John Carlo Bertot of the University of Maryland, Baltimore County were contracted to do this study for the Commonwealth Libraries. This evaluation, known as *Linking people to the global networked society, evaluation of the Online at PA Libraries Project: public access to the Internet through public libraries*, came out in October of 1997. McClure and Bertot (1997) found that the goals of the original project were indeed accomplished.

The project influenced these communities in many ways. Commonwealth Libraries were able to remove some of the isolation of these rural communities by providing a link between the library's service area and resources, information, and ideas in a global setting. The technology helped bring new users who might not otherwise have used traditional library resources and services into the libraries. Due to the Online at PA Libraries Project, "two-hundred fifteen different libraries have now installed three hundred twenty-five computer systems" (Fogarty & Misiewiez, 1998, p.37). Most of these libraries were in rural areas. Without this initial grant, these libraries may have never been able to afford a computer system. The project opened a new forum for access in libraries in Pennsylvania and assisted in fulfilling the information needs of hundreds of thousands of Pennsylvania residents (Fogarty, & Misiewiez, 1998).

The next step for the Online at PA Libraries Project was a $250,000 technology grant from Bell Atlantic, matched by $250,000 in federal Library Services and Construction Act Funds. In 1998, this grant enabled 20 public libraries in the Commonwealth of Pennsylvania to acquire the necessary training and equipment to provide their communities with multiple simultaneous public accesses to the Internet. One of the participating libraries was the Clarion Free Library in Clarion, PA (Pennsylvania Department of Education, 2002, Online). In 1998, the Clarion Free Library received ten Gateway computers, a laser printer, and a content server to help them increase their connectivity to the Internet. This project was not the end of improvements brought to libraries by state funding.

In his 1998-1999 budget, former Governor Tom Ridge made a $7 million technology initiative available to public libraries for information technology and to enhance technological capabilities. The program, called Library PEN/Connect, has benefited more than 250 Pennsylvania public libraries and their communities (Pennsylvania Department of Education [PDOE], 2002a). Because they received these funds, public libraries in seventeen locations now have web-based systems which allow patrons remote access to the library catalog via the Web. Additionally, fifty-one public libraries received stand alone, dial-up computers to provide public access to the Internet, and thirty-one public libraries installed LANs to allow multiple users simultaneous access to information on the Internet (PDOE, 2002a).

Along with this additional technology and connectivity came many benefits to library users. According to the United States National Commission on Libraries and Information Science (NCLIS), there are three most important benefits of connecting to the Internet (1996). The first benefit is that the public can go to the library and go online free of charge (Saupp, 1997). Second, the Internet allows more convenient means of communicating with other professionals from any location (Saupp, 1997). The third and most important benefit of libraries providing access to the Internet is that it can be used as another tool to augment reference service (Saupp, 1997). As Saupp writes, one fact remains—"the status quo of Pennsylvania's rural libraries will never be the same again. Any further speculation will be history" (p. 63).

Because of the advancement of technology, Pennsylvanians can now access information within their libraries and other vast global resources. Libraries serve as access points for information technology. Governors Tom Ridge and Mark Schweiker have made several investments to assist Pennsylvania libraries with their development of technology capabilities (PDOE, 2002b), including Online at PA Libraries, joining the SSHE Keystone Library Network, Library Services and Technology Act grants, Library PEN/connect, and the Pennsylvania Online World of Electronic Resources (POWER).

The POWER Library Databases provide a wealth of online information that would cost individual libraries about $40,000 to purchase on their own (J. Hollinger, personal communication, February 6, 2002). For example, ACCESS PA is one of the POWER databases used for interlibrary loan. ACCESS PA is an initiative of the Ridge Administration, completed with the support of the Pennsylvania General Assembly, and is "offered as a service of Pennsylvania's public libraries, school libraries" (Commonwealth Libraries, 2002). The databases of the POWER Library are available at schools, libraries, the State Library and now at home through PA library Web homepages. To access the

databases, library patrons must simply get a library card from their local libraries. Then, a patron can simply log on to his/her library's website, enter his/her library card number, and access the databases. Patrons can also utilize terminals at the library to access the databases.

In addition to providing the means for technology, the Commonwealth Libraries also provides an annual Technology Conference for libraries in the state. One such conference is a statewide teleconference to be aired on Tuesday, May 23, 2002, to explain a new State Telecom Contract to schools, libraries and local governments. It is going to be hosted by the Office of Educational Technology. The Commonwealth of Pennsylvania began a major competitive bidding process that would consolidate twenty-two separate telecommunications contracts into one. The goal is "to use the purchasing power of the Commonwealth to gain a cost savings for state government, accelerate the deployment of broadband and advanced services throughout Pennsylvania, and to provide lower pricing for other groups such as public schools, libraries and universities" (PDOE, 2002d).

Finally, the Commonwealth Libraries has worked with the Bill & Melinda Gates Foundation of Seattle, Washington to apply for computers and computers labs for libraries in Pennsylvania. Pennsylvania is the 31st state to be a recipient of this funding, and Pennsylvania libraries received grants totaling $5.5 million (Colombo, 2002). The Bill & Melinda Gates Foundation's Digital Divide initiatives include the Library Program (Digital Divide Network, 2002). The Library Program is the Gates Foundation's "$200 million commitment to provide computers with Internet access to every eligible public library in the U.S. and Canada" (Digital Divide Network, 2002). The Foundation offers grants to help patrons to navigate the Internet and use computers, provides technical training, ongoing technical assistance and support to grantees (Digitial Divide Network, 2002). Moreover, the Library Program has specifically designed a technology model for libraries. This model comes pre-configured with children's, reference, and productivity software installed at the factory. Each model employs connectivity technology depending on the service population of the library and on the type of Internet connection the particular library plans to use (Bill & Melinda Gates Foundation, 2001).

Pennsylvania libraries were given notice in 2001 from the Office of Commonwealth Libraries that the Gates' Foundation was coming to Pennsylvania and that the libraries should fill out the necessary grant application. The grants given to these libraries included hardware and software for the libraries' use. For example, the Clarion Free Library, headquarters of the Clarion County Library Association, was awarded two grants from the Bill and Melinda Gates Foundation. One was a

multi-workshop grant of four Gateway tower computers with flat screen monitors, floppy drive, DVD drive, hard drives with software pre-loaded, sound card, and Ethernet card (10/100). It also came with a Hewlett Packard laser printer. Because the Oil Creek District Center did not have the space, the Commonwealth Libraries offered a computer lab to the Clarion County Library System. The lab comes with eleven Gateway tower computers with flat screen monitors, a content server, two switches, a projector, a Hewlett Packard Laser printer and a network in a box kit to hook up the computers within the library.

Further, the Foundation provides support to train the staff during installation as well as ongoing network technical support to libraries. The library is responsible for ensuring it purchases lab furniture, has the proper wiring, and subscribes to the Internet. When the lab is not being used for workshops, conferences, and training, the Clarion Free Library and others libraries like them must allow access to the computers to the general public during business hours. Mary Elizabeth Colombo, Director of the B.F. Jones Memorial Library in Pittsburgh, PA, and president of the Pennsylvania Library Association best expressed the impact that these grants have had upon libraries when she wrote

> thanks to the Bill and Melinda Gates Foundation, many Pennsylvania public libraries will provide state-of-the-art computer hardware and software to their communities. The economically poor and those challenged by rural life will no longer need to be 'informationally poor.' With the Gates Foundation Grant and the efforts of our public libraries, we will bridge this digital divide. (2002, p. 3)

The Foundation's grants are not, however, the only technological assistance being offered to libraries. In early April 2002, Pennsylvania libraries received an e-mail from Glenn Miller, Executive Director of the Pennsylvania Library Association containing information from Julie Tritt Schell from the Office of Educational Technology (G. Miller, personal communication, April 10, 2002). The E-mail concerned a State Digital Grant. The Department of Community and Economic Development (DCED) has released a grant RFP for a Digital Divide initiative worth $8 million over the next two years. Economic development and nonprofit community organizations and educational institutions are eligible to apply. Awards will range from $25,000 to $500,000, and there is no grant deadline.

This funding is being offered because DCED feels that computer literacy and access to the Internet are vital. The U.S. Department of Commerce reports that low-income families are much less likely to have Internet access than higher income families. These grants will be awarded

to qualified organizations that bring digital technologies, including increasing high-speed computer literacy skills and Internet access to low-income Pennsylvania residents (USDOC, 2000).

As one can see, rural libraries in Pennsylvania have looked to their state library for assistance and have found it. There is a variety of funding available to rural libraries, and the Office of Commonwealth Libraries supports individual libraries in finding and utilizing funding from LSTA grants, private companies, foundations, and other agencies of the federal government such as the Rural Utilities Commission and the National Telecommunications and Information Administration (NTIA). NTIA is an agency of the U.S. Department of Commerce that acts as "the Executive Branch's principle voice on domestic and international telecommunications" (NTIA, n.d.). NTIA's goal is "providing greater access for all Americans [by] working to ensure that all Americans have affordable phone and cable service [and] helping to bring the benefits of advanced telecommunications technologies to millions of Americans" (NTIA, n.d.). Through infrastructure grants, NTIA tries to bring advanced telecommunications technologies to millions of rural Americans. It is NTIA's goal to encourage the development and implementation of new and emerging telecomm technologies (NTIA, n.d.).

Thus, modern utilities have come to rural America through some of the most successful government initiatives in American history. Most of them were carried out through the United States Department of Agriculture (USDA), and their workings with public bodies, for-profit utilities, nonprofit associations and rural cooperatives. However, federal LSTA grants, state grants, and grants provided by private organizations have also played important roles in the development of technology in the rural setting.

Technology in Schools

Former Vice President Al Gore wrote that "today communications and information technology are transforming our economy and our society, changing the way we live, the way we work, and the way we relate to one another" (Gore, 1998). Because of his interest in how technology affects our daily lives, Gore also wanted to learn how increased technology affected children. Studies showed Gore that children in technology-rich learning environments tend to have higher attendance rates, show more enthusiasm, and display a greater capacity to communicate effectively about complex problems. Gore and Clinton worked hard to enable schools and libraries to have affordable access to telecommunications and information technology. This was one of the reasons for the E-rate program. Gore (1998) concluded, "We must give our children—all

of our children—the chance to succeed in the information age, and that means giving them access to the tools that are shaping the world in which they live."

Connecting schools to the Internet "is becoming increasingly important, especially for low income and rural communities" (Wired Schools, 2001). Familiarity with technology is fundamental to allowing children to be competitive in today's job market (Wired Schools, 2001). Because students come from various backgrounds and economic statuses, educators have found that "computer use in the classroom is an effective way of introducing technology into students' lives" (Wired Schools, 2001). Additionally, studies have shown that at-risk students are motivated to focus more on their education when computers are used in the classroom, making them feel useful (Wired Schools, 2001). Small communities and rural schools can gain access to additional educational resources by integrating the Internet into their schoolwork. By exposing students to ideas and opportunities, the Internet can provide global awareness for small town children.

Developing a plan for the type of technologies needed is a simple beginning step in getting a rural school wired (Wired Schools, 2001). Having a technology plan helps schools make sure the technology purchased is current and used effectively. Outdated computers need to be replaced on a fairly regular basis, and computers and technology should be readily accessible. Teachers will need to be familiar with current technologies. Teachers will "also need to know how to integrate the technology into the curriculum" (Wired Schools, 2001). Schools will need to have a computer technician who is qualified to fix networking problems and keep the technology in good working order (Wired Schools, 2001).

Grant money from both public and private entities is available to help schools become wired. These funds include grants from the U.S. Department of Education, state and government grants, and community support (Wired Schools, 2001). As mentioned earlier, additional funding is available through the E-rate program. E-rate is a response by the government to the tremendous potential of the Internet as a tool for education and the growing divide of use between rural and urban schools. E-rate is a necessary condition to spur telecommunications infrastructure development in poor communities.

The Keystone Central School District (KCSD) is a good example of a school that uses technology to support communication among teacher, student, and parent, to aid in learning at home, and to support classroom instruction. KCSD, located in the community of Clinton County, Pennsylvania, is geographically the largest school district in the

Commonwealth of Pennsylvania (Yoho, 1997). Educators saw that Pennsylvania was "among the top five states who have most school districts suffering from 'technology poverty" (Yoho, 1997, p. 12). Because Pennsylvania ranked 37th by its ratio of computers to students, 12:1 in 1995, this school district decided to do something about it (Yoho, 1997).

The Keystone Community Network (KCNet) is a rural area network that offers electronic services for the economic, educational, and cultural advancement of the local communities in Clinton County. It was established to "provide the infrastructure for electronic access to local, state, and local government" (Foust, 1999, p. 31). KCnet was incorporated in June 1995 as a non-profit organization and is involved in the educational effort of Keystone Central School District, Bellefonte Area High School, Lock Haven University, Centre County Vocational-Technical School and State College School District (Foust, 1999).

This KCnet Consortium was funded and formed by the Link to Learn Test Bed Initiative (Yoho, 1997). It has been successful in helping KCnet rural area network expand into Centre and Clearfield counties (Yoho, 1997). This rural partnership has evolved into a transparent virtual community that has been empowered by its ability to readily access current information for cooperative decision-making and cooperative learning. This community network has shown that schools and their communities have to have communication, collaboration, cooperation, commitment, and creativity.

In his January 1997 State of the Union address, President Clinton declared that classrooms should be online by the year 2000. He also advocated that teachers and their students should be computer literate. Since then, private companies have been kicking in millions of dollars for schools. Monies from local and state governments are pouring in as well. Gore (1998) suggested that today's biggest challenge should be helping children grow up in a world in which communications and information technology dominates the economy and helps shape society. American children must be given the opportunity to succeed in the information age, so we must provide all children access to the necessary tools that are shaping the world in which they live (Gore, 1998).

Unfortunately, schools, like public libraries, find that there are strings attached to the federal funds they receive. For instance, they have to filter Internet content or lose their funding. Congress passed an appropriations bill that will require most of the nation's public schools to block obscenity and child pornography or any other material deemed inappropriate for children. Free speech advocates are, of course, "planning lawsuits to challenge the measure, which they say violates the First Amendment

(Bowman, 2000). However, some say that there is less cause for alarm than these opponents might think. Senator John McCain's aide David Crane, said the "bill is intentionally broad, leaving local communities and schools to pick their own technology and define terms such as 'obscenity'" (Bowman, 2000).

New Roles for Libraries and Librarians in the Information Age

Cisler (1995) had been asked by a few librarians to define their role in a rapidly changing technological climate. He stresses that although librarians may not be technologically minded individuals, they are organized and can be of great assistance to others in the community who may want to network. Thus, one new role for libraries and librarians is that of organizer.

A second role a library can play is by offering a meeting place. Most libraries have meeting rooms where groups who are planning a network can meet to get started. In addition to providing a centralized place to meet, libraries can provide the role as facilitator. Librarians are good people to invite representatives from schools, cellular and cable companies, local BBS system operators, satellite and wireless companies and the power company to come to the library and meet with interested parties in the community. Librarians are also excellent sources to utilize in bringing in speakers and beginning dialog. Seeing librarians serve in this capacity, people will begin to relate change and foresight with the library. Also, librarians are the individuals who can work with the State Library and state and local government representatives.

If community projects are already underway to network the community, both the library and the school should become active participants in the project. They can provide articles and news items that describe systems that could be models for the particular area. Librarians and school personnel can be instrumental in involving and informing others in the community. They can do this by offering to distribute surveys, post meeting minutes, and just help get the word out. Cisler (1995) recommended, too, that libraries should examine their role in providing Internet access and services. Often, libraries and schools are expected to fulfill the role of trainer and online support to their patrons. There are a great number of rural people who do not have the Internet in their home, nor do they know who to use such technology. If librarians are trained, they can be better equipped to work with these people so they can connect with the rest of the world.

Another option for the library is to allow the library building to serve as the holding site for telecommunications (Cisler, 1995).

This is something that the Clarion Free Library in Clarion, Pennsylvania recently did when they accepted a lab from the Bill and Melinda Gates Foundation. Having library information online lends stature to the library as well as it being excellent advertising. Representatives of schools, civic groups, and libraries should be vigilant and informed because they will be viewed as guides to the development of policies and technologies (Depo, 1999).

New technology and electronic information services are essential tools for operating in today's society. The only problem with it is in its access. Access to telecommunications is essential. Schools and libraries can help. Depo (1999) suggests that we need to empower citizens by teaching them "about new communications technologies and their potential uses" (p.56). This can be done by holding workshops and meetings that bring together "representatives from different local institutions with others who have successfully implemented telecommunications" (Depo, 1999, p. 56).

Today, it is imperative that schools and libraries get involved in telecommunications by providing access to their communities, devising plans for community migrations toward the vision of advanced universal service, and looking for ways to make themselves major partners in demand aggregation strategy.

Conclusion

Our values, which predate technological innovations, are key factors in determining what kind of technology we develop and how we use it. This paper has shown that the Internet has become an extremely popular tool that is accessible to Americans in communities across the United States. About half the population of this country is now online. As a result of this, the United States is becoming more and more a national online. We have become a nation that has the potential to take advantage of the information resources provided by the Internet, and we are a nation trying to develop the technology skills to compete in a global economy.

The ever-expanding use of Internet at work, schools, and libraries has played a very significant role in the development of an online nation. According to a telephone study completed by the Bill & Melinda Gates Foundation's U.S. Library Program in 2000 and 2001, Americans believe "free access to computers and the Internet is vital, and they are willing to pay higher taxes to support it in public libraries" (Americans, 2002, p. 20). ALA released the results of the study conducted by the University of Washington in March 2002. Researchers discovered that computer services in public libraries have been so successful that they should be

maintained and funded by the government (Americans). In fact, they found that those who earn less than $15,000 a year were willing to give more to ensure public access (Americans, 2002). Richard Akeroyd, the Executive Director of the Foundation's Library Program, "hopes the survey will be useful to libraries as they approach funding authorities and potential donors" (Americans, 2002, p. 21).

Further, this paper has focused on how the presence of computers and the Internet at schools is making resources available to children who can't access them at home. Because schools are becoming wired, like libraries, means that American children can now can the familiarity and skills with these new and ever changing technologies, technologies which will allow our children to find jobs in the 21st Century.

Moreover, more Americans are using the Internet and computers at work and school. The roles for libraries and teachers have developed because of technology. Libraries can provide help, advice, and collaborative help. As Cisler (1995) concluded, "potential causes, grant partners, and network collaborators will vary, but individual efforts to reach out, learn more, become involved, and offer the best services your library can manage will win friends, support, prestige, and perhaps an important place in the growing web of networks" (p.189). Because of our dedication to providing access to technology to all Americans, our nation has passed a significant milestone. The majority of Americans have the ability to use the Internet and computers at work, at school, or at work. In other words, Americans have access to the Internet somewhere.

Over time, declining prices, increased availability in libraries and schools and wider applications in many occupations have combined to reduced inequality in both Internet and computer use. This, in part, is due to the library, schools and wired communities and the changing communications landscape.

References

Americans want free access, says Gate Foundation study. (2002).
American Libraries, 33(5), 20-21.

Benton Foundation. (1996). Public interest advocates, Universal Service
and the Telecommunications Act of 1996. Retrieved March 15, 2002,
from http://www.benton.org/Library/Advocates.advocates.html

Benton Foundation. (2002). Bush abandons national strategy to bridge
Digital Divide. Retrieved February 14, 2002,
from http://www.benton.org/Press/2002/pr0211.html

Bible, S. (1999). Spread Spectrum—it's not for breakfast any more.
Retrieved February 5, 2002,
from http://www.tapr.org/tapr/html/ss.qexss.html

Bill & Melinda Gates Foundation (2001). Support for U.S. Library
Program grantees: Introduction to grant configurations.
Retrieved January 25, 2002, from http://www.gatesfoundation.org/
libraries/libraryprogram/granteesupport/computermodels/default1.htm

Bowman, L. M. (2000, December 19). New bill requires net filters in
libraries, schools. Retrieved April 1, 2002,
from http://news.com.com/2009-1023-250082.html

Cisler, S. (1995). The library and wired communities in rural areas.
Library Trends, 44(1), 176-189.

Colombo, M. E. (2002, March). President's column.
PaLA Bulletin, 57(3), 2-3.

Commonwealth Libraries. (2002). POWER Library.
Retrieved March 4,2002, from http://www.powerlibrary.net

COPPA and CIPA Laws. (2002). Retrieved March 30, 2002,
from http://www.4kids.org/safesurf/adults/coppa_cipa.shtml

Depo, G. (1999). What communities need to do.
Rural Libraries, 19(2), 46-64.

Digital Divide Network (2002). Bill & Melinda Gates Foundation.
Retrieved January 24, 2002,
from http://www.digitaldividenetwork.org /content/sections/
partner_gates.cfm

Federal Communications Commission. (2002). Universal service.
Retrieved January 26, 2002,
from http://www.fcc.gov/wcb/universal_service/welcome.html

Fogarty, J. S., & Misiewiez, M. (1998). Online at Pennsylvania Libraries. *Rural Libraries*, 18(2), 34-38.

Foust, S. (1999). Kcnet: A model for rural connectivity. *Rural Libraries*, 19(2), 31-45.

Franklin, C. (2002). How DSL works. How stuff works. Retrieved April 7, 2002, from http://www.howstuffworks.com/dsl.htm

Gasman, L. (1996). The Telecommunications Act of 1996. *Regulation*, 19(3). Retrieved March 30, 2002, from http://www.cato.org/pubs/regulation/reg19n3d.html

Goldenstein, C. (1996). Community networks in rural areas: Extending the information superhighway to America's back roads. *What are community networks?* Retrieved March 14, 2002, from http://www.nortropic.com/lis341/cgold/commnet.html

Gore, A. (1998, May 25). Should schools be wired to the Internet? *Time*, 151(20). Retrieved April 9, 2002, from http://www.time/time/magazine/1998/dom/989525/nation.should_schools_be31.html

Judges' remarks give optimism to opponents in CIPA trial. (2002, May). *American Libraries*, 33(5), 18-19.

Kornbluh, K. (2002). Telecommunications infrastructure. *Digital Divide Network*. Retrieved March 15, 2002, from http://www.digitaldividenetwork.org/content/Stories/index.cfm?key=213

Library officials head to court to protest 'net filters'. (2002, March 25). *The Derrick*, 8.

Link 2 Learn. (1999). KCnet: The fiber model for rural connectivity. Retrieved March 29, 2002, from http://www.lhup.edu/kcnet

Lovigilo, J. (2002, March 25). Porn filtering hearings today. *Pittsburgh Post-Gazette*, A7.

Lowenberg, R. (1995). Telluride InfoZone. Retrieved March 13, 2002, from http://www.lanl.gov/sfc/95/bios/papers/infozone.html

Mayo, D., Public Library Association, & Nelson, S. S. (1999). *Wired for the future: Developing your library's technology plan*. Chicago: American Library Association.

McClure, C. R., & Bertot, J. C. (1997). Linking people to the global networked society: Evaluation of the Online at PA Libraries Project. Retrieved February 4, 2002, from http://research.umbc.edu/~bertot/OnLinePA.html

McInnes, A. (1997). The agency of the InfoZone: Exploring the effects of a community network. *First Monday*, 2(2). Retrieved March 13, 2002, from http://www.firstmonday.dk/issues/issue2_2/mcinnes

Mississippi Library Commission. (1997). Mississippi Information Network (MissIN). Retrieved April 4, 2002, from http://www.mlc.lib.ms.us/mississippi_information_network

National Center for Small Communities. (2002). Attracting high-speed telecommunications. In *Getting Online: a guide to the Internet for small town leaders* (Chap. 5). Retrieved March 17, 2002, from http://www.natat.org/ncsc/Pubs/Getting Online/Chapter_5.htm

Nye, D. E. (1999). *Consuming power*. Cambridge, MA: MIT Press.

Nye, D. E. (1990). *Electrifying America: social meaning of a new technology*. Cambridge, MA: MIT Press.

Pennsylvania Department of Education. (2002a). Library PEN/Connect. Retrieved April 5, 2002, from http://www.l2l.org/library/penconnect.html

Pennsylvania Department of Education. (2002b). Library Services and Technology Act (LSTA). Retrieved February 13, 2002, from http://statelibrary.pa.us/libraries/cwp/view.asp?a=5&Q=40316

Pennsylvania Department of Education. (2002c). Online at PA Libraries. Retrieved April 5, 2002, from http://www.l2l.org/library/libonline.htm

Pennsylvania Department of Education. (2002d). State Telecom contract. Retrieved April 5, 2002, from http://www.l2l.org/telecom_sum.html

Peterson, I. (2002, April 1). Trial shows library policies on online porn differ. *Pittsburgh Post-Gazette*, A5.

Reuters. (2002). Panel to rule on net porn filters at libraries. Retrieved April 9, 2002, from http://digitalmass.boston.com/news/2002/04/05/porn_libraries.html

Saupp, K. (1997). Connections: Internet in rural Pennsylvania libraries. *Rural Libraries*, 17(1), 51-67.

Schuler, M. (1996). *New community networks: Wired for change*. Reading, MA: Addison-Wesley.

Spread Spectrum information. (n.d.). *Spread Spectrum technology*. Retrieved February 5, 2002, from http://www.kmj.com/proxim/pxhist.html

Staihr, B. (2001, February). The success of "E-rate" in rural America. *The Main Street Economist*, 1-4.

Toasting tech in Telluride. (2000, October). *ColoradoBiz*, 27(10), 66.

United States Department of Commerce, National Telecommunications and Information Administration, United States Department of Agriculture, Rural Development, & Rural Utilities Service. (2000). Advanced telecommunications in rural America: The challenge of bringing broadband service to all. Retrieved March 1, 2002, from http://www.mtia.doc/reports/ruralbb42600/pdf

United States Department of Commerce. (2000). Americans in the information age: Falling through the net. Retrieved April 15, 2002, from http://www.ntia/doc.gov/ntiahome/digitaldivide

United States Department of Commerce. (2002). A nation online: How Americans are expanding their use of the Internet. Retrieved February 11, 2002, from http://www.ntia.doc.gov/ntiahome/dn

United States National Commission on Libraries and Information Science. (1996). *The national survey of public libraries and the Internet: Progress and issues*. Washington, D.C.: GPO.

VITA Volunteers in Technical Assistance. (n.d.a). Communication technology. Retrieved March 16, 2002, from http://www.vita.org/communic.htm

VITA Volunteers in Technical Assistance. (n.d.b) Low cost communication and information services for remote areas. Retrieved March 17, 2002, from http://www.vita-connect.org/brochure.htm

VITA Volunteers in Technical Assistance. (n.d.c). VITA-Connect. Retrieved March 16, 2002, from http://www.vita-connect.org/brochure.htm

Wavix, Incorporated. (2001). Retrieved April 4, 2002, from http://www.wavix.com

Willis, D. (1996). The interactive network design manual: Building a f rame relay network. Retrieved February 2, 2002, from http://www.networkcomputing.com/netdesign/frame1.html

Wired Schools. (2001). Retrieved April 9, 2002, from http://www.girltech.com/Teachers/TE_teachers_wired.html

Yoho, J. (1997). KCNet: A rural area network model. *Rural Libraries*, 17(2), 7-24.