part1
Realizing the Benefits

The promise is yet to be met, but unlike the latest whiz-bang toy, hot new sports car, or bell-bottom pants, the Information Superhighway is not a fad. It's here to stay. To be sure, over the years there will be pot holes that need to be filled, bridges to be replaced, new roads, and vehicle destinations we can't imagine today, but the Superhighway and the information that flows within its confines will only get better with age. And in what will seem like the wink of an eye, just like the telephone, the automobile, the airplane, the clothes dryer, and the microwave oven, people will wonder how they got along without it.

In fact, in 1995, 27 million U.S. workers were using e-mail in the workplace, just under a sixth of U.S. homes had at least one computer connected to a modem, and more than 12 million Americans were using the Internet each day.[1]

Most people are using some aspect of the Superhighway whether they know it or not. Regardless of how remarkable the current uses may be, they are only the tip of the iceberg.

The technology and the information it carries is the new vehicle for social and economic activity. The Information Superhighway will affect and improve the lives of individuals of all ages, as well as the Nation's educational system, business environment, and the very fabric of community life. It has already started, in many places.

ENHANCING AND IMPROVING THE LIVES OF INDIVIDUALS

The Superhighway is helping bring people and communities together. A 1995 CommerceNet/Nielsen study estimated that 37 million people have access to the Internet. Americans are sending messages to more than 60,000 bulletin boards every day.[2] Parents are trading electronic messages with their own parents and grown children who have left the nest to begin adult lives or college careers. Friends are finding it easier to keep up longstanding relationships because they can send a message nearly instantaneously, without worrying about time zone differences or whether someone will be home to pick up the phone. And, people of all ages are widening their circle of friends by making new friends—Cyberpals, you might say—online. For many people, going online and checking for e-mail has become a highlight of the day—just like going to the mailbox was in years past.

Obtaining Job Skills for a Changing Economy

As the 21st century approaches, a well-developed mind, knowing how to learn, and the ability to put knowledge to work will increasingly determine success in the workplace; fully 60 percent of jobs in 2000 will require a working knowledge of information technologies. Young people who leave school without the knowledge and foundation required to find and hold a good job will pay a high price—throughout their working lives.

When Seniors Go Online

According to the American Association of Retired Persons, the largest organization of senior citizens in the Nation, 2 million of its 33 million members are computer users. For these seniors, computers are not just a way to learn or earn, they are a way to get back into life, make new friends, keep up with their families, and recreate. Seniors are doing everything from monitoring investments, tracking genealogy, producing memoirs, starting postretirement businesses, and chatting online. Take the story of Rick and Rita Hanson.

In 1993, Rick Hanson, a former truck mechanic, and his wife Rita sold their home in Bellingham, Massachusetts, purchased a 28-foot-long mobile home and set out on a nationwide tour. The two felt comfortable making this lifestyle change because of SeniorNet, the San Francisco-based network designed to introduce those over 55, those not "raised with computers," to the joy of being online. Says Rick, "We wouldn't have considered this trip if it weren't for SeniorNet . . . If one of us got ill what would the other do? But no matter where we are in the U.S., we're within 100 miles of friends." This traveling couple has gone from Thanksgiving in Las Vegas with 60 online friends to a wedding of 2 SeniorNetters in Michigan. "Lord willing," says Rick, "we'll see all 350 people in our computer family."—*John F. Dickerson, Time Magazine, Special Issue: Welcome to Cyberspace, "Never Too Old." Spring 1995, p. 41.*

Four years ago, the Secretary's Commission on Achieving Necessary Skills met with business owners, public employers, unions, and workers and supervisors in shops, plants, and stores to determine what the demands of this Nation's workplaces would be in the next decade and whether young people are being properly prepared to meet those demands.[3] The Commission reported that, in addition to technical knowledge, to succeed in the workplace of the 21st century every American will need to know how to:[4]

- Identify, organize, plan, and allocate resources;
- Work with others;
- Acquire and use information;
- Understand complex interrelationships among social, organizational, and technological systems; and
- Work with a variety of technologies.

The foundation for these competencies is built on three types of skills:

- The ability to read, write, perform arithmetic and mathematical operations, listen, and speak;
- The ability to think creatively, make decisions, solve problems, visualize, learn outside of the classroom environment, and reason; and
- Personal qualities, including responsibility, self-esteem, sociability, self-management, and integrity and honesty.

Whether in the classroom, in a library, in a community center, or at home, every American who goes online is acquiring many of these skills—often without ever knowing it.

Gaining New Opportunities for Lifelong Learning

Recent research has shown that people who read, take up new hobbies, and find other ways to stimulate thought processes—that is, engage in lifelong learning—are happier, more productive, and have better mental health. Those who engage in the lifelong learning process will find themselves empowered to be creative and to capitalize on unexpected opportunities—their professional skills will continue to be updated; they will find new avenues for fun and entertainment for the family; they will find it easier to keep up on local and national issues; and they may take full advantage of new, easily accessible commercial and government services.

The Information Superhighway promotes lifelong learning because it promotes collaborative learning; can provide access to online digital resources; provides new opportunities to gather data for, as well as create and disseminate, video, writing, and music projects; and can take people to places to see things that they could only have read about before—through "virtual" field trips to museums and science exhibits—without leaving their homes, schools, workplaces, or communities.

Improving Job Skills, Career Advancement, Employment Opportunities, and Professional Development

It used to be that hunting for a job consisted of networking and hunting through the employment section of the newspaper or the career opportunities sections of job-specific periodicals. Today, in many communities, employers are also posting job openings on the World Wide Web. For employers, using the Information Superhighway to advertise openings has three advantages: they can reach a nationwide audience; they can be assured that prospective employees are conversant with Information Age technologies (after all, a person has to know how to travel on the Information Superhighway to find the job offering); and job offerings can be posted at any time, for however long it takes to find the right employee, at very low cost. In California's Silicon Valley these days, the best jobs are now posted on the World Wide Web. Furthermore, in Sacramento, California's State capital, job hunting accounts for the bulk of uses of the main library's online facilities.

For many individuals, gaining the new skills required for career advancement and professional development often meant time away from work and family to travel to a distant location and attend a professional training seminar or conference. Because of the costs associated with travel, housing, and conference fees, in these times of tight budgets, the combination of costs and lost time on the job have caused many employers to limit or eliminate employee professional development opportunities. The Information Superhighway provides cost-effective opportunities for distance learning, and, thereby, new opportunities for career advancement and professional development.

For instance, nurses in North Carolina have attended training sessions given at a conference in Atlanta, Georgia, without ever leaving their own hospital. The hospital does not have to pay travel or housing costs, and time away from the job is minimal. As a result, more nurses are being trained at a lower cost.

Improving Participation in the Democratic Process

Computers and communications technologies have brought Federal, State, and local government to the fingertips of any person who knows how to fax, send e-mail, or retrieve information off the World Wide Web. Anyone, anywhere can read the press releases that emanate from 1600 Pennsylvania Avenue, and the speeches made by the President and placed on the White House Web site. Anyone can learn what State and local politicians are saying and doing. What's more, the average American can tell the President, State and local officials, and government agencies at all levels what they think about what they're doing, how they're voting, and issues they should be addressing.

The Information Superhighway is also having significant effects on the operations of municipal government and the conduct of public life at the local community level. For example:[5]

- **Community access networks.** The Information Superhighway is expanding opportunities for individuals to participate in local political

Getting Out the Vote

A bipartisan coalition of 110 women's groups has launched an effort to get more women to vote—and it is using the Information Superhighway to spread the word.

Employing a World Wide Web site and a fax network, the Women's Vote '96 coalition hopes to convince the Nation's 99 million voting-age women (1994 census figure) to exercise their right to vote. Almost 38 percent voted in the 1994 elections, about the same percentage as men.—*"Women's Groups Push High-Tech Outreach,"* The Washington Post, *Sun., Nov. 5, 1995, p. A12.*

"I am totally blind; with two glass eyes. I have been blind all of my life, and have never known anything different. I have been mainstreamed in schools all my life, and have always had to depend on others to get me school materials. . . . Getting Internet access was the best thing that ever happened to me. In a way, my computer and access to the Net have become my eyes to the world. I can read a newspaper, talk to people around the world, and get materials for class papers, unlike before when I had to depend on others to get the resources I needed."—*Randy Hammer*

activities through grassroots networks that provide citizens and taxpayers with a wide range of information services. These information services give citizens more of an opportunity to participate in all forms of government, regardless of geographic or other limitations—physical disabilities, for instance.

- **Government that works better and costs less.** All levels of government are using the Information Superhighway. The Federal Government, for instance, uses it to disseminate economic and trade information, permit electronic downloading and filing of tax returns, and provide information on how to apply for education and science research grants.

The Information Superhighway thus gives every person living in this country a new voice in the democratic process, as well as rapid access to information produced, for their benefit, with their tax dollars.

Enhancing Cultural and Creative Opportunities

Not everyone can visit the famous museums of the world or Carnegie Hall, but they can be exposed to a variety of works of fiction and nonfiction, music, video, and art on the Internet. In addition, they can express their own creative talents and make their works available for others to enjoy. This is one of the most exciting and personally rewarding aspects of the Superhighway, and people are making use of this aspect of the Internet in droves. Senior citizens, for instance, are writing about their life experiences. Students are putting together multimedia presentations on subjects such as Lady Macbeth. The Navajo tribe is preserving its language, stories, and culture for future generations using the Information Superhighway.

For many in the United States, particularly those who live in isolated rural areas, the Superhighway is providing a first glimpse of many aspects of culture and creativity that the world has to offer. It is expanding horizons, and particularly for young people, providing an opportunity to develop parts of themselves that might not otherwise be reached.

Improving Access and Communications for Individuals with Disabilities

Between 40 million and 50 million children and adults living in this Nation have disabilities. Some use wheelchairs or have limitations in using their arms or hands. Some have vision or hearing impairments; others have difficulty speaking, and still others live with combinations of limitations, some physical, due to conditions such as arthritis or diabetes, and some mental and cognitive, due to strokes, mental retardation, or other conditions. With adaptations to the environment or through the use of technology, most can be actively involved in school, work, recreation, and civic life.

People with disabilities experience barriers to many facets of life. The United States has attempted to eliminate or reduce these barriers by enhancing the opportunities for public education for disabled children, modifying the environ-

ment through accessibility standards in building codes, creating new opportunities through legislation such as the Americans with Disabilities Act, and providing public education campaigns to change stereotyped and negative attitudes.

The Information Superhighway can be a major boost to open up opportunities and remove barriers for persons with disabilities. Because geographic location is much less relevant with information technology, people who have difficulty with transportation or physical endurance can opt to receive information about their bank account balance, or participate in adult education programs, for example, from their own homes.

Right now, a wide variety of existing adaptive equipment is enabling people of all ages with disabilities to use information technology for participating in many aspects of life that most people take for granted. New advances in the design of technology that incorporate these accessibility features into off-the-shelf equipment for generic use will make information technology much more affordable and useful for persons with most kinds of disabilities.

Improving and Reducing Costs of Health Care

Many observers believe that the Information Superhighway will bring substantial savings to the health care industry while continuing to extend the quality and availability of health care. Some experts estimate that telecommunications applications could reduce health care costs by $36 billion to $100 billion each year while improving quality and increasing access.

Some existing and potential applications of the Information Superhighway in the health care field include:[6]

- **Telemedicine.** The Superhighway allows health care providers to consult with specialists thousands of miles away, upgrade their education and skills, and share medical records and X-rays under appropriate procedures. For instance, doctors at the Mayo Clinic have provided expert help to patients and local doctors at the Pine Ridge Indian Reservation in South Dakota.
- **Personal health information systems.** Today, most people lack the tools they need to become active and informed participants in their own health maintenance: 50 to 80 percent enter the health care system unnecessarily; many go to emergency rooms when what they need is a consultation with a family doctor; and many with serious health problems enter the system too late. The Information Superhighway can and is being used to promote self-care and prevention in a way that is accessible to and helps individuals. For example, one shopping center in California has a public access site where anyone who wants to can tap into health information: a research assistant is available to help users get the appropriate information. Communications and Computer Applications in Public Health estimates that if personal health information were used just 25 to 35 percent of the time, savings on medical care would be $40 billion to $60 billion per year.

Computers Bring History Alive for Vocational Students

It wasn't long ago that a number of students at the Medina County Career Center were seen with their heads down during their social studies class. Today, these same students are bright and alert and spending extra time in the classroom, lured by a modern social studies lab.

The idea for this classroom came from history and government teacher Jackie Smith. She researched computer systems, software, and laser disks, and then received a grant to turn her vision into a reality.

Today, approximately 200 students use the lab for history and government classes. One student recently took a tour of the Capitol, walking down halls and learning about paintings on the walls with CD Capitol Hill. Other students are learning about various facets of World War I—weaponry, world leaders, and causes of the conflict—through another program. And students who had previously balked at learning are often skipping lunch just to stay and work in the lab.

- **Computer-based patient records.** Computer-based patient records are critical to improving the quality and reducing the costs of health care, according to the Institute of Medicine. Today, 11 percent of laboratory tests must be reordered because of lost results; 30 percent of the time treatments ordered by a physician are not documented; 40 percent of the time a diagnosis is not recorded; and 30 percent of the time a medical record is completely unavailable during a patient visit. Use of computerized patient records shows real promise for improving records and record tracking.

REINVIGORATING AND IMPROVING EDUCATION

American children are capable of learning at substantially higher levels—many at levels previously expected only from those pinpointed by the education system as especially gifted or talented. Evidence of this has come from research in cognitive science, educational achievements of other countries, and pioneering efforts in American schools. After 35 years of research, it is clear that the children educated in this country can learn more, faster, and that technology can be the key to higher levels of achievement.[7]

When computer technologies and the vast resources of the Information Superhighway are introduced into academic settings, children get excited. They dig in and begin to locate information, and in the process they learn—not by memorizing or regurgitating, but by doing. They become archaeologists unearthing hidden treasures of times gone by and trying to figure out how past civilizations lived. They learn about the environment by collecting data and comparing their findings with others online. They improve writing skills by asking questions and expressing their views to others—both subject experts and peers looking for answers. They consume what the Information Superhighway has to offer, but they frequently add to its resources with their own creative efforts, making additional resources available for others to use or simply enjoy.

It takes only a few minutes in a classroom to realize that students quickly become engrossed in the Information Superhighway. Aside from their enjoyment, however, the benefits of using the Superhighway are both real and documented with both quantitative and anecdotal evidence. Networking technology is a powerful tool to help improve education and the learning process. Use of the Information Superhighway:

- **Brings the world to the classroom**. No matter what their socioeconomic or ethnic background, and no matter where they live, the learning field for all students can be leveled. Students are introduced to people, places, and ideas they might otherwise not be exposed to;
- **Enables students to learn by doing.** Research has now confirmed what many instinctively knew—that children who are actively engaged in learning, learn more. The effects are particularly noticeable among students who were not high achievers under more traditional methods. Networked projects, where students work with others and conduct their own research and analysis, can transform students into committed and exhilarated learners;

- **Encourages students and parents with limited or no English skills** to learn English, in order to expand their economic opportunities;
- **Makes parents partners in their children's education** by connecting the school with homes, libraries, or other access ports;
- **Makes it possible for educators to teach at more than one location simultaneously.** Vastly expands opportunities for students in small, remote areas to take courses on subjects that, for economic reasons, are generally available only to students in more affluent, populated, urban and suburban areas;
- **Enables educators to accommodate the varied learning styles and pace of learning within the classroom.** This individualized instruction can be a key factor in student achievement;
- **Encourages students to become lifelong learners** who can access, analyze, and synthesize information;
- **Allows educators to become guides and coaches to students,** rather than be "the sage on the stage";
- **Enables administrators and educators to reduce time spent on administration and recordkeeping,** so they can spend more time with students; and
- **Makes students proficient in the basic technological skills needed to take their place in society,** whether they enter the working world directly after high school or pursue further formal education.

In the past few years, research data demonstrated these benefits, plus substantial, additional real achievement benefits such as:

- A 1995 review of more than 130 recent academic studies found that *using technology to support instruction improved student outcomes in language arts, math, social studies, and science.*[8]
- A review of computer-based instruction in military training found that students reached *similar levels of achievement in 30 percent less time* than needed to achieve the same level of competency using more standard approaches to training.[9]
- A congressionally mandated review of 47 comparisons of multimedia instruction with more conventional approaches to instruction *found time savings of 30 percent, improved achievement and cost savings of 30 to 40 percent, and a direct positive link between the amount of interactivity provided and instructional effectiveness.*[10]
- A review of New York City's Computer Pilot Program, which focused on remedial and low-achieving students, showed *gains of 80 percent for reading and 90 percent for math when computers were used to assist in the learning process.*[11]
- A comparison of peer tutoring, adult tutoring, reducing class size, increasing the length of the school day, and *computer-based instruction found computer-based instruction to be the least expensive instructional approach for raising mathematics scores by a given amount.*[12]

Preparing Young People for Lifelong Learning

An example of how to prepare young people for lifelong learning that will help them to succeed and prosper in the Information Age comes from the National Urban League. Under the leadership of its new president, Hugh Price, this venerable civil rights organization is launching a major effort to prepare America's black children, both academically and socially, for the 21st century.

The Information Superhighway plays an important role in the League's strategy. "We plan to work with parents to show them what their children must know and be able to do in order to succeed in the technological age," Price says. "Then we'll translate those skill standards into benchmarks so parents will know if their kids are on course." The League has received a grant from The Pew Charitable Trusts to determine what those benchmarks might be and how parents can use them to measure their children's progress.

The League intends to package its benchmarks and make them available nationwide "to every interested parent," Price says, through its 114 affiliates, PTAs, religious institutions, and other outlets. "That's in addition to other parent-education efforts," Price adds. "The goal is to help parents become sophisticated and insistent consumers as regards their children's education."—*William Raspberry, "Hugh Price's Children's Crusade,"* The Washington Post, *Sept. 25, 1995, p. A21.*

Businesses and Individuals Benefit from Telecommuting

When commuters replace daily trips over concrete highways with trips on the Information Superhighway, their productivity increases, they are more motivated, and they change jobs less frequently. In addition, employer costs for retraining, office and parking space, and energy decrease. And there are benefits to society as a whole—roads are less congested, and fewer cars mean less pollution.

Time and again studies on telecommuting have evidenced these benefits. For example, a study of more than 400 telecommuters in Los Angeles, conducted over an 18-month period, found that telecommuter productivity increased an average of 12.5 percent, or $6,100 per telecommuter, when compared with the productivity of comparable nontelecommuters. When other benefits were quantified, employers saved: an additional $2,400 per year for each telecommuter; 4,000 kilowatts in energy per year, as a result of reduced fuel consumption; and 30 percent in office and parking space. Additionally, 18 percent of telecommuters reported that the ability to telecommute was a moderate to decisive influence on their decision to stay with the city. As a final point, this study showed that telecommuting afforded mobility-handicapped persons new employment opportunities.

- A 1993 survey of studies of the effectiveness of technology found that "courses for which computer-based networks were used *increased student-student and student-teacher interaction, increased student-teacher interaction with lower-performing students*, and did not decrease the traditional forms of communications used."[13]
- Research on the costs of instruction delivered via distance learning, videotape, teleconferencing, and computer software indicates that *savings are often achieved with no loss of effectiveness.* Distance learning vastly broadens the learning environment, often providing teaching resources simply not available before. Technology-based methods have a positive impact on learner motivation and frequently save instructional time. Savings in training time produce benefits both by reducing training costs and by shortening the time required to become and remain productive in the workplace.
- A landmark study on the use of technology for children with disabilities showed that *"almost three-quarters of school-age children were able to remain in a classroom, and 45 percent were able to reduce school-related services"* when computer-assisted learning techniques were employed.[14]

These data are only the tip of the iceberg. New studies heralding the benefits of Information Age technologies and the Information Superhighway for improving education are now reported almost on a daily basis. The stories, although beginning to have a familiar ring, also sometimes have some interesting twists. For example, the Advisory Council found specific benefits in these success stories (see Part 3 for full descriptions of these stories):

- In Union City, New Jersey, operation of the Christopher Columbus Middle School was about to be taken over by the State because students were performing at unacceptable levels—virtually across the board. A few years after the deployment of networked computers, student achievement levels rose to above average in reading, language, the arts, and math;
- In California, students at Chula Vista's Clear View Elementary School went from being in the bottom 10 percent on standardized achievement tests to the 80th percentile, just 2-1/2 years after advanced technologies were implemented in the classrooms;
- In Georgia, when computers were introduced to the Carrollton City School District, dropout rates fell from 28 percent to 5 percent, and yearly savings in operating costs reached $1 million per year; and
- In the State of Washington, many students who were in danger of dropping out have come alive and have become experts in computers, networking technologies, and the Information Superhighway.

What the Council has learned in the past 2 years is that the education benefits of the Information Superhighway are numerous, and varied. Best results come when teachers have a clear understanding of how to use information technologies for specific educational goals, and can creatively employ those resources in their classrooms. The good news is that, with some time and effort, and the

appropriate technologies and resources, any teacher can become an effective user of this exciting technology. In many schools, in fact, students and teachers are teaching each other about the Superhighway.

IMPROVING AND EXPANDING BUSINESS OPPORTUNITIES

At the Ford Motor Company, leading-edge interactive technology is transforming the way engineers design automobiles. Today, engineers in England, Germany, Italy, Japan, Australia, and several different locations in the United States are linked over a high-speed network that allows them to transfer complex images and three-dimensional models. Throughout the automotive design process, styling, design verification, ergonomic studies, air flow analysis, crash simulation, digital mockups, and general group engineering reviews can all be accomplished in real-time across the network. The technology enables Ford to build highly realistic and interactive digital models of vehicles, in real-time, rather than resorting to the traditional design methodology of creating expensive physical prototypes. The result: significant cost reductions and productivity improvements that enable higher-quality cars to be brought to the market faster.

While Ford is reaping the benefits of the Information Superhighway on a global level, numerous small businesses are also growing and expanding as a result of computers and connectivity. The Peoples Flower Shop in Alexandria, Virginia, is a case in point. This small, family-owned, minority business was started in 1948 and has operated successfully ever since. During the recession of the past few years, however, business was slowing. The children of the black woman who owns and operates the shop convinced her to participate in services that take advantage of telecommunication technologies, including, 1-800-Flowers, AFS, Teleflora, and Karick. The result: a 50-percent-plus boost in business. Today, the owner says, "I have more employees and more expenses, but a lot more orders, too. In fact, sometimes I get so many wire orders during the holidays that I have to pass them to others or shut down the machine because I can't get enough flowers."

The Information Superhighway affords businesses of all sizes and types new opportunities to compete and grow both within this country and in the global economy. Using the Information Superhighway:

- **Creates new markets**—reaching potential customers, worldwide, is easier and cheaper;
- **Eases entry into new markets**, especially geographically remote markets, because it makes the playing field more level between companies of different sizes and in different locations;
- **Provides new opportunities** to undertake national programs such as health care, where the costs of personnel needed to manage a manual or disjointed automated system might be prohibitive;
- **Reduces costs to buyers** because of increased competition in procurement—more suppliers are able to compete in an electronically open marketplace;

Coupons and the Superhighway—the Winning Combination for a Business

CPI, a St. Louis, Missouri-based 1-hour photo processor, owns and operates 600 photo retail outlets in malls nationwide, as well as 1,000 Sears Portrait Studios in Canada and the United States. With $500 million in annual sales, it is the largest business of its kind in the United States. Throughout its history, discount coupons—often found in the weekly television viewing guides of Sunday newspapers—have been one of CPI's most successful promotional tools. When recent market research showed that CPI customers were generally computer-literate and likely to have access to the Internet, corporate marketing executives had an idea. Why not offer downloadable coupons on the World Wide Web?

First offered through the homepage of Val-Pack Direct Marketing Systems Inc.—a company whose traditional business is mailing packaged coupons to consumers—and then through its own Web site, the downloadable coupon program has been a boon to business. Says Jim Moeller, CPI's creative director of advertising, "We wouldn't offer this premium unless we thought it would increase sales."

Coupons can be read and printed by any computer user with access to the Internet, and redeemed at any CPI/Fox Photo retail outlet. The Web site also includes a locator map to help potential customers find the CPI outlet closest to them.—*Phillips Business Information, Oct. 27, 1995.* Interactive Marketing News *2:22.*

Girl Scouts Go Online to Keep a Tradition Alive

The four members of Troop 732 grew up together. They worked on their cooking badges, sold cookies, and went on camping trips as they rose from junior to cadet to senior Girl Scouts. After 8 years of afterschool meetings and activities, however, their troop was just about to disband: the troop leader, one of the girl's mothers, no longer had time to run the meetings. The girls solved the problem using the Information Superhighway.

While working as a junior counselor at Girl Scout Camp, one of the troop members mentioned that Troop 732 no longer had a leader. Two college students volunteered to fill the job, but there was a hitch. The students live in Michigan. The scouts live in California. Troop 732 became Internet Troop No. 1 and scouting over the Superhighway was born.

Today the girls of Internet Troop No. 1 are working on getting their "computing" patch, using the computer lab at Mira Costa High School, Manhattan Beach, California, as their troop meeting site. Their next goal is to earn a patch in "communications."

Girl Scouts of the U.S.A. has given its full blessing to this concept. It already has plans to make the Internet an important part of its scouting program. In fact, the organization already has a World Wide Web site under construction to provide the 3.4 million scouts worldwide with event information and foster communications among the troops.—*Tracy Johnson*, Los Angeles Times. *October 16, 1995, Metro. "Girl Scouts Go Online to Save Troop."*

- **Reduces costs to suppliers**—when suppliers can access, respond to, and receive orders online, their costs decline;
- **Reduces the time needed to complete business transactions**, particularly the time from product delivery to payment;
- **Speeds the time to market**—linking business processes virtually eliminates time delays between steps and subprocess engineering, which results in seemingly seamless processing;
- **Optimizes use of human resources**—employees are freed from many routine activities, giving them more time to focus on customer service and other duties;
- **Reduces inventory requirements**—as demands for goods and services are electronically linked through just-in-time inventory and integrated manufacturing techniques, the need to stock inventory that might become obsolete declines;
- **Reduces errors, time, and overhead costs** in information processing—requirements for reentering data are eliminated;
- **Improves the quality of goods** as a result of standardization of specifications and increased competition; and
- **Increases the variety of available goods** as a result of expanded markets and the ability to market customized products.

Every corporate giant in America started out small and grew its way into the international arena. In the past, those companies have had to develop communications networks. As the Information Superhighway grows and develops new capacities, it will provide virtually limitless opportunities for businesses to reach the global marketplace to sell their products and services and obtain the people and other resources they need to grow, themselves. Employing the Superhighway to their advantage will certainly give businesses a running start into the Information Age.

REBUILDING AND STRENGTHENING COMMUNITIES

For many, the most promising and exciting dimension of the Information Superhighway is its ability to strengthen existing communities and to create new ones among like-minded people. This capability may, indeed, generate the most lasting effects of the Information Age.

Examples abound of how interconnected networks strengthen existing communities. Members of an extended family can communicate with each other by e-mail, swap family videos over the wire, or hold a mini-family reunion after a Saturday football game on television. Neighbors can leave detailed messages for each other when leaving town for a few days. The elderly can link up with each other to enjoy games or online chats, and sick or infirm individuals can check with local health clinics for information of importance to them and communicate with one another. Young people can form a club to exchange information and ideas, plan outings, and conduct meetings online.

Beyond those personal uses, citizens can, or will be able to, dial up City Hall and find out about the expenditures of their tax dollars on particular projects. They can register to vote, make their views known to elected officials, and obtain licenses and permits online. Consumers can order goods and services from local supermarkets or small businesses, check on local job opportunities, or find out about evening courses at the local community center

A civic club event chair can now place one call to the telephone carrier, which can automatically relay the message to hundreds of club members in the town or city within a few minutes. The ease, speed, and low cost of the effort encourages club officers to communicate far more frequently with their members, resulting in a more tight-knit group. They can obtain information from libraries and other cultural institutions to enable them to continue learning.

These kinds of activities break through the isolation of contemporary life, when neighbor may not be acquainted with neighbor. Networks can put people in direct contact with other people in personal, civic, and commercial relationships. The key point here is that people will become *active* participants in using the networks, and will be able to interact with many different and often distant people.

Another kind of networked community consists of physically dispersed elements within a common geographical area. An example is the 200 U.S. affiliated territories and small island nations in the Pacific Ocean. Today, PEACESAT public service satellite transmissions carry noncommercial, educational, medical, environmental, and emergency information throughout the island group. Earth stations are located at colleges or other educational or government institutions and provide access to the Internet, voice exchanges among the islands, and access to resources in the United States and the rest of the world. PEACESAT terminals are community resource centers that have not only encouraged development of partnerships on each island, but also have strengthened partnerships among organizations on different islands and in different countries.[15]

Forming New Communities of Interest

As networks bind existing neighborhoods and communities together electronically, they simultaneously open limitless opportunities to join "virtual" communities that know no geographic bounds. These new communities consist of people of like minds or interests who communicate electronically from any place on Earth.

A virtual community can include anyone, of any age. It may consist of people who link up over the Internet to play chess, talk about the problems of dating, discuss politics, argue about literature, trade tales of experiences in the Second World War, swap information about home improvements, or talk about school.

But a virtual community may also consist of people who tap into a common resource. An example is the partnership run by the University of Cincinnati Medical Center, which provides health information to citizens of the Ohio Valley Information on prescription drugs, diseases, wellness and general health,

E-Mail Transmits Key Message

In early October 1995, residents of an urban neighborhood became concerned about police handling of the alleged murder of a young man. They sought out the block captain of their low-income housing development, operated by a nonprofit agency, for guidance.

The block captain, working out of a community center, consulted his electronic database and found an e-mail message, just received, announcing the appointment of a director of community policing for the nonprofit agency. The block captain contacted that person, a nun, who had been on the job just 6 days. The nun promptly talked with the residents, set up a meeting with police precinct officials, led the residents to the meeting, and joined in presenting their views. Relations between residents and police were much improved by the meeting.

What Really Happens When Families Go Online

A newly completed study of the uses of computers and the Information Superhighway within the family, conducted by the New York–based Find/SVP and Grunwald Associates, found that:

- In 64 percent of families with computers, television viewing by children declines, and in 75 percent of households where the computer is enhanced with multimedia capability and a CD-ROM drive, it declines even further.
- Children with online services use their setups most often to reference information and write homework papers, and to a lesser degree to participate in chatgroups, play games, send e-mail, and keep up with news. (Less than 40 percent of their time on the computer involves playing games.)
- Girls with computers log on for an average of 9.6 hours a week during the Pre-K to third-grade years and 10 hours during high school years.
- Boys with computers log on for an average of 6.6 hours a week during the Pre-K to third-grade years and 12.3 hours a week during high school years.
- Children with online services log on an average of three times a week for a total of 1.5 hours: adults log on an average of 6.4 hours a week.
- Children who go online are more likely than other children to be involved in sports, outside activities, volunteer activities, and private lessons in music and dance.
- Mothers are as likely as fathers to use a computer in the home: mothers use the computer for activities such as running home businesses, keeping track of the household budget, personal learning activities, online searching, and volunteering, while fathers' use is primarily for work-related activities.

The 9-month study involved 12 focus groups, followed by a survey of 1,200 family households. It was sponsored by more than 20 U.S. learning, computer, and media companies—*Phillips Business Information. Oct. 27, 1995.* Interactive Marketing News *2:22.*

alternative therapies, insurance, physician referrals, regional online service providers, and other channels for health care are all provided. Anyone with a computer in the tri-State region can access this information—it is available at public workstations in libraries, health clinics, hospital waiting rooms, and pharmacies.[16]

Improving Emergency Management and Public Safety

The Information Superhighway is creating new and expanded opportunities for coordination among emergency and law enforcement agencies, enabling them to better communicate with and serve communities. These agencies are now typically equipped with up-to-date communications systems, but often lack the ability to communicate quickly and effectively with each other, especially during high-stress episodes such as natural disasters and civil disorders and in unusually demanding situations such as search-and-rescue in remote areas or under hazardous conditions.

The Information Superhighway provides new opportunities for emergency management and law enforcement to exchange vital information under difficult and changing circumstances. As new systems are developed and implemented, people in every community of the United States will benefit.

EMBRACING THE BENEFITS: MANAGING THE CONCERNS

Even with these many benefits of the Information Superhighway, many are worried about what universal access will mean to themselves, their families, or their business. For instance:

- Parents are concerned that their children may gain easy access to inappropriate material via the Internet or other networks, or come into contact with dangerous people through online conversations.
- Business managers fear the loss of sensitive proprietary data or information that their customers think is held in strict confidence.
- Individuals are worried that private financial, health, or other information about themselves will get into the wrong hands.
- Creative interests and content providers are concerned that their property rights may be infringed.

These concerns are valid, but as people all over America have learned, they are also manageable. For example, you can:

- Learn what others have done to deal with difficult issues by turning to Section 3 of this guide; and
- Get on an online network and share concerns with others.

SUMMARY

If properly developed and deployed, the Information Superhighway has the capacity to narrow the gap between individuals in this society, whether that gap is based on economic, ethnic, geographical, or other factors. These benefits will not be realized without hard work and the vigilance to include all segments of our society. However, it is already opening doors of career opportunities to any person, anywhere in the Nation, who has access to a computer keyboard, a screen, the right software, a modem, and some training. It is already bringing new excitement and educational resources into teaching environments. It is already helping businesses to perform more efficiently and effectively. It is already giving people throughout the Nation a new sense of community and belonging.

The benefits of the Information Superhighway are there and waiting, and as more and more schools, libraries, community centers, businesses, government agencies, and individuals travel its many arteries, the resources each adds will increase the benefits for all.

part 2
Highlighting the Ingredients of Success

President Clinton and Vice President Gore have established a national goal that calls for every school in America to be connected to the Information Superhighway by the year 2000. They envision an America of schools and other important institutions linked to a Superhighway built by the private and not-for-profit sectors.

The Council applauds and endorses the Administration's vision and goals. The question now arises: How does the Nation best move from the Administration's vision and goals to plan and implementation? The Council's answer is that communities take the lead in connecting people to the Superhighway through schools, libraries, and community centers.

A community must begin with forming and articulating its vision and goals for joining the Superhighway. What do they want to accomplish, i.e., in what timeframe for what users? For instance, a school system may want to implement effective computer learning as well as to communicate via the Information Superhighway. This vision needs to include a plan for what technology must be acquired and put into place and for how to train personnel to enhance learning using the systems. In addition, the goals need to include what kind of content—the finding, using, and creating of information—is most effective in bringing the fun and benefits of the Superhighway to the target group.

The Council examined this process all over the country and identified these four ingredients of success:

- Leadership;
- Technology;
- Training and professional development; and
- Content.

"You should have been there to see their faces [teachers attending a computer workshop] and feel the excitement in the room when they realized what they had learned. There was even one teacher that decided to take a powerbook home and work on it during the summer. This teacher could not turn the computer on when the day started. . . . I feel if we can introduce the teachers to computers and technology in a very unintimidating way we will see success. . . . If you can get them to play with a computer, I guarantee you they will be hooked."—*Elaine Devers, parent, school technology coordinator and workshop instructor, Kentucky*

LEADERSHIP

Leadership is critical: Every successful community effort has a champion—an energetic, visionary individual who gathers wider leadership support from various sectors of the community. And, one of the interesting facets of a KickStart Initiative is that almost anyone can catalyze and lead the effort:

- In the Issaquah School District, Issaquah, Washington, it was a student's father who developed the plan to bring the Information Superhighway to the more than 10,500 students and 1,000 teachers and staff in the district's 21 schools and 3 administrative sites using funds that had been earmarked for the project;

Wireless Communications Help Bring the Superhighway to Older Schools

Nearly half the school buildings in the United States were constructed 50 or more years ago. Many are insulated with asbestos. This makes installing telephones and computer cables difficult, costly, and dangerous. For these schools, wireless telecommunications are proving an effective means for accessing the Information Superhighway.

At a Richardson, Texas, junior high school, more than 350 hours a week—about $7,000—were saved in overall staff time that would normally have been spent confirming attendance, dealing with schedule changes, requesting textbooks, and communicating with parents and other school personnel. Teachers reported that telephones in the classroom saved substantial time that would have been spent traveling the halls to talk to others (savings amounted to approximately 15-1/2 days of teaching time per year).

ClassLink, an initiative of the Cellular Telecommunications Industry Association (CTIA) Foundation, Washington, D.C., will bring wireless communications—including wireless access to the Internet—to 100 schools across the Nation. The effort evolved as a result of the Richardson program—where Southwestern Bell Mobile Systems donated both wireless telecommunications equipment and airtime—and is currently being tested in two schools in Washington, D.C., through support from Bell Atlantic Mobile. CTIA members are funding ClassLink's wireless equipment through cash contributions and donated airtime.

- In the Chestnut Ridge School District, Fishertown, Pennsylvania, it was the district's technical coordinator, with the support from teachers, who found the funds needed to implement the Superhighway and train those who would teach others;
- In a small parochial school in Baltimore, Maryland, it was a corporate sponsor who saw a school in trouble and decided to step in and save it;
- In Lansing, Michigan, it was the local television station's general manager who came up with the idea of getting area students online to learn about current events;
- In Taos, New Mexico, it was two young leaders of a grassroots nonprofit organization that led the way to the development of a network that is helping community members gain new skills; and
- In the State of North Carolina, it was the Governor who called for a statewide effort to connect all schools, libraries, medical, and government facilities.

These leaders, and others who have led successful connection efforts, took on the task because they believed in the educational, social, and economic benefits of being connected. Some knew and understood the technologies and other requirements for successful connections at the onset. Others did not. All were able to garner the support—both financial and technical—needed to carry out their project as a result of their vision, commitment, and hard work.

TECHNOLOGY

All connections to the Information Superhighway—whether for voice, data, graphics, or other types of information—require equipment, software, and access to the network. The specific technologies employed, however, depend on the goals of connection, the facilities to be connected, and the budget for the project. For instance:

- In the Christopher Columbus School in Union City, New Jersey, computers were supplied in the school and at the homes of students so that teachers, students, and parents could communicate even during nonschool hours. To begin with, they used plain old telephone lines and later added ISDN lines and multimedia server technology to the network.
- At the Clear View Elementary School in Chula Vista, California, they have integrated the use of technology into the curriculum and use 10 computers in each classroom. In addition, they use a broadband connection to access a multisubject laser disk jukebox located 8 miles from the school. They also use satellite and cable connections to access online resources.
- At Ralph Bunche Elementary School in Harlem, New York, a "mini-school" has been created to foster computer-assisted learning. In this mini-school, computers are connected to each other on a LAN and to the outside world through a WAN.

Technology Choices Reflect Goals and Available Resources—Financial and Human

Information Equipment: From Telephones to Computers to TVs

- **Telephones and faxes:** Telephones and fax machines, commonly available for administrative purposes, are rapidly becoming useful in classrooms as well. Voice mail has also been used effectively by many school districts to share information over the phone system among teachers and administrators, parents, and other community members.
- **Computers:** Like telephones, these come in varying degrees of sophistication and cost. Most schools, libraries, and community centers start with simple multimedia computers and add technology capability as they evolve their needs and capabilities.
- **TVs and VCRs:** Many schools, libraries, and community centers are beginning to use TV hookups for access to cable shows, for distance education, and for showing educational shows over VCRs.

Network Access

- **Network access:** Plain old telephone lines (POTS) are typically used for voice mail and, with the addition of modems, data at low speeds. Integrated Services Digital Network (ISDN) lines transmit data and images at about twice the speed of a regular phone line, which allow some multimedia materials to be used. T-1 lines are leased lines for point-to-point communication and allow data and images to flow at 50 to 60 times the speed of a regular phone line. T-3 lines transmit data and images at 1,500 times the speed of a regular telephone line. Some technology choices include optical fiber, coaxial cable, hybrids of coax and fiber, wireless, and satellite. The choice of technology will determine the speed and quality of the network access.

Networking

- **Local area networks (LANs):** LANs link computers together that are in the same proximity/locale—computers in the same office building or school. When linked through a LAN, computers can share data files and peripherals such as printers and scanners.
- **Wide area networks (WANs):** More capable networks beyond the local building(s) which enable users to share information across large geographical distances (e.g., school-to-library, State-to-State, or across the globe). WANs can also be used to interconnect a number of LANs at different sites (e.g., all the schools in the district). Other technologies, such as bridges and routers which route the data, must be purchased as well.

Content Resources

- **Databases**: Access to databases in other places, including libraries and museums, has enriched many learning programs.
- **Software**: CD-ROMs, electronic mail, word processing programs, integrated office products which contain several capabilities combined (e.g., word processing and spreadsheets and graphics), and educational software have all been used effectively by many schools, libraries, and community centers.
- **Live communication**: Communicate with content and technology experts, colleagues, community and business partners, parents, and other learners.
- **Curriculum resources**: Subject matter and problemsolving materials, curriculum frameworks, workforce knowledge and skills resources, strategies for curriculum planning and interactive curriculum learning materials have been used by schools to organize teaching and learning.

- In the J.O. Wilson Elementary School, Washington, D.C., and the Richardson West Junior High School, Richardson, Texas, they are using wireless technologies (cellular phones and wireless LANs) to overcome the difficulty of installing cables in older buildings.
- In Hawaii, the State government has implemented several statewide infrastructure initiatives that satisfy the State's goal of providing access to all learners. These include I-Net, which links elementary and secondary schools, the University of Hawaii, and 50 district and State offices.

Texas' Education Network Gets Teachers Online and Working Together

When educators and librarians in Texas are looking for peer support, professional development activities, ideas for lessons, or views on particular teaching approaches, they go to their computers and access the Texas Education Network (TENET). In the words of Connie Stout, director of the network, "Considering how isolated teachers are from each other in classrooms during the school day, it is frequently easier to consult with colleagues via TENET because time and place no longer matter. For teachers in our rural communities, the opportunities provided to exchange ideas with colleagues is a reality for the first time."

Established by Texas statute in August 1991, this network was specifically designed to assist in the collaboration and exchange of information between and among schools, district offices, educational service centers, the Texas Education Agency, and other State and educational entities. It is doing just that. Although the network had only 500 users when it was established in February 1995, 44,000 members of the State's community of educators were using it for an average of 15.5 logins per month.

TENET is funded by the Texas Education Agency, and administered and operated by the University of Texas at Austin.

- In North Carolina, the State has invested in a statewide information infrastructure to meet its goal of using the information technology as a "strategic tool for economic growth and social welfare."

These are only a few examples of the kinds of technologies being employed to access the Information Superhighway. In most instances, successful initiatives evolved through several phases—beginning with a standalone computer with communications capabilities and standalone video players and television sets and growing into full-fledged local area and wide area networks. As their goals and needs evolve, so do their technology choices.

The choice of technology is often driven by user needs. For example, persons with disabilities often require additional features, and/or specialized equipment both to access and to interact over the Information Superhighway. For the past 10 years, computer and software manufacturers have been working to integrate disability access features into their standard, mass-marketed products. As a result, a number of assistive technologies are now available to ease access to the Superhighway by disabled persons, and disability access features are now being incorporated directly into most of the major operating system environments in the computer industry. Equipment can now be purchased that has built-in features such as text or screen enlargers, keyboard alternatives to the mouse, single-stroke command features, onscreen substitutes for auditory cues, screen readers, and other features that allow users to customize how they interface with the Information Superhighway.

TRAINING AND PROFESSIONAL DEVELOPMENT

Every traveler on the Information Superhighway had a mentor at the beginning of the journey—a teacher in school, a co-worker, a librarian, a volunteer at a community center, a parent or family member, a friend, or a fellow student. Although training can occur in many different settings and in many different ways it is essential that every mentor, whether in an academic or other institutional setting, such as a library or community center, receive adequate and ongoing training in how to use the required technologies, and employ the resources of the Superhighway to assist children and adults in their lifelong learning process.

Unless teachers are properly trained, the technology and connections that so many are working to bring into schools, libraries, communities, and other settings will not be used to their fullest potential, or worse yet, left in the corner to gather dust. A 1995 study completed by the Office of Technology Assessment (OTA) elucidates this point. OTA found that 68 percent of the teachers surveyed had access to computers, but that only 42 percent were using them as a part of their curriculum; and that although 50 percent said they had access to educational software, only 32 percent used that software in their classrooms. Kathleen Fulton, project director for the OTA study, comments on the central importance of training teachers: "They've been trying so hard to get technology into the hands of kids that they forget it's the teachers who direct what goes on in the classroom." The same is true for mentors in libraries and community centers.

Figure 1. Technology Skill Stages for Teachers

Skill Stage	Description	Professional Development Needed*
Entry	Teachers struggle to cope with technology and new learning environment, or have no experience at all.	—
Adoption	Teacher moves from initial struggle to successful use of technology at a basic level (e.g., can use drill and practices software).	■ 30 hours training
Adaptation	Teacher moves from basic use to discovery of potential in a variety of applications. Teacher has good operational knowledge of hardware and can perform basic troubleshooting.	■ 45+ hours training ■ 3 months experience ■ Just-in-time support
Appropriation	Teacher has mastery over the technology and can use it to accomplish a variety of instructional and classroom management goals. Teacher has strong knowledge of hardware, local area networks, and wide area networks.	■ 60+ hours training ■ 2 years experience ■ Just-in-time support
Invention	Teacher actively develops entirely new learning skills that utilize technology as a flexible tool.	■ 80+ hours training ■ 4-5 years experience ■ Just-in-time support

* Required times for professional development are cumulative

Source: McKinsey & Company, Inc.; U.S. Congress, Office of Technology Assessment: Teaching Matters.

Although much of the training "mentors" receive is on an ad hoc basis, a number of schools, school districts, universities, public, private, and nonprofit organizations are developing and offering training programs for in-service teachers, student teachers, librarians, and others who will be expected to teach children and adults to use information technologies. For instance:

- In Albuquerque, New Mexico, teachers can attend a voluntary training course at the school district's training center. Those who complete the course are certified as "in-house advisers" within Albuquerque's 110 schools. As in-house advisors the teachers are expected to help their peers learn to use computers in their classrooms. In addition, they serve as a resource on such issues as software and hardware compatibility.
- In Mission Viejo, California's Saddleback Valley Unified School District, in 4 of its 36 schools, laptop computers are available for teachers to take home, where they can train themselves at their convenience. During the school day, these computers are set up, 12 at a time, on library carts that are moved from classroom to classroom for students' use.
- At the University of Maryland, student teachers are required to take courses on computers and to learn how to teach using the Internet, so

Tennessee's Virtual School Teaches Teachers to Embrace Computers

In just 3 years, Tennessee's Virtual School has transformed 11,000 of the State's 50,000 K-12 teachers from computer illiterates to seasoned travelers on the Information Superhighway. Many of these new converts were once afraid of the Information Age, but today they are teaching their peers and actively engaging their students in learning with the assistance of worldwide electronic resources. Teachers, librarians, counselors, and their students across all Tennessee counties now make use of the Virtual School.

Educators now employ the Virtual School to communicate with one another, share curriculum materials, develop classroom projects, and access the Internet, mostly for student-related purposes. Three curriculum projects have been developed with funding from Eisenhower Foundation, Appalachian Regional Education Lab, and BellSouth Corporation. The State appropriated money for 800-number access and is equipping all 1,500 of its libraries with a computer and modem and has set a priority for training library personnel and aligning the program with its statewide 21st-century classroom technology initiative.

"All the computers, telephones, fax machines, scanners, cameras, keyboards, televisions, monitors, printers, switches, routers, wires, cable, networks, and satellites in the world will not create a successful [Information Superhighway] if there is not content."—*Bruce Lehman, Assistant Secretary of Commerce and Commissioner of Patents and Trademarks*

that they will be prepared to teach using Information Superhighway resources once they move into the Nation's classrooms.

- The National Alliance for Restructuring Education opened four Apple Classrooms of Tomorrow (ACOT) teacher development centers. Located in California, Kentucky, Vermont, and Washington, these centers offer teachers the opportunity to participate in 1-week practicums on how to use technology in the classroom. Participants in the program learn by observing and working with ACOT teachers and students in actual classroom settings. Project coordinators guide participating teachers as they examine student outcomes, learn about new technologies, and develop instruction that integrates technology into their curriculum.
- In Texas, every prospective teacher is being encouraged to purchase a laptop computer for lesson planning, telecommunications, recordkeeping, and instruction as a result of the Houston Consortium's drive to redesign teacher education. To encourage the integration of technology into the pre-service education of teachers, the Consortium also supplies every participating K-12 school with a telecommunications center and portable multimedia station for use by pre-service and in-service teachers; individual laptop computers for professional development of up to 6 faculty members; and a computer classroom (5 computers for instruction and 10 laptops for students) to each participating university or college of education. Training on the use of the technology and its integration into the curriculum is also provided.

"In this age, content becomes outdated so quickly that schools must encourage independence and teach learning how to master the process of acquiring content"—*Barbara Sylvester, education professor, Austin College. Source: Kevin Helliker,* The Wall Street Journal, *"Texas Tech," Nov. 13, 1995, p. R18*

CONTENT

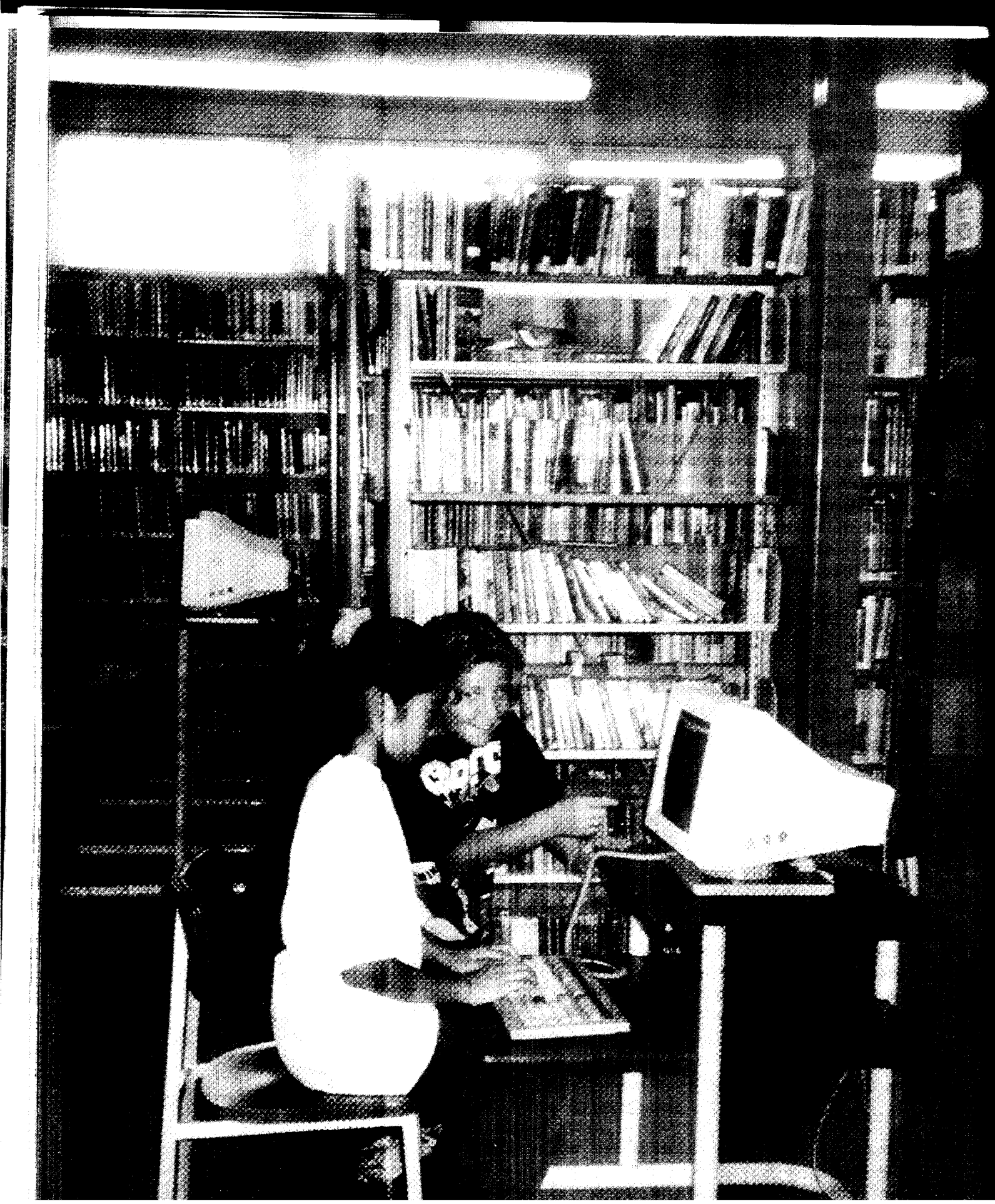
Content—the ideas, information, pictures, music, and other material that flow over the Information Superhighway—is the final and in many ways most exciting and critical ingredient of this new tool of the Information Age. Every Superhighway success story involves having, creating, and integrating content in a way that encourages children to learn, makes everyday tasks easier and quicker, helps people communicate faster and more frequently, and makes life more enjoyable and interesting.

With each passing minute new resources are added to the already vast information, services, education, cultural, business, and recreational content of the Superhighway. Some is targeted to specific populations groups—schoolchildren, parents, or senior citizens, for example. Some is meant for specific professionals—businesspersons, educators, policymakers, law enforcement personnel, or persons in the medical community. Some is intended to fulfill information needs about local events, weather, news, and the like. And some is simply intended to help people enjoy their leisure time by finding a good restaurant or movie, listening to music, or playing a game.

In looking at the many kinds of resources now available, the Council found that persons from all walks of life and every possible profession are finding innovative ways to use the Superhighway to benefit others. The volume of useful, interesting resources available is growing and changing at such a rapid pace that

it is nearly impossible to describe the new uses for this technology in the coming year, let alone the coming decade. Today, however, users can find such resources as the following:

- In 60 cities and across 1,000 schools and universities real-time meteorological data is brought into school and local communities via the AWS Nationwide School Weather Network. Each participating schools has an AWS automated weather system and interactive telecommunications software that allows real-time data to be collected from any site and integrated into daily classroom activities. Local television weathercasters in participating cities routinely integrate data generated from these schools into their weathercasts.
- Sponsored by Columbia University, New York City, "Go Ask Alice" provides young people with health information they might feel uncomfortable asking for in a face-to-face meeting with a physician. Information available through this services falls into five categories: sexual health and relationships, physical health and nutrition, alcohol and drugs, emotional health and well-being, and general health. The service is staffed by a health professional who reviews questions and develops generalized responses.
- Headquartered in Washington, D.C., the Consortium for School Networking (CoSN) offers a variety of discussion forums where parents and educators can consult with each other and learn. Current forums include curriculum, technology, professional development, teacher education, parental issues in involvement and technology, and electronic publishing.
- Throughout the United States, USA CityLine allows cities and towns to include information about their localities on the Internet. For instance, Orlando, one of the most popular vacation destinations in the world, provides information about accommodations, attractions, businesses, real estate, local government—including statistics, taxes, licensing—restaurants, golf courses, nightlife, television, radio, events, shopping, tours, transportation, and travel agencies.
- Students and teachers throughout the United States now have the opportunity to travel with scientists to study natural phenomena such as volcanos, rare animals, birds, and marine species, and other aspects of Earth through the Jason Project. Established in 1989, this project is intended to excite and engage students in science and technology while providing teachers with opportunities for professional development.



part 3
Showcasing Success Stories

All across the United States, people are building elements of the Information Superhighway. Some are installing computers and obtaining interactive software in schools, libraries, museums, and community centers. Others are setting up online networks for nonprofit and public agencies at the community, regional, town, or city level. And still others are implementing plans to interconnect an entire State.

Every one of these people has an interesting story to tell—when they first experienced their dream of joining the Information Superhighway, how they got their equipment, who taught them how to use it, how long it took to feel like a Superhighway pro, and most importantly, the people they met, the places they have "visited," and the things they have learned and experienced online.

When teachers talk about how the Information Superhighway has affected their classrooms, they relate stories of reawakening of students who at one time spent their days waiting for dismissal, but are now coming in early and giving up recesses—just to get a few extra minutes online. Librarians speak of adults using their online facilities to learn new job skills. Community center administrators talk of once-lonely seniors who have made new friends and gotten a new lease on life through online chatrooms. Stories of how the Information Superhighway has improved lives are endless—each inspiring in its own right. Stories of how institutions achieve access to the Superhighway, although peppered with unique components, are in large part quite similar.

SCHOOLS

In some ways, schools are the most important component of the Information Superhighway. Their success in implementing and instructing students on the use of Information Age technologies may determine how well children assimilate into the working world. Some of the steps schools have taken to implement these technologies and the ways teachers and students are making use of them are described below.

If Chestnut Ridge Can Do It, Anybody Can

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Chestnut Ridge School District is rural, poor, and small. Located in south central Pennsylvania, the district is 30 miles from end to end and serves 1,900 children. The local library's budget, which was already small, was cut by nearly 30 percent from 1994 to 1995. And, because there is no toll-fee Internet access in the community, the library director believed that Internet use in that facility would probably kill it financially.

Yet, in this poor community, the school district believes that "Technology can be a catalyst and agent in changing the way teachers teach and students learn . . . [it is] the great equalizer, in a playing field, where unequal amounts of money are spent on educating children," according to Kathy Popp, technical coordinator for the district. Thus, the school district is making every effort to ensure that students get the technological resources they need to be productive members of society, and they're succeeding. They are succeeding because they have built partnerships with the local community, and have spent a lot of one-on-one time with community leaders—both supporters and opponents of access.

The school district searches for resources wherever they can find them. In 1993, three teachers received a GTE Pioneering Partners Award that included 5 free hours of Internet access per month for each recipient. During the school year, a score of teachers and administrators have been trained with those free hours. In 1995, the district aggressively pursued another Pioneer Award, simply to get three more accounts with 5 hours each of monthly Internet time. It won again, and teachers traveled more than 30 miles to the local university's crowded computer labs to use the accounts. Some teachers also purchased America Online time and paid the toll charges themselves just to get the technology in their classrooms.

"Most people are waiting for the Internet to happen to them. We feel that every day that our children do not have access to the Information Superhighway is one day less of an excellent education for them. One day less for the "have not" children."—*Kathy Popp, technical coordinator, Chestnut Ridge School District, Fishertown, Pennsylvania*

The commitment of the school to connectivity was further evidenced when funds were budgeted for a 56-Kbps line. Funding the line meant that a high school teacher position was left unfilled and supplies were cut. To get additional funds teachers teamed with a neighboring school district to create an Internet course for teachers and librarians. The course will be taught by teachers in the school and take place in summer 1996.

Finally, in partnership with Bedford County Library, the school district applied for a Goals 2000 grant. The $25,000 award will pay for Internet access during the 1995-1996 school year. It may be touch and go, but if this school district can do it, anybody can.

Educators in Chestnut Ridge see unlimited use of the Information Superhighway as the books they don't have on their library shelves, the experts they would like to have on staff, a means to bring people together for retraining, a means for breaking out of the professional isolation of living and working in a small town, and, most importantly, as a means for children to be on the same playing field as those in more privileged communities.