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## Learning Online Through The Exploratorium

Want to dive into the gene pool and explore genetics, learn about the bombing of Nagasaki through a photographic exhibit and discussion, or leaf through a digital library of online exhibits, scientific images, and sounds? For teachers who have Internet capabilities in their classrooms, these exhibits have been just a click on The Learning Studio location of the World Wide Web.

The Learning Studio is a multimedia and communications lab operated by The Exploratorium—San Francisco's renowned, hands-on museum of art, science, and human perception. The Exploratorium's more than 650 interactive exhibits draw more than 660,000 visitors—67,000 children on field trips—and trains more than 500 teachers each year. It operates in partnership with local government, the higher education system, and the private sector. During the second week of August 1995, The Learning Studio's Web site had more than 150,000 accesses.

The Learning Studio provides multimedia and communications training for science educators and will be opening to the general public shortly. It is part of the Science Learning Network (SLN), which is funded by the National Science Foundation and Unisys Corporation and part of the Web resources forum. Using The Learning Studio's Web page: teachers can learn how to build classroom/home versions of more than 100 Exploratorium exhibits; review a guide to student-built experiments, written by teachers for teachers; and find other science sites on the Web.

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## Teaching Children about Computers Through Boston's Computer Museum

The Computer Museum of Boston is an independent, nonprofit institution where people of all ages and backgrounds can see how computers have touched all aspects of modern life, from business to education to health to entertainment to art. Its mission is to educate and inspire people on the evolution, technologies, applications, and impact of computing through dynamic interactive exhibits and programs. The museum is unique in that it is making special efforts to reach children from underserved communities and provide them with the resources needed to develop their talents, contribute to their community, and pursue fulfilling employment. Each year it has more than 135,000 visitors.

Among the museum's many exhibits and attractions is the Computer Clubhouse—an afterschool program primarily focused on youth from underserved communities—where visitors develop computer-based projects. Youth ages 10 to 16 work on projects with mentors using professional-level software to design computer graphics, robots, video games, interactive newsletters, music, science simulations, and multimedia presentations and animations. Some of the specific projects include: Continuum; a group of minority teenagers who are building family trees on the Web; a workshop for girls to work with women to learn and create; and the Clubhouse animation studio, where computer-generated 2D and 3D animation and cartoons are created. The final products are shown on Boston's cable access channel; and at an online art gallery, where computer-based works of art are shown in a virtual gallery accessible over the World Wide Web.

The museum has published a *Guide to Best Software for Kids* and maintains 170 interactive exhibits, including: Networked Planet, a new gallery on the Information Superhighway, which was a finalist in the 1995 Computerworld Smithsonian Awards; a walk-through computer; a multimedia robot show; and an extensive collection of computers and robots.

The Computer Museum is funded by a broad spectrum of corporate and individual donors, museum admissions fees, and foundation and government grants.

## Learning Cultural Heritage in the Getty Art History Information Program

The Getty Art History Information Program (AHIP) works to enrich the content of computer networks of the future by encouraging persons concerned with preserving the cultural heritage to collaborate in building a cultural information infrastructure. The opportunity to link databases of information, a long-awaited development, is now at a critical juncture. The idea of synergy among institutions that wish to share information is becoming a reality and AHIP is focusing attention on issues and policies to make humanities and arts information a powerful part of the Information Superhighway.

AHIP plays a catalytic role to build consensus on key issues, identifying and bringing together stakeholders, and provides leadership for the research and development process needed to establish connections between people and their cultural heritage. AHIP works to evolve and establish crucial standards to guarantee the preservation of information and ensure that it will be accessible on the networks of the future.

The AHIP initiatives include a vast array of projects and programs. The Network Access Project promotes access to cultural heritage information by mobilizing the cultural sector to create and distribute relevant information. It is currently formulating a research agent for cultural heritage on information networks, which is designed to build consensus on critical technical issues and propose solutions for them.

Representatives from interested cultural heritage communities work together to develop open systems built on a solid foundation of standards. AHIP's experience and interests equip it to play an essential catalytic role, helping those who value the arts and humanities to be ready to take advantage of the possibilities offered by this new age.

AHIP programs receive support through the Department of Commerce/NTIA's TILAP grants.

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## COMMUNITY CENTERS AND THE NETWORKS COMMUNITIES BUILD

Community centers are an excellent adjunct to schools and public libraries in meeting the needs of a community and providing public access to the Information Superhighway. Connecting community centers can fulfill the access needs of the adult population of a community; can extend the hours when the Information Superhighway is available to the community; can bring the community closer together as citizens create electronic bulletin boards, homepages, etc., that address specific needs that are not filled by schools and libraries; and can create a point of access for "special interest" groups within a community—senior citizens and veterans, for instance—who would not otherwise have access to the Information Superhighway. Connecting community centers can also allow access to the Information Superhighway for specific types of communities—the Native American community, for example—that would not otherwise use or have access to public schools or libraries.

For the purposes of discussion, a community center is defined as a physical location where community members go to meet others, learn, play, receive social services, or access both print and electronic resources. This definition encompasses a broad range of locations, including government offices (city or town halls), public institutions (post offices or municipal recreation departments), cultural or religious centers (churches or ethnic centers), and centers for at-risk populations (public housing projects or boys/girls clubs). Even privately owned shopping malls, banks, museums, and grocery stores can be regarded as centers where communities meet and, in fact, have already been targeted as test sites by several community networking efforts. In addition, electronic community centers have been established in the form of online community bulletin boards, chatlines for selected communities-of-interest—for example, LatinoNet, SeniorNet, Alzheimer's Disease Network—and/or homepages and databases for community organizations. In the broadest sense, a community could seek to be "wired" by connecting a range of physical community centers as well as creating electronic communities that connect individuals or groups to each other and to community resources.

## One in Ten Go Online in Taos

Since December 1994, more than 1,000 residents of the small multicultural rural community of Taos, New Mexico, have joined the Information Superhighway—1 in 10 residents has gone online in a community where the per capita annual income is only \$9,300 and only 60 to 65 percent of the population has a telephone at home, and that number is growing every day.

La Plaza was the first community network to access the Information Superhighway in the State of New Mexico. It is state-of-the-art, providing access to a wide array of information and communications resources to all Taoseños and other Northern New Mexicans, regardless of physical disability, economic status, cultural identity, age, or degree of computer literacy. Everyone in the region can use the network through public dial-in access. Persons who lack computers and modems can obtain 15 hours of free time each month through one of 56 terminals in the La Plaza center, located at the University of New Mexico, Taos. At the center, a La Plaza staff member is available from 9:00 AM to 9:00 PM every day to help anyone with technical questions or information needs.

Today, community residents—ranging from grade-school children to octogenarians, Taos Pueblo Indians, Hispanics, and others—are using this network for such activities as: school work; to enhance educational opportunities; to visit a virtual library, an online art gallery, and an online art museum; to look for jobs, obtain assistance on how to prepare resumes, and learn how to interview; to obtain information on prenatal care, AIDS, diabetes, emergency health care, and on other medical issues; to learn about regional history and folklore; and to keep up with events in the community.

To date, La Plaza has engaged in a number of successful, mutually beneficial joint efforts and received funding and equipment from a number of sources. It enjoys extraordinarily good relationships with the educational institutions in the Taos region, the Taos Public Library, government entities, health care providers, local museums, and the business community.

From the beginning, a close working relationship was developed with the University of New Mexico-Taos Education Center. Under a memorandum of understanding, UNM-Taos provides physical space for office and equipment, utilities, copying and other support services, and early on it provided a telephone line for the project. In return, La Plaza provides technical expertise, including setting up the UNM-Taos' internal network and LANs for the computer laboratories—and has trained university faculty, staff, and administration in the use of the Internet. La Plaza personnel also teach specialized workshops for individual groups, such as science and math teachers, other teachers in other disciplines, and the business community.

Financial and in-kind support has come from UNM, the Town of Taos, the State, Federal agencies, local business, and several large corporations. In July 1995, La Plaza was named by NH Awards as one of the top six community projects on the Information Superhighway, and nearly every day new capabilities are added. New Mexico will soon replicate this project in 20 cities across the State.

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## Luminet—A Small-Town Network with Big-City Capabilities

In 1993, a small community in Minnesota—population 30,000—had a big idea. The community wanted to connect its government, health care, business, and K-12 and postsecondary education institutions with interactive voice, data, and video communications. Winona community leaders believed that such a network would provide, among other benefits:

- Parents, teachers, students, administrators, community leaders, government officials, and business people with a means to collaborate in a virtual learning environment anywhere in the community;
- The school district with the means to deliver a multitude of applications to the community to support the idea of learning, not as a geographic place, but as a social and cognitive one;
- Means for enhancement of curriculum and staff development as well as the redefinition of the roles and instructional opportunities for teachers, students, and the community;
- More learning resources—including distance learning opportunities, and more information on demand that both engages and empowers students; and
- Means to make home and workplace connections that encourage lifelong learning and technological literacy, which in turn encourage economic progress.

To test the validity of their assumptions, the community conducted a feasibility study. To obtain initial funding for the project they looked to the Hiawatha Education Foundation, which committed \$600,000 in seed money. Minnesota's Board of Government Innovation and Cooperation also awarded a grant on the basis of the proposed network designed, which focused on human and government services.

Luminet, the name chosen for the Winona network, formally came into being in December 1993, and is being implemented in three phases. During phase one, nine sites, including postsecondary and secondary educational institutions, local government, and a health care facility were interconnected. In phase two, a full fiber optic ring that extends around Winona to include elementary and middle schools, the library, and business is being installed. In phase three, the feasibility of bringing broadband and multimedia capabilities into homes is being explored.

Luminet's principal purpose is education for both traditional and nontraditional users, including business and industry. Thus, the network is applications driven and designed to address identified needs, such as sharing resources of time, talent, and technology, providing opportunities for professional collaboration on a global scale, fostering experimentation with new teaching/learning methods, lowering the costs of education and training, enabling all Winona institutions to access each other, removing regional barriers for information access, developing community groups to encourage enduser participation, identifying ways to create "knowledgeware," and developing new applications that can be shared within the region and around the world.

## Community Networking via Broadband Cable

The 30,000 residents of Glenview, Illinois, a suburb on the north side of Chicago, are now enjoying access to Information Superhighway resources, including online public catalogs of all public libraries, through a local television cable network that links schools, libraries, local government agencies, and other organizations to each other, and to the Internet via a high-speed network.

Planning for the communitywide network began several years ago. A number of civic committees and organizations were aware of the potential of network connections and were eager to find a method of interconnection.

The head of the public library wanted to see his institution make use of Internet resources. A school superintendent wanted a more reliable mechanism than the phone link to a public bulletin board system in Chicago then run by hobbyists. Administrators at other schools in Glenview were discovering the resources available on the Superhighway. The Glenview Schools already had extensive building networks and equipment in their buildings that provided the raw material for interconnection.

The breakthrough came with the discovery of a separate two-way cable system in Glenview that had lain fallow for 10 years. Engineers found it possible to restore this unused cable system to working order quickly and easily. This discovery made the cost of communitywide interconnection fall within reasonable limits. Three local organizations committed to share the cost of interconnection and maintenance, and Glenview's community network was soon up and running.

Glenview, Illinois  
Internet Access: [http://  
www.glenview.lib.il.us/](http://www.glenview.lib.il.us/)

"I firmly believe that the Internet, e-mail, Net News, and the World Wide Web's ability to present virtually all types of printed documents in an easy format will be as important a watershed in the history of mankind as was the development of the printing press." —*John P. Mundt, former head of administrative computing, Glenview School District 34*

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## Community Coalition Builds a Local Network

Clark County, Nevada, is one of the fastest growing communities in the Nation. The county school district covers more than 8,000 square miles—including the City of Las Vegas and vast rural areas—and serves 166,788 young people through 127 elementary, 27 middle, 24 high, and 6 special education schools. In the past, county size and diversity have made equitable dissemination of information and services between schools, local government, and human resource providers such as United Way of Southern Nevada, difficult, if not impossible.

Because of the challenges presented by rapid growth, the Clark County Public Education Foundation, under the direction of its executive director, Judi Steele, is looking to the Information Superhighway as a cost-effective means to improve academic achievement levels, solve challenges of inequity of educational resources for students in the rural and urban sectors of their community, and develop a collaborative partnership among businesses, schools, and the United Way of Southern Nevada.

Founded in 1992, the Clark County Public Education Foundation created InterAct™—an education and community resource network. The foundation is an independent, nonprofit corporation created by business and community leaders to mobilize the community to support public school projects and initiatives to improve student performance and prepare students for the 21st century. Since then it has raised more than \$6 million from the community for those purposes. The Department of Commerce supported the effort with a TIAP grant.

To implement reforms, the foundation created an alliance of the home, school, and business communities that included school board members, school administrators, teachers, parents, students, and representatives of the business community. This group developed a plan, built a consensus for that plan, and engaged in collaborative problemsolving to create a computer network that would serve all members of the community. The United Way of Southern Nevada partnered with the foundation to bring community resources information to educators and distribute school information to the community. The United Way also marshaled additional community support from such groups as the Nevada Association for the Handicapped, Center for Healthy Families-Sunrise Hospital, Catholic Charities of Southern Nevada, Howard Cannon Senior Center, University of Nevada, Las Vegas, and other community agencies.

Recently, InterAct™ created a global village partnership with the Milton Keynes Community Network in Milton Keynes, United Kingdom. Through InterAct™, teachers, community members, and students are able to share ideas and resources, promote international cooperation, and discover the wonders of different cultures.

Community leaders believe that the rich cultural diversity of the community and the unique collaborative perspective that participating organizations bring to this project is a key factor in the overall success of this venture. The diversity of the coalition ensured that the network maintained a productive edge, always reflecting community needs.

## **Bridging Cultural and Technological Barriers to Unite a Native American Nation**

The Navajo Reservation covers 25,000 square miles in Northern Arizona, Western New Mexico, and Southern Utah—roughly the size of West Virginia. Its population hovers around 225,000, the majority of whom raise sheep, horses, and cattle, and live on the open range in hogans, trailers, and mobile homes. Medicine men and women perform healing ceremonies for the ill, despite the availability of modern hospitals and physicians trained in Western medicine. Computers, and for the most part, the people who sell them, are not a part of this world.

Devising a plan for wider access to computer technology within the Navajo Nation has required addressing cultural and religious beliefs of the Navajo people and achieving a strategy to coordinate the use and development of computer technology that respects tribal songs and prayers. That has meant helping the Navajo people understand that the machines are a key to bringing myriad affirmative benefits to the Navajo Nation such as improved health care, education, the tribal court system, and administration of law enforcement and child welfare programs.

In addition, it is being used to: provide grassroots training and organization; help build communities and get community members involved in such activities as lobbying for building a new library; develop an overall information strategy to achieve distributed processing of financial transactions to the agency and chapter levels of the Navajo Nation Government via computer technology; allow for agency and chapter access to various Navajo Nation Government data and information via computer technology; and allow for agency and chapter access to the Internet.

Although substantial effort has been required to get the network off the ground—many members of the Navajo community live and work in remote sites in New Mexico that lack telephone access—currently, the network can accommodate 500 to 600 users simultaneously and includes six public access points. Funds and other support for the project have come from the Bureau of Indian Affairs, the Indian Health Service, the University of New Mexico, Gallup, San Juan Community College, and the Department of Commerce/NTIA's TIIAP grants.

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### **Making Healthy MUSIC**

Residents of New Community Corporation's housing in Newark, New Jersey, whose children attend Newton Street Public School, are now linked by an electronic network that puts them in communication . . . with each other. The purpose of the network is to improve student achievement by improving the delivery of primary health care. Additionally, the program introduces people to and teaches them about computer information technology.

The most popular discussion groups on the network are Circle of Brothers, Circle of Sisters, About AIDS, and Parenting and Housekeeping. One woman who lost her son, daughter-in-law, and granddaughter to AIDS hosts a discussion group on AIDS. She is committed to educating the community about the importance of avoiding HIV infection and considers the discussions a form of therapy to deal with her grief.

The community database is designed on the metaphor of a house with many rooms. Neighborhood captains have . . . music, writing, etc. The project is working to empower community residents to overcome their lack of transportation, concerns about confidentiality, and apprehension about discussing health problems.

Funds for the Newark Public Schools project come from the U.S. Department of Commerce/NTIA's TIIAP grants. The project links residents' homes with New Community Corporation and the New Jersey Medical School, i.e., University of Medicine and Dentistry of New Jersey, the two partners of the Newark Public Schools in the program—along with Rutgers University, Newark Public Library, *The Star Ledger*, and other agencies.

## Community Wide Education and Information Service

Community Wide Education and Information Service (CWEIS) is a program through which public broadcasters have been instrumental in establishing community computer networking projects across the Nation. CWEIS projects develop and encourage free and universal public access to education and information online services. Public radio and television stations across the county participate.

For example, KQED-FM and KALW-FM (with their public television counterparts) are involved in a San Francisco-based computer network project called "San Francisco CityLink Bridge." These public radio stations and their educational and civic partners established a central Web site that aggregates information about community resources. It provides access to the San Francisco Public Library, local elementary and secondary schools, the California Department of Education, local institutions of higher education, public broadcast information, State, Federal, and international government resources, and information on health and social services available from the City and County of San Francisco.

The system is designed to meet a variety of needs through a network of different access points. School children can access the central Web site from computers at their schools or homes to get help with their math skills, or even learn how to dissect a frog. Visitors can look at the Web site for maps, restaurant recommendations, and travel arrangements.

For persons without access to a computer, the city's public libraries offer free community access. Through these information kiosks, homeless persons can access the city's Department of Human Resources online publications on "How to Get a Job in San Francisco" or "Permanent Job Opportunities." The online information is supplemented by programming on government access cable channels, as well as programs on public broadcast stations.

One of the unique educational experiences that visitors to the San Francisco CityLink Bridge site have access to is National Public Radio's (NPR) Science Friday Kids Connection program (SFKC). KQED-FM (a participant in both projects) has joined with Luther Burbank Middle School and NPR's Science Friday and its scientists to make science education fun for middle school students. KIDSNET, the only national nonprofit computerized clearinghouse devoted to children's television, radio, audio, and multimedia, is also a sponsor of the project.

The program involves seven NPR member stations and a local school in each station's service area. Using a variety of broadcast, Internet, print, and hands-on resources, the students are working with Science Friday scientists to develop exciting and challenging science projects.

These and the rest of the projects in the partnership will culminate in a special Science Friday broadcast in spring 1996.

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cweis/cweisz.html](http://www.cpb.org/cweis/cweisz.html)

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“Community residents are coming to the family rooms because they perceive that they need computer training to get a better job and they are excited about being able to get the training in the neighborhood.”—  
*Shella Martin, University Settlement's development director and liaison to the United Neighborhood Houses of New York project*

## Neighborhood-Based “Family Rooms” Benefit a Community’s Low-Income Residents

Over the years, unemployment and poverty have been common in the settlement houses of New York City’s Lower East Side. Today, United Neighborhood Houses of New York, Inc. (UNH) is attempting to better the lives of residents of these houses through an initiative that improves the delivery of integrated human services and enriches recreational, cultural, and educational activities. Use of the Information Superhighway is at the heart of this initiative.

As a result of this initiative, every settlement house now has a “neighborhood-based family room”—a place where multimedia computers and Internet access community residents can learn computer skills and access telecommunications-based resources for job and referral services. And, as Nancy Wackstein, executive director of Lenox Hill Neighborhood House in Manhattan reports, these family rooms have become “. . . a first point of contact for people with problems in our neighborhood. . . . [M]aking Internet access available greatly magnifies the information resources that we bring to bear when residents of our community come to us for help. For example, one early participant in our computer program was able to use the Internet to get information about cancer support groups when he learned that he was suffering from the disease.”

Settlement house family rooms have also been used by teens in the Summer Training and Employment Program (STEP) to produce their own newsletter, an afterschool program for at-risk youth, adult literacy classes, a Saturday program where parents and their children use the computers together, and numerous other activities for groups and individuals.

UNH is a nonprofit agency supported by the Department of Commerce/NTIA’s TIIAP Program.

## **Project DIANE—A Diversified Information and Assistance Network**

In Tennessee, children and disadvantaged youth are seeking and receiving guidance from senior citizen volunteers, the hearing impaired and others are attending sign language seminars and deaf culture workshops, and teenagers are interviewing with admissions officers at Tennessee's State University and applying for summer jobs—all through the videoconferencing facilities of the Diversified Information & Assistance Network (Project DIANE).

Project DIANE is a nonprofit, community-oriented network developed to provide communities and schools with information resources and professional expertise for education, community service, and small business development. Since 1992, it has helped to equip, recruit, and train teachers, scientists, librarians, community workers, business counselors, and other public service providers to use emerging information technologies. Currently more than 12,000 children and adults from educational institutions, community service organizations, economic development agencies, businesses, and communities in Nashville, as well as other parts of the country, are making use of the network.

To date, DIANE-based programs and applications have included: distance learning and tutoring, K-12 interactive remote field trips, distance mentoring, library reference services, children's story hour, interactive puppet shows, health care programs, small business counseling and training, language instruction, science and nature lectures, expert faculty consultations, computer software training, communication support for speech and hearing impaired persons, senior citizen assistance, and community-oriented applications. In addition to regularly scheduled activities, DIANE organizations also conduct special events ranging from workshops to community forums. Individuals and service organizations can use DIANE for such activities as:

- Conducting full-screen, two-way videoconferencing;
- Providing high-quality FM stereo-like voice communications;
- Transmitting multimedia information and jointly creating, editing, or annotating an electronic document or digital image;
- Watching remote VCR or laser disc video recordings;
- Sending e-mail; and
- Receiving stored or real-time information from satellite downlinks, local area networks, coaxial camera systems, or other interconnected external sources.

Users can access the DIANE network from 26 different locations. DIANE is an all-digital, dialup, wide area network. Interactive video and multimedia computer users connect locally to DIANE via local public telephone company ISDN circuits and to DIANE service centers in other cities via long-distance telephone company virtual private network services.

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## REGIONAL AND STATE INITIATIVES

### **Businesses, Educators, Local Governments, and Citizens Join to Create a Smart Valley**

One of America's most innovative, promising demonstrations of the power of community leadership is happening in Silicon Valley, California. Four years ago, faced with daunting challenges to the Valley's future attractiveness as a place to live and work, leaders from business, government, education, and community organizations decided to work together collaboratively to rejuvenate the Valley's economy and strengthen its quality of life. With that bold mission, they formed a new regional organization, Joint Venture: Silicon Valley Network. Its long-term vision is to build a community collaborating to compete globally.

Joint Venture launched a number of initiatives to pursue these goals. Recognizing the centrality of education and technology, two of these initiatives are the 21st Century Education Initiative, which is helping to bring about systemic change in K-12 education, and Smart Valley, whose mission is to help develop an electronic community.

Together, the Education Initiative and Smart Valley created Challenge 2000, a 5-year, \$22 million effort, funded by corporations and foundations, to help build a world-class educational system that will enable all students in greater Silicon Valley to be successful, productive citizens in the 21st century. The Challenge 2000 coalition includes chief executive officers of major local companies, school superintendents, teachers, parents, and other community leaders who have joined forces to achieve systemic and sustainable changes and measurable gains in student achievement.

Challenge 2000 provides an opportunity to integrate the Valley's technology effectively into education. Successfully integrating technology into the learning process requires not only the right equipment, but also the right skills, institutional support, and clear objectives. Challenge 2000 provides technology only to schools that can clearly demonstrate how the technology will improve student learning.

In its first year, Challenge 2000, with assistance from the 21st Century Education Initiative, has selected four Renaissance Teams, representing 37 elementary, middle, and high schools serving 27,000 students in Silicon Valley, to receive financial and human-resources assistance to improve their educational processes. These "vertical slices" of elementary, middle, and high schools are working together, some for the first time, to give students an integrated continuum of world-class education.

Smart Valley is providing technical guidance for the effective use of technology in the schools. One of its projects is Smart Valley Technical Guidelines to help K-12 schools design a local and wide area network. The Guidelines leads schools through a decisionmaking process for the design of their networks.

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The Smart Schools Resource Bank is assembling donations of hardware, software, and technical-support personnel to ease the financial burden of bringing technology to schools. With this technical capability, students, for example, can tap into libraries at Stanford University and San Jose State University; run simulations on supercomputers at Lawrence Livermore National Laboratory; and access scarce resources such as video materials and master teachers through two-way video links.

Another Smart Valley effort to connect people in communities to the Superhighway is a public access network. Sites are being opened in public libraries, city and county administrative offices, and retail outlets.

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## North Carolina Information Highway

The North Carolina Information Highway (NCIH) is an example of how one State is harnessing state-of-the-art broadband information technology as a strategic tool for economic growth and social welfare. It is the product of long-range planning and vision, cooperation between government and industry, and a commitment on the part of potential users.

In addition to social benefits in education, law enforcement, and health care, State planners believed that the NCIH would be a powerful economic development tool for both luring new business and encouraging existing business to expand operations. A March 1994 study by the WEFA Group, a leading economic forecasting firm, predicts that over the next decade, the North Carolina economy will gain \$2.7 billion and 44,000 jobs because of the NCIH.

Planning for the network began in the 1980s and was fueled by the success of several testbed projects in the early 1990s, such as: Vision Carolina, a 2-year, public-private project that employed fiber optics to link 16 sites—high schools, community colleges, universities, and a medical center; and the Impact North Carolina project, which demonstrated the value of copper-based distance learning by linking Appalachian State University and nearby public schools.

NCIH will link more than 3,400 sites—public schools, hospitals, libraries, community colleges, universities, law enforcement centers, courthouses, prisons, and local and State government locations—in all 100 counties of the State. Implementing the network has required upgrading the State's public switched network to link the sites with the high-speed fiber optics cables and advanced ATM broadband switches and SONET transmission systems. Southern Bell, Carolina Telephone, GTE South, and the 24 other local telephone companies who are building the network will own and operate it as they have with the State's public switched network. The State serves as the network's anchor tenant.

The State is obtaining funds for the project from a variety of sources, including: local budgets and bonds, reallocating existing money at local and State levels; Federal and foundation grants; and new appropriations from its General Assembly, which in 1994 appropriated \$7 million for a grant program.

A former North Carolina legislator once described the Tar Heel State as having islands of prosperity in a sea of poverty. State officials believe that the NCIH, once fully deployed statewide, will serve as a great equalizer of resources between urban and rural areas, and the wealthy and low-income residents. For North Carolina, the main benefits of the NCIH fall into four categories—increased efficiency, access to information, equity in education, and sharing of resources. On the surface, these benefits may appear abstract, but when applied to specific areas of society—government, education, crime control, health care, and economic development—North Carolina State officials believe they are clear and concrete.

## Hawaii Education Network

The people of Hawaii, dispersed as they are across eight major islands, have special reason to look to a future in which all learners are empowered to fully participate in the global village. This long-range goal dictates the State's pragmatic decision as it designs and implements an educational technology infrastructure that will provide access for all learners.

The effort to date includes local and statewide efforts. Locally, for example, more than half of Hawaii's elementary and secondary schools have begun installing the cabling needed for local area networks. Statewide, Hawaii has instituted a network (I-Net) that links 243 elementary and secondary schools, the University of Hawaii, and approximately 50 district and State offices.

Hawaii is extensively cabled for CATV, and indeed cable television is important to the State's education technology goals. The State's distance learning programs rely on several different technologies to provide connectivity, the State's microwave backbone, leased telephone lines, interactive video between islands, and ethernet-over-CATV capability. These and other investments in infrastructure already allow the State to offer its students and teachers a substantial amount of two-way communications. For example:

- In Hawaii, 240 hours of distance learning programming is delivered each week: 72 percent is delivered live with interactive capability over the State's I-net.
- The University of Hawaii offers 40 to 50 courses each semester, including a number that fulfill associate's, bachelor's, and master's degree requirements. There are also courses that are part of emergency medical services training, courses that help preserve the islands' indigenous language, and workshops that prepare nontraditional students for higher education.
- The State Department of Education offers 65 hours of programming designed for students in elementary and secondary schools and for in-service teacher training. The State's standards are high: for example, the award-winning KidScience program has enabled students to speak with astronauts on the space shuttle and with scientists under the sea in Antarctica; and a series on a voyaging canoe, the *Hokule'a*, had its own Internet homepage and toll-free number so that schools could track the canoe as it sailed the Pacific.
- In early 1996, the Department of Education will launch its Electronic School, whose mission is to prepare Hawaii's students to succeed in the 21st century's global society. The first emphasis will be on the global Network News (a student-run Internet newspaper and news channel) and a student-run World Trade Center. The electronic approach will also allow students living in rural and remote areas to take the full range of course offerings provided throughout the State, or any student to take advantage of accelerated study.

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"We have tried to create a community in Waialua Elementary like the real world . . . we call it our 'microcommunity'. In our system of government, we have a court and a legislative body called the House of Students. The School/Community-based Management Council (Hawaii's statewide school reforms council) allows the House of Students to pass bills which may even change the school's rules . . . Maybe in the future . . . we could collaborate with other schools to create a United Nations of Students over the Internet dealing with world issues . . ." *Kelly Seleaka (5th grade student) and Ashley Barit (6th grade student)*

"Connecting to any place, at anytime, with anyone is what we envision students doing . . . Students need not just read about an event or place . . . they could literally travel, visit, and experience it . . ." *Cindy Hagino, Waialua Elementary School resource teacher.*

ARKnet  
Internet Access: <http://www.uark.edu/state/ARKnet>

## Arkansas ARKnet Brings Communities Together

What began in 1991 as an effort to link all higher education facilities in Arkansas to the Internet has mushroomed to include interoperable networks in the public school system, libraries, medical research facilities, State government, and cities and towns statewide. As of November 1995, all 4-year public and private colleges and universities, rural community colleges, and community centers in every part of the State had access to each other's information and education services and to the Internet.

The Arkansas approach is to help your neighbor. Every community project to join the Information Superhighway has, to date, been successful, and each success story becomes a model for the next. Communities send teams of technology planners to make site visits across the State looking for opportunities and solutions that may apply to their communities.

Mentoring among discipline specialists in higher education and public school-teachers has flourished since ARKnet (the higher education and research network) met the Arkansas Public School Computer Network (APSCN), a private, nonprofit organization operating under the State Department of Education. ARKnet is operated by the University of Arkansas on behalf of more than 45 member institutions that support telecommunications and information infrastructure. In the APSCN network of the more than 1,500 school buildings targeted to be connected, more than 500 are currently online, supporting more than 2,000 teachers and administrators and more than 18,000 students.

Projects are now springing up all over the State to generate support for local infrastructure development. Funding streams combine community, State, and Federal sources. In the rural Lake Hamilton School District, for example, voters recently approved a \$2 million capital outlay tax earmarked for technology development in the public schools. ARKnet and APSCN coordinate network design for sharing line costs in communities where these two networks coexist.

Among the uses of the combined networks are these:

- The Bernice Jones Center for Families has opened in Springdale, with a learning resource room that has Internet and videoconferencing capabilities and is open and free to the public. The Jones Foundation supports the project, which also links all Springdale public schools, the community center, ARKnet, and Internet, and provides every public school classroom with a computer for network access.
- Henderson State University established the Arkadelphia Community Network, a joint project with the university, TCA (a cable television service), and Digital Equipment Corp., which provides the broadband to ethernet technology required to make this network operational.

Other uses link members to the Arkansas Science Teachers Association, libraries throughout the State, and the University of Arkansas Government Relations Department homepage, which dispenses general information about the three branches of State government.

## SUMMARY

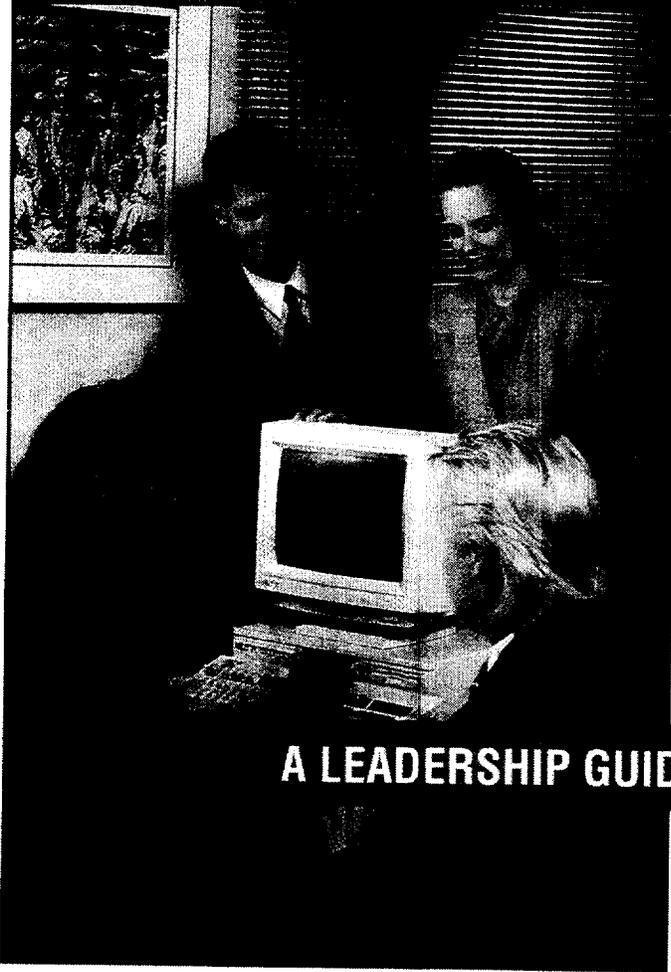
The collection of success stories presented here offers a rich mosaic of innovation depicting various ways communities are connecting to the Information Superhighway. Although each story is unique in its approach and context, the stories viewed as a whole offer some key insights.

First, there is no single or best starting point for connecting to the Information Superhighway. Getting started depends on the availability of "startup" funds, the knowledge and expertise of local leaders, and the readiness of community members. Encouraging communities to create their own approach, context, and framework is a powerful message in the stories.

Second, broad-based participation and collaboration are considered important strategies to build sustained commitment. Although many of the success stories point to the need for "champions" to lead the changes described, long-term success comes from the sustained participation of all stakeholders.

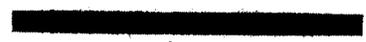
Third, technology is viewed as a facilitating force (not the driving force) for the substantive work of schools, libraries, and community centers. For example, many of the schools' success stories focused on the Information Superhighway and new forms of learning and innovative approaches to teaching.

Fourth, as communities move forward with connecting to the Information Superhighway they are grappling with difficult policy issues—acceptable fair use, privacy, security, and intellectual property rights.



## **section2**

**A LEADERSHIP GUIDE TO GETTING THERE**





## part1

# Galvanizing the Stakeholders

Dedicated community-based leaders and change agents will be needed to kickstart communities and shape broader Information Superhighway applications at the local level. They are the best situated to identify, establish, and cultivate the key opportunities for building positive collaborations leading to successful projects within their own individual communities.

Locally based stakeholders—both on an individual and group level—can pool and leverage expertise, resources, and hard work to make lifelong learning and other community resources available to all through public access sites such as schools, libraries, and community centers.

Renewed focus on community awareness and equalized public access to Information Superhighway resources will improve the quality of life of all residents by:

- Empowering individuals;
- Increasing both individual and community creativity; and
- Reinvigorating community spirit by encouraging greater individual involvement in and responsibility for local affairs.

### THE STAKEHOLDER ROLE

Stakeholders are individuals, associations, or organizations with an interest in a particular issue. Because of their varied backgrounds, affiliations, and interests, they often hold different, and even divergent, perspectives on how to best manage the issue and even what the final objectives should be. However, despite dissimilar value systems and the potential for conflict, stakeholders can develop innovative, creative, and positive strategic alliances that often result in formal partnerships. Drawing from each other's strengths, such alliances and partnerships can pool and leverage collective knowledge, expertise, and resources—be they human, technical, or financial—to achieve mutually desired outcomes.

Positive, mutually beneficial alliances and partnerships are only possible when stakeholders commit to flexibility, negotiation, and compromise. To accomplish this, however, stakeholders must first agree on the desired outcomes and means to achieve them. Once desired outcomes have been identified, initiating stakeholders can identify, reach out to, and incorporate other locally based groups who have something to offer to the process—groups who can themselves become project stakeholders.

Collaboration requires open and frequent communications. Meetings should include policymaking and technical representatives who have decisionmaking authority. Partnerships can increase awareness on the range and depth of locally available expertise.

## Stakeholder Roles in KickStart

Despite the wide array of potential stakeholder groups who can richly inform and contribute to the goal of enabling ubiquitous societywide access to the Information Superhighway, achieving KickStart's goal involves primary stakeholders who can effectively operate at the grassroots level:

- **Educators.** Instructors from all educational levels, including K-12 schools, community colleges, 4-year colleges and universities, and institutions for vocational training and continuing education.
- **Librarians and other cultural heritage professionals.** Employees of libraries, museums, archives, historical societies, and the like.
- **Parents.** In collaboration with educators and with their own children.
- **Boards.** School, library, and community center boards that oversee the operation, budget, and management of these institutions.
- **Administrators.** School, library, and community center administrators who are responsible for daily operation and management of these institutions.
- **Private sector.** Individuals and organizations from the for-profit, not-for-profit, and nonprofit sector.
- **Government officials.** Elected officials and public servants at the State and local level; and the Federal Government as catalyst and grantor.
- **Foundations.** Institutions that provide financial grants for specific projects.
- **The Public.** Private citizens who volunteer their time and equipment for specific projects.
- **Other local community groups and users.** Individuals and organizations that represent labor, consumers, public safety, health, religious groups, special-needs and ethnically diverse populations, the elderly, user groups, and others.

To succeed, the KickStart Initiative must reach and spur each of these locally based stakeholder groups and individuals to act at the grassroots level to assist deployment of wide local public access to Information Superhighway technologies and, thereby, facilitate lifelong learning for every individual in their community.

Stakeholders in each community are central to providing vision and leadership for getting onto the Information Superhighway. Each primary KickStart stakeholder has a role to play to:

- Articulate and communicate a clear vision;
- Understand the potential the Information Superhighway offers for individual growth and the reinvention of communities;
- Understand its ability to improve the quality of education and democratic institutions;
- Learn lessons from existing successful projects; and

- Understand the limitations of technology, including costs and the other challenges associated with its use.

Below are descriptions of the roles that primary stakeholders can play.

### **Boards**

As planning components for community schools, libraries, and community centers, boards provide leadership vision by communicating the importance and relevance of connectivity to the broader community and encouraging others to share this vision. Members of school, library, and community center boards who have successfully implemented Information Superhighway projects recommend their counterparts in other communities undertake the following to reach their goals:

- Make connectivity a major institutional priority and reallocate resources—financial, technological, and staff—to achieve that priority;
- Hold joint meetings with other boards to address connectivity issues, and invite members of other community stakeholder groups to become involved;
- Create a working group that includes a facilitator, to coordinate connectivity logistics;
- Be willing to start small. Recognize that the technology is scalable. In the words of one stakeholder, “You don’t need a Cadillac. You can start with a Chevy”;
- Have your institution host network services and information resources of other community institutions and organizations and make them available to the public; and
- Look at capital investments in a new way, recognizing that technology infrastructure may require a lower initial investment, but that the investment will need to be renewed more frequently than other types of infrastructure investments. Explore how replacement budgeting will enable equipment and software upgrades over time and what ongoing training will be required and must be built into budgets.

### **Administrators**

Administrators involved in day-to-day management and operations of an institution provide the vision by communicating the importance and relevance of connectivity to the broader community and encouraging others to share that vision. Beyond that role, administrators must address some very specific requirements to achieve connectivity. Administrators who have achieved interconnectivity for their institutions report that the development and implementation process requires that they:

- Make connectivity a major institutional priority and rededicate existing resources—financial, technical, and staff—to connectivity projects;
- Develop strategic planning skills that incorporate the lifecycle of technology—both hardware and software—and training;

- Initiate cooperative efforts with others in the community to leverage resources;
- Establish a working group, including a facilitator, to coordinate connectivity logistics;
- Create a full-time project management oversight position;
- Identify and apply for the connectivity and development grants available from the public and private sector;
- Initiate electronic resources and technology training programs, recognizing that training programs must be ongoing, not a one-shot event—employees must be provided with adequate training resources and time so that they can use installed technologies effectively; and
- Provide “release time” so that employees can learn the technology and tie the rewards systems to connectivity goals.

### ***Government Officials***

Government officials also have a role in providing leadership vision in communicating the importance and relevance of connectivity to the broader community and encouraging others to share in that vision. But they also have a much broader role. Government agencies should be active in this process:

- Encourage the development of electronic access to commonly consulted government and private sector information and resources;
- Work to establish a local point of presence so that community residents can access the Internet through a local telephone call;
- Provide startup seed money in the form of “connectivity grants”;
- Establish partnerships with the private sector so that resources are pooled for joint projects;
- Initiate electronic resources and ongoing technology training programs, and provide employees with adequate training resources and time so that they can use the technologies effectively;
- Encourage employees to use their skills to help others in their community;
- Collect and disseminate best practices.

### ***Private Sector***

Stakeholders in the private sector can, and should, provide financial, technological, and leadership support. Successful projects have often looked to the private sector stakeholders to:

- Provide startup seed money in the form of “connectivity grants”;
- Encourage employees to volunteer their technological skills to the community, including providing assistance in planning for the use of information technologies;
- Donate quality, useful, used equipment to community organizations in need; and