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ABSTRACT

Designed for school administrators, policymakers, and others concerned about communications and education, this report first traces the ideas and political forces that led to establishment of the E-Rate. It then looks at the practical issues confronting school districts as they seek to seize the opportunities the E-Rate affords. After examining how four school districts have used the program, the report provides a toolkit that school officials can use to organize, conceptualize, and communicate information about the impact of the program on their districts. Finally, it suggests resources for learning more about the E-Rate. The report contains the following chapters: (1) "E-Rate 101: How the Program Works"; (2) "E-Rate Policy: Universal Service in Education and Communications" (Anthony Wilhelm and Jorge Reina Schement); (3) "E-Rate Politics: A Brief History" (Andy Carvin); (4) "The E-Rate in Practice: Research Findings in Four Midwestern Cities" (Margaret Honey and Katie McMillan Culp); and (5) "An Educator's Toolkit: Planning and Evaluation of the Impact of the E-Rate Program" (Margaret Honey and Katie McMillan Culp). Appendices include a summary of legislative proposals related to the E-Rate and a list of E-Rate online resources. (MES)

THE E-RATE IN AMERICA: A TALE OF FOUR CITIES

BENTON FOUNDATION
COMMUNICATIONS POLICY AND PRACTICE PROGRAM

Edited by Andy Carvin
Additional editorial contributions by Chris Conte and Allen Gilbert

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IN MEMORIAM

This report is dedicated to the memory of Dr. Jan Hawkins, former director of the Center for Children and Technology and consultant to this project from October 1998 until her untimely passing in February 1999. Her leadership, intellect and passion for education are sorely missed.

THE E-RATE IN AMERICA: A TALE OF FOUR CITIES

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PREFACE

Nothing is more important to the success of democracy than robust systems of communications and education. Communications bind society together. Education expands its conscience. Without an effective system of communication, we cannot engage in collective action or acquire the information we need to make sound decisions. Without a strong system of education, we cannot cultivate citizens with the knowledge and skills they need to govern themselves.

Even though we have long embraced these principles, the United States has yet to deliver either a communications or an education system that provides access equally and meaningfully to everyone, regardless of their location, socioeconomic status or race. The simple fact is that some students have substantially greater prospects for success than others because they attend schools with better facilities, higher-paid teachers and safer learning environments. Similarly, some families and communities possess means beyond the reach of others to obtain information and to communicate their ideas.

The E-Rate—the federal program that offers schools and libraries a subsidized educational rate for telecommunications services—lies at the heart of the continuing struggle to create communications and education systems that fulfill our democratic creed. This sweeping innovation, which ensures students access to telecommunications services through schools and libraries, represents an enormous stride toward realizing the dream of universal access to the basic prerequisites of democracy.

The Benton Foundation and the Education Development Center/Center for Children and Technology collaborated to produce this report on the E-Rate. Designed for school administrators, policymakers and others concerned about communications and education, the report first traces the ideas and the political forces that led to establishment of the E-Rate. It then looks at the practical issues confronting school districts as they seek to seize the opportunities the E-Rate affords. After examining how four school districts have used the program, the report provides a toolkit that school officials can use to organize, conceptualize and communicate information about the impact of this important program on their districts. Finally, it suggests resources for learning more about this important issue.

Our findings suggest that the E-Rate is working: it has led to dramatic improvements in network infrastructure and Internet access at schools. But while installing hardware and wiring is a necessary step toward ensuring that all students benefit from the new learning opportunities of the information age, it is not sufficient to guarantee success in this endeavor. To sustain public support for this ambitious undertaking, we must set goals carefully, and we must document progress toward achieving them. Moreover, we must provide sustained and creative training opportunities for teachers so that they learn how to use these new tools effectively.

In short, it is no time to rest on our laurels. Much hard work lies ahead. But what better way could there be to advance our democratic principles than to bring the opportunities of the Information Age into our schools? As James Madison said, "Learned institutions ought to be favorite objects with every free people." ■

I. E-RATE 101: HOW THE PROGRAM WORKS

The E-Rate is a federally-managed program that provides significant discounts on telecommunications technologies to schools and libraries in the United States. Discounts range from 20 percent to 90 percent and are based on the percentage of students participating in the federal school lunch program who are served by the school or library. The E-Rate is administered by the Universal Service Administrative Company (USAC), a private, not-for-profit corporation that is responsible for ensuring universal service to telecommunications services throughout the country. USAC's Schools and Libraries Division (SLD) is specifically responsible for providing telecommunications discounts to America's schools and libraries.

The E-Rate is funded by money from the Universal Service Fund (USF), which was created in 1993 to ensure that all Americans could afford telephone services. With the passage of the Telecommunications Act of 1996 and the Federal Comminications Commission's subsequent implementation of the E-Rate, the fund was expanded in 1997 to support telecommunications services at schools and libraries. Local and long-distance telephone companies are required to contribute to the fund.

Services covered by the E-Rate include Internet access, videoconferencing services, high-speed data connections, phone service and certain types of internal wiring and network equipment. Computer hardware, electrical upgrades and many other services are not covered by the program.

Schools can apply for E-Rate funding individually or in groups (such as districts or state-wide consortia). The application process includes several steps:

- Prepare and submit a technology plan that meets specific SLD criteria, including a clear technical and educational strategy for implementation telecommunications services.
- Submit Form 470, describing the specific services being sought.
- Collect bids from local vendors for these services and select vendors during a mandatory 28-day competitive bidding period.
- Submit Form 471, notifying the SLD of the contracted vendors and the specific costs involved.
- Receive notification from the SLD of those services that have been approved for discounts.
- Begin implementing services. Once services are completed, discounts are disbursed directly to vendors. These discounts appear on the bills submitted to the school or library.

The E-Rate has thus far been structured as a series of funding-year cycles, with each cycle offering an application window ranging from 75 to 90 days during which institutions can submit Form 470 and begin the application process. Funding decisions are then made in waves, beginning with those institutions receiving the highest discounts and with the most basic services (such as telephone service and Internet access). Waves of funding continue to be made until all requests are met or until the budget is depleted. ■

For more information on the E-Rate, visit the Schools and Libraries Division Web site: http://www.sl.universalservice.org. A detailed list of online E-Rate resources can be found in Appendix B.

II. E-RATE POLICY: UNIVERSAL SERVICE IN EDUCATION AND COMMUNICATIONS

The E-Rate represents a vital national commitment to equal educational opportunity, as well as a significant step forward in deploying high-speed communications networks. Because it resides at the intersection of our education and telecommunications systems, the E-Rate has profound importance in each of these two spheres.

When Congress laid the foundation for the E-Rate by enacting the Telecommunications Act of 1996, policymakers cited several justifications for making such a substantial investment in bringing advanced telecommunications to schools:

- **Economic:** Availing students of access to computers and the Internet prepares them for an economy in which three out of five jobs require a working knowledge of information technology;
- **Educational:** Students gain access to a greater breadth and depth of up-to-date educational resources, and quality educational services are delivered more efficiently;
- **Community Infrastructure Development:** Building technology capacity in underserved communities diminishes the competitive disadvantage faced by certain areas, especially inner cities and rural parts of the country.

These reasons tell much of the story, but there is an even more important one. American leaders since the time of the founding fathers have recognized that a nation comes closest to achieving true democracy when all its citizens have access to information about their government, the knowledge to imagine new possibilities and the opportunity to participate in political discourse. Whether we debate the future of education or debate who shall have access to essential telecommunications services, we should ask the question: How do these proposals advance a democratic way of life?

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In recent years, however, the meaning of our democratic heritage has been up for grabs. Much as Alexis de Tocqueville predicted in the 19th century, Americans have been wrestling with a tension between two cherished values we associate with democracy: liberty and equality.

This conflict has taken center stage in education policy since at least the *Brown v. Board of Education* decision in 1954. Our tradition of public education open to all students reflects our commitment to equality. Indeed, many state constitutions uphold education as a fundamental right; New Jersey, for instance, guarantees all children a "thorough and efficient education." Some parents and concerned citizens have argued that lack of resources in impoverished districts effectively means that children are being denied equal educational opportunity. "Unless we get equal resources and funding to the poorest schools, there will never be equal education," notes Gary Orfield, a professor at Harvard University's Graduate School of Education. "Even with those resources for all schools, there will be some inequalities."

Courts have found such arguments persuasive, prodding policymakers to seek resource parity or educational "adequacy" across school systems. However, the pendulum in education reform has swung in recent years away from this emphasis on equality. Schools should be held accountable for meeting certain standards, the newer thinking goes, and in districts where schools are perceived to be failing, parents should have the freedom to send their children elsewhere. But while choice may be good for individual children and families, it risks sidestepping the problem of underachieving schools.

Policies addressing communications technology also have been in flux. Just as we developed a system of universal education, we traditionally have sought to establish a system of universal service in telecommunications. In particular, policymakers have concentrated over the past half-century on ensuring that all Americans can avail themselves of telephone service. Universal service policies have been remarkably successful; currently, more Americans are connected to the telephone network than ever before, due in part to regulations that reduce the cost to poor households of both installing telephones and using them to make calls.

But just as some would have us turn away from equality in education, telecommunications policy appeared a few years ago to be shifting toward a greater emphasis on liberty. The Telecommunications Act of 1996 sought to spur the deployment of advanced telecommunications technologies primarily by enhancing industry competition. In other words, lawmakers looked first and foremost to a competitive market to provide affordable and ubiquitous services.

Within this pro-deregulation atmosphere, however, an idea began to take root: access to high-speed connections (ones much faster than standard telephone lines) is fundamental to our democracy. We have previously acknowledged telephone service as essential so that people can communicate with the outside world, dial emergency services and seek information. Today, the idea gaining currency is that advanced information and telecommunications services also are necessary because they allow us to engage in activities that palpably affect our quality of life, such as distance learning and electronic commerce. Perhaps most importantly, we increasingly understand that high-speed networks could revolutionize education—and indeed are already beginning to do so in schools fortunate enough to have access to them.

The growing recognition of the importance of new telecommunications technologies came at a time of growing concern over the "digital divide" separating individuals and communities that have access to these tools from those that do not. Although Congress was not ready in 1996 to include advanced services to the home as a key component of universal service, lawmakers did see public access to these tools in schools and libraries as a stepping stone to developing a modern communications infrastructure in communities. Faced with the likelihood that the latest information and communications tools probably would not reach our public schools and local libraries for a long time, policymakers felt compelled to take steps to meet the infrastructure needs of these institutions.

Congress sent a clear message in crafting the E-Rate. It acknowledged that the market would not deliver ubiquitous service to poor communities—at least not as fast as the belief in democracy and equal opportunity required. And by designing the E-Rate so that it would provide the greatest benefit to the poorest communities and rural populations, Congress committed the nation to leveling the playing field in a society in which rapidly changing technology exacerbates inequalities. As an indication of just how far the pendulum could be swinging toward equality in telecommunications policy, former Department of Commerce Assistant Secretary Larry Irving suggested in July 1999 that Internet access is fast becoming a civil right. Of course, naming something a right does not guarantee everyone access to these tools. However, it does shift the debate since civil rights demand appropriate public action to ensure that they work in practice and not just exist in principle. Thus, if the primary mode of delivering high-speed connections to Internet-based applications through the market is a civil right, then new policies are necessary to protect it and ensure its effectiveness. Creation of the E-Rate also sent an important policy signal concerning education. By singling out schools and libraries, Congress also renewed the national commitment to equal opportunity in education.

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There is, of course, no easy remedy to inequality in a free society, since policymakers can in part control the floors but not the ceilings relative to educational and technological advantage. Thus, governments cannot and should not discourage college-bound youth from taking advanced placement courses, despite the fact that these classes may not be offered in high schools in less well-to-do parts of town. Rather, policymakers should try to equalize access to these classes. Similarly, the authorities cannot wrestle computers and modems from the hands of affluent children because others cannot afford them. Instead, if telecommunications access is considered essential to the learning process, it ought to be as available as possible in schools and public access centers. Every child should be offered a fair shake in gaining access to a wealth of resources, opportunities for communication and tools for personal expression.

Moving equity issues back to the front burner of educational reform will require a concerted effort among local, state and federal policymakers. But the E-Rate is a significant start. Educational equity expert Marilyn Gittell, professor of political science at the Graduate School of the City University of New York, has suggested "a school reform agenda for the 21st century requires recognition that school reform, like schools, cannot be separated from other community reform efforts." A commitment to revitalize institutions will happen as programs like the E-Rate are viewed in terms of giving all Americans—particularly our children—the resources and opportunities they deserve. ■

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III. E-RATE POLITICS: A BRIEF HISTORY

The origins of the E-Rate can be traced to the National Information Infrastructure Advisory Council (NIIAC), established by President Bill Clinton on September 13, 1993. In Executive Order 12864, the president directed the Department of Commerce to form a council that would advise then-Commerce Secretary Ron Brown on the development of a National Information Infrastructure (NII), a seamless network of information and telecommunications services. According to the order, the NII would integrate "hardware, software and skills that will make it easy and affordable to connect people with each other, with computers and with a vast array of services and information resources." The executive order also stated that the council should make recommendations concerning the appropriate roles of the private and public sectors in creating the NII, as well as regarding the issue of universal public access to this information network.

Secretary Brown selected more than two dozen leaders in telecommunications, broadcasting, computing and education, as well as representatives of state and local government, to participate in NIIAC. With Vice President Al Gore serving as chairman, the council conducted more than a dozen meetings, gathering views of a diverse range of community leaders, businesses and private citizens between February 1994 and December 1995.

As 1995 drew to an end, the council developed a project known as *The KickStart Initiative: Connecting America's Communities to the Information Superhighway*. KickStart reflected the council's conclusion that efforts to develop a National Information Infrastructure should be concentrated at the local level. The KickStart Initiative would help communities develop tools to launch their own networking efforts. Schools, libraries and community centers would be the vanguard of this movement, giving citizens their first access to the Internet and other networks.

Following the publication of KickStart, NIIAC released its final report, *A Nation of Opportunity: Realizing the Promise of the Information Superhighway*, which detailed a set of recommendations for building the NII. Among its findings, the report encouraged policymakers to expand traditional notions of universal service to include providing every citizen access to the information superhighway. The council wrote:

> The United States, indeed the world, now stands in the midst of the information revolution. This nation must ensure that the enormous empowering capabilities these new information and communications services afford will be available to all Americans and not create a society of information "haves" and "have-nots."...Traditional concepts that have existed within the communications industry for decades must be reevaluated...The traditional concept of universal service must be redefined to encompass a concept more in line with the Information Superhighway of the future.

Continuing the strategy outlined in the KickStart Initiative, the council went on to encourage NII connectivity through schools and libraries. "A short-term national goal should be set to deploy Information Superhighway access and service capabilities to all community-based institutions that serve the public such as schools and libraries by the year 2000," the council stated in its report.

The Clinton administration quickly embraced many of the advisory council's findings. Within a year, the council would begin to see the fruit of its labors translated into federal law.

"The traditional concept of universal service must be redefined to encompass a concept more in line with the Information Superhighway of the future."

—NII Advisory Committee

SNOWE-ROCKEFELLER AND THE TELECOMMUNICATIONS ACT OF 1996

For several years, a movement had been brewing to overhaul U.S. telecommunications policy. Numerous politicians and industry leaders were ready to re-write the 60-year-old law that governed telecommunications policy to reflect modern economics and new technologies. The Clinton administration and its allies in Congress began to propose ways to incorporate the council's findings into the proposed telecommunications law. At the same time, organizations such as the Consortium for School Networking (CoSN) and the International Society for Technology in Education (ISTE) advocated a national initiative to connect U.S. schools to the Internet.

In April 1995, Sens. Jay Rockefeller (D-WV), Bob Kerrey (D-NE) and James Exon (D-NE) proposed requiring telecommunications companies to offer educational institutions access to their digital networks at the lowest cost available. The overriding goal of some of the earliest proponents was economic development. "We have to harness this technology so it is put to positive use in our classrooms," Sen. Rockefeller argued in 1998. "By doing this, we will have a workforce that can attract the businesses and industries who are looking for the skills needed for the new economy."

Beyond the prospect of a highly skilled workforce was a conviction that technology would greatly improve educational opportunity. Sen. Kerrey suggested that "by providing schools and libraries access to the nation's telecommunications infrastructure, we are giving our students a chance for a better education." Several of the most active supporters of the E-Rate represented states with large rural populations. They argued that building information technology infrastructure in schools could counteract some of the disadvantages associated with living in sparsely populated or remote communities.

"We have to harness this technology so it is put to positive use in our classrooms. By doing this, we will have a workforce that can attract the businesses and industries who are looking for the skills needed for the new economy."

—Sen. Jay Rockefeller

Opponents of the E-Rate protested that the proposal would require telecommunications companies to contribute to an existing universal service fund to help cover the cost of educational access. The measure almost died in the Senate Commerce Committee, but Sen. Olympia Snowe (R-ME) joined Sen. Rockefeller and the Senate Democrats in supporting the bill. "With the E-Rate," Sen. Snowe stated, "we can ... give [our students] the tools they need to learn." The Commerce Committee subsequently approved the proposal by one vote. The Snowe-Rockefeller Amendment, as the measure came to be known, became a rallying point for educators and policymakers determined to get schools and libraries online. In June 1995, the Senate passed a telecommunications bill that included the Snowe-Rockefeller Amendment.

The House, meanwhile, took up a separate telecommunications bill that would have ordered the Federal Communications Commission (FCC) to create a board of state and federal agencies to develop a plan for ensuring Internet access to schools and libraries. The bill did not specifically guarantee affordable access to the Internet.

Snowe-Rockefeller's survival was by no means certain, but the Clinton administration lobbied hard for it. Prominent in the fight for Snowe-Rockefeller was Reed Hundt, chairman of the FCC from 1993 to 1997. A former teacher, Hundt passionately advocated Internet connectivity for all American schools:

> Today, despite all the efforts made by teachers who are far better than I was then, I know that there are still far too many classrooms that resemble the desolate, outdated classroom in which I taught in 1969. And in many ways, it is all the more tragic because today there are so many more tools at our disposal that could be used to realize those dreams into reality. Access to the Internet could provide even

the poorest school with the resources of the world's libraries. E-mail would allow frequent contact between students, teachers and parents. Computers and quality software would allow children to start learning the skills they need to learn, explore and find ways of realizing their individual dreams.

Despite numerous pronouncements that a comprehensive telecommunications act would never survive (at one point Rep. Michael Oxley [R-OH] declared the bill as "dead as Elvis"), the House and Senate finally reconciled their differences and passed a compromise version of the bill. The Telecommunications Act of 1996, signed by President Clinton on February 8, 1996, included much of the original Snowe-Rockefeller proposal, though it now reflected the House's desire to create a Federal-State Joint Board on Universal Service to recommend to the FCC details of the policy designed to achieve educational access. According to section 254(h) of the Telecommunications Act:

> All telecommunications carriers serving a geographic area shall... provide such services to elementary schools, secondary schools and libraries for educational purposes at rates less than the amounts charged for similar services to other parties. The discount shall be an amount that the [Federal Communications] Commission, with respect to interstate services, and the States, with respect to intrastate services, determine is appropriate and necessary to ensure affordable access to and use of such services by such entities.

FROM SNOWE-ROCKEFELLER TO THE E-RATE

The FCC organized the Federal-State Joint Board on Universal Service in the spring of 1996. For the next six months, the Joint Board solicited comments from the public.

Telecommunications industry representatives recommended a block-grant program in which funds for advanced telecommunications links would be distributed to schools through local or regional authorities, as well as a plan to offer service vouchers for schools and libraries. In response, EdLiNC—the Education and Library Networks Coalition—put forward its own plan. A consortium that included over three dozen organizations including the American Library Association (ALA), the National School Boards Association (NSBA), the Consortium for School Networking (CoSN) and the Council of Chief State School Officers (CCSSO), EdLiNC recommended offering schools and libraries percentage discounts for telecommunications services. The group favored discounts over vouchers and block grants, which they feared would place low-income school districts at a great disadvantage.

EdLiNC argued that the price for telecommunications services paid by schools and libraries should not exceed the cost of previous discounts, the lowest price "charged for similar services to other parties" or the market price "discounted to assure affordability." EdLiNC also advocated a "lifeline subsidy" to ensure that the poorest of schools could still afford telecom services no matter the market price. EdLiNC offered the following example in its April 10, 1996 filing to the Joint Board:

> The lifeline subsidy would be available to schools and libraries serving the poorest 25% of the population. The amount of the subsidy would be proportional to the amount by which the average income in the district falls below the national average, so that an area with only 25% of the national average income would pay only 25% of the discounted price.

"Access to the Internet could provide even the poorest school with the resources of the world's libraries... Computers and quality software would allow children to start learning the skills they need to learn, explore and find ways of realizing their individual dreams."

—Reed Hundt,
former FCC chairman

The U.S. Departments of Commerce, Education and Agriculture submitted a plan on behalf of the Clinton administration. Their proposal, following an idea advanced by Rep. Ed Markey (D-MA), Sen. Byron Dorgan (D-ND), U.S. Department of Education Secretary Richard Riley and Assistant Department of Commerce Secretary Larry Irving, would establish a specially discounted rate for schools and libraries accessing telecommunications services. This education rate, or E-Rate, would "guarantee a free package of basic telecommunication services to every school and library in America," and would establish "discounted rates for access to other services used for educational purposes." Specifically, each school and library would receive a free package including "basic connectivity and Internet access at adequate transmission speeds to meet educational needs." The costs for telecommunications providers to supply this free package would be reimbursed through the Universal Service Fund, which historically had pooled money collected from telephone companies to pay for telephone service in hard-to-reach communities. Other services would be offered to schools through a competitive bidding process, with low-income and high-cost schools receiving an additional discount "based on an affordability index whereby more seriously disadvantaged institutions would receive greater price reductions." The administration suggested this index be based on the number of students in a school district who qualify for Title I funds or the federal school lunch programs.

On November 7, 1996, the Joint Board on Universal Services issued its recommendations to the FCC. Reflecting the influence of EdLiNC and the Clinton administration, the Joint Board recommended that schools and libraries be empowered to purchase telecommunications services and Internet access at discounted rates. The board, however, did not favor a free package of basic services for all schools and libraries; instead, it suggested that these institutions should be able to select the services they want and then receive appropriate discounts. E-Rate discounts would range from 20 percent to 90 percent based on a school's level of economic disadvantage. Schools would be required to submit technology plans before receiving any subsidies, and they would be allowed to apply in groups, rather than individually.

This education rate, or E-Rate, would guarantee a free package of basic telecommunication services to every school and library in America, and would establish discounted rates for access to other services used for educational purposes.

The FCC considered the recommendations of the Joint Board for six months, weighing the interest of the schools and libraries against concerns among telecommunications industry officials that the E-Rate plan would unfairly burden their businesses. On May 7, 1997, the day before the deadline specified in the Snowe-Rockefeller Amendment, the FCC unanimously endorsed an E-Rate plan that was almost identical to the Joint Board's recommendations. The program it approved included the following:

- All public schools, as well as nonprofit private and parochial schools with endowments of $50 million or less, would be eligible for E-Rate discounts;
- Schools would receive E-Rate discounts ranging from 20 percent to 90 percent, based on the percentage of students participating in the federal school lunch program;
- A maximum of $2.25 billion per year would be available from the federal universal service fund to support the costs of Internet access, telecommunications services and internal wiring connections;
- Discounts would be available beginning January 1, 1998. To qualify, schools would have to submit proof of their eligibility (including eligibility for needs-based discounts), technology plans approved by independent agencies and descriptions of services that would be paid with E-Rate funds.

The FCC ordered the National Exchange Carriers Association (NECA) to create two new private companies—one to oversee the distribution of universal service funds to schools and libraries, the other to oversee funds for health care institutions. NECA soon complied with the request, establishing the Schools and Libraries Corporation (SLC) and the Rural Health Care Corporation (RHCC). By November 1997, the Schools and Libraries Corporation's newly appointed board hired its first chief executive, former FCC official Ira Fishman. On January 30, 1998, SLC opened the first round of E-Rate applications. It subsequently received over 30,000 applications for discounts valued at over $2 billion.

E-RATE OPPONENTS FIGHT BACK

Even before the first round of E-Rate applications, opponents of the program made their voices heard. During the summer of 1997, three long-distance telephone companies—BellSouth, SBC Communications and GTE—filed lawsuits to block the FCC from implementing the E-Rate. The suits were consolidated into one proceeding in the Fifth Circuit U.S. Court of Appeals, which is based in New Orleans. The telephone companies contended that the E-Rate constituted an illegal tax. The FCC was requiring long-distance carriers to contribute to the Universal Service Fund to cover E-Rate costs, but only Congress has the power to tax, they argued. The companies also complained that they were being singled out to pay for the E-Rate. They noted that Internet service providers were not required to contribute to the fund, and that local telephone companies could shift the costs by increasing the local access charges that long-distance companies paid them.

Beginning in the fall of 1997, a steady stream of congressional leaders publicly denounced the FCC's implementation of the E-Rate program. Sens. John McCain (R-AZ), Ted Stevens, (R-AK) and Ernest Hollings (D-SC), among others, charged the FCC had exceeded its authority when it created a private corporation to manage the E-Rate. Moreover, they voiced frustration over the FCC's decision to include internal wiring in its list of acceptable E-Rate expenses. Wiring, they argued, was prohibitively expensive for the Universal Service Fund to support and could provide telephone companies with another excuse to shift to consumers the costs of contributing to the fund.

At the request of Sen. Stevens, the General Accounting Office (GAO) conducted an investigation of the FCC's implementation of the E-Rate. The GAO report, released in February 1998, concluded that the FCC had indeed violated the Government Corporation Control Act of 1945, which requires that federal agencies have specific authorization from Congress to establish or acquire corporations.

Compounding the FCC's predicament, AT&T and MCI announced in early May 1998 that they would begin imposing a "universal service charge" on consumer phone bills, effective July 1, 1998. Sprint soon issued a similar announcement. AT&T set a fixed fee at 93 cents per phone bill, while MCI and Sprint created charges of 5 percent and 4.5 percent of the consumer's total long-distance cost, respectively.

These actions set off a furor in Washington. Numerous Republicans and even some Democrats complained that the E-Rate, while based on a laudable idea, created an unfair and illegal tax on the consumer. Then-Speaker of the House Newt Gingrich (R-GA) and other Republicans openly referred to the E-Rate as the "Gore Tax," in reference to Vice President Gore's strong support of the program. In one of the most pointed public attacks on the E-Rate, Reps. Thomas Bliley (R-VA) and John Dingell (D-MI) joined Sens. McCain and Hollings in a letter to the new FCC chairman, William Kennard, demanding an immediate suspension of the E-Rate program:

"...We believe it is too late for the Commission to rescue itself merely by tinkering with a fundamentally flawed and legally suspect program."

—Sens. Ernest Hollings and John McCain, with Reps. John Dingell and Thomas Bliley

It is our understanding that you will shortly adopt changes to rules for funding your schools and libraries program. But we believe it is too late for the Commission to rescue itself merely by tinkering with a fundamentally flawed and legally suspect program. Instead, it is time for you and your colleagues to put the mistakes of the previous Commission behind you, and start anew.

Accordingly, the Commission should immediately suspend further collection of funding for its schools and libraries program, and proceed with a rulemaking that implements all universal service programs in a manner that reflects the priorities established by Congress in the Telecommunications Act of 1996. In doing so, the Commission will protect the present and future viability of universal service, and the interests of American consumers.

Two of America's most respected consumer rights organizations joined the fray, voicing frustration with the FCC's handling of the E-Rate, despite their general support for wiring schools and libraries. "How can consumers trust a federal agency that disregards its public commitment to prevent rate increases, and then transforms that commitment to nothing more than an effort to avoid undue price hikes?" wrote Gene Kimmelman of the Consumers Union and Mark Cooper of the Consumer Federation of America in a letter to FCC Chairman Kennard.

Despite an enthusiastic response by the education community, the political atmosphere in Washington was quickly making the elimination of the E-Rate a real possibility. The FCC chose to delay a planned May 1998 overhaul of the E-Rate until June, hoping to save the program from extinction. Six leading national education organizations—the American Association of School Administrators, the National Association of Independent Schools, the National Catholic Educational Association, the National Education Association, the National School Boards Association and the U.S. Catholic Conference—took advantage of the delay to form a "Save the E-Rate" campaign to lobby for the program's preservation. "We're fighting to make sure that promised resources are there so that none of the pending applications is denied due to threatened cuts, and no child or community is left behind," said Monsignor Thomas J. McDade, Secretary for Education for the U.S. Catholic Conference.

"We're fighting to make sure that promised resources are there so that none of the pending applications is denied due to threatened cuts, and no child or community is left behind."

—Monsignor Thomas J. McDade, U.S. Catholic Conference

In the days prior to the FCC June 1998 meeting, members of both the House and Senate continued to pressure Kennard to suspend all E-Rate activities. "Nothing in the Telecommunications Act suggested that the Universal Service Fund should become a cash cow for Internet access or a vehicle for political campaigns," Sen. Conrad Burns (R-MT) wrote in a letter to the FCC. "The law explicitly states that this goal should only be accomplished in a way that is economically reasonable. I would argue that excessive line-item charges on consumers' phone bills which put the goals of universal service at risk fail this test miserably."

On June 10, FCC Chairman Kennard announced that the FCC would scale back the E-Rate program, but would not suspend it. Several days later, the FCC lowered the first-year funding cap from $2.25 billion to $1.9 billion, and spread the first-year funding over a period of 18 months instead of 12. This decision meant that the first "year" of funding, which was supposed to conclude on December 31, 1998, would continue until June 30, 1999. E-Rate funding would thus be spent over a greater period of time, and future funding cycles would coincide more closely to the traditional academic calendar.

The decision did little to quell the E-Rate's critics. "The FCC's latest attempt to recalibrate its schools and libraries program is an exercise in futility," complained Sen.

McCain. In July 1998, Sen. Burns introduced the Schools and Libraries Internet Act, a bill that would prevent the E-Rate from drawing from the Universal Service Fund. The program would receive money instead from an existing excise tax fund. Rep. Billy Tauzin (R-LA), who introduced an identical bill in the House, explained his bill in a letter to congressional colleagues:

> The schools and libraries program is in total disarray. In my opinion, an illegal corporation has been set up to administer an illegal tax. My plan would abolish the so-called Schools and Libraries Corporation, along with its $200,000-a-year administrator [Ira Fishman], and remove the FCC as overseer. A new, legal program would be established by Congress—with appropriate institutional controls on the size and scope of the program—and administered by the Department of Education in the way of block grants to the states.

Just as the two bills were being introduced, officials from the General Accounting Office (GAO) testified to the Senate Commerce Committee that the Schools and Libraries Corporation was a bureaucratic disaster. The GAO said new procedures were needed to prevent waste and fraud in E-Rate applications. Rep. Joe Scarborough (R-FL) introduced legislation that would bar the FCC from collecting Universal Service Fund money for use in the E-Rate program.

Unceasing political assaults had taken its toll on the Schools and Libraries Corporation, which had yet to approve a single E-Rate application. These delays fomented mounting frustration among the 30,000 applicants, putting more pressure on the federal program. The only way the E-Rate could remain a viable program would be for the FCC to overhaul the entire management process. So the FCC announced that both the SLC and the Rural Health Care Corporation would cease to exist at the end of the year. On January 1, 1999, the two programs would be established as divisions within the Universal Service Administrative Company (USAC). From then on, the SLC would be known as the Schools and Libraries Division (SLD).

SLC's Ira Fishman resigned as the corporation's Chief Executive Officer in August 1998 and was replaced by Chief Operating Officer Kate Moore. Within several weeks of her appointment, Moore wrote to all E-Rate applicants, promising that they would begin to receive their funding commitments soon. Moore's letter also announced plans to begin accepting second-year applications during an 80-day period beginning December 1, 1998. Funds would be available from July 1999 to June 2000.

DESPITE SETBACKS, E-RATE RISES AGAIN

In November 1998, the SLC announced that the first wave of E-Rate commitments had been mailed. Although many months behind schedule, the release of funds helped secure the future of the E-Rate in the eyes of many opinion leaders in Washington. "Now that the money is flowing, it's going to be very dicey politically to attack this program," said Michelle Richards, a lobbyist for the National School Boards Association in the December 2, 1998 issue of *Education Week*. "A reduction in the program at this point would mean pulling computers out of the classroom." Also in December, just as second-year E-Rate applications began to come in, both BellSouth Corporation and SBC Communications withdrew from their lawsuit against the E-Rate (GTE, however, pressed on with the case). Many of the pressures against the E-Rate, it seemed, were starting to dissipate.

"The schools and libraries program is in total disarray. In my opinion, an illegal corporation has been set up to administer an illegal tax."

—Rep. Billy Tauzin

Not all foes of the E-Rate had backed off from their convictions, however. In February 1999, Rep. Thomas Tancredo (R-CO) submitted his E-Rate Termination Act, which eventually included 37 congressional co-sponsors. At the same time, Rep. Ron Klink (D-PA) and a bipartisan group of five co-sponsors introduced the Telecommunications Trust Act, which sought to shift the E-Rate's funding source to the existing excise tax on telephones.

Despite these potential roadblocks the SLD successfully completed its first round of E-Rate awards in March 1999, providing $1.66 billion to approximately 26,000 applicants. More than 40,000 schools with 640,000 classrooms as well as 7,000 libraries benefited. Some 79 percent of the funds went to schools and libraries eligible for discounts of 70 percent or higher. Approximately 67 percent of the funds went to urban schools, while 11 percent went to rural schools. These announcements were soon followed by the closing of the second round of E-Rate applications on April 6. This time, more than 32,000 applications requested $2.4 billion. The funds would enable the wiring of another 528,000 classrooms in 40,000 schools.

Despite schools' enthusiastic response to the second round, the SLD's total funding commitment was yet to be decided. At the end of May 1999, the FCC was expected to rule on whether schools would receive the full $2.25 billion allowed each year under the Telecommunications Act of 1996. While the E-Rate's condition had improved remarkably over the course of the previous six months, bills such as the E-Rate Termination Act made it clear that support for the program was by no means universal.

In the weeks leading up to the FCC ruling, the Council of Chief State School Officers released the results of a survey designed to assess the overall impact of E-Rate discounts on state education and technology planning and implementation procedures for schools and libraries. Among the CCSSO survey findings:

- By fall 1998, nearly three-fourths of the states indicated that at least 80 percent of their school districts had state-approved educational technology plans that satisfied requirements to participate in the E-Rate program; nearly one-half of the states responding to the survey said all of their school districts had approved plans. By fall 1999, nearly 90 percent of the states responding to the survey indicated that at least 90 percent of their districts had approved technology plans, with only two states reporting having fewer than 70 percent of their districts with approved plans.
- Four-fifths of the states had policies or some kind of strategies for inducing school districts to reinvest E-Rate discount savings and reimbursements in technology-related services. But most (85 percent) gave local school districts discretion in the matter; only seven states required or urged school districts to reinvest the savings in technology; and in this regard only three states had specific state policies on whether or not the savings had to be spent on technology or other services.

"As mayors, we want to deliver a clear, simple message. E-Rate is working—and should be expanded."

—U.S. Conference of Mayors

EdLiNC subsequently reported on a poll that showed an overwhelming majority of American supported the E-Rate. The EdLiNC report, *E-Rate: Connecting Kids and Communities to the Future*, included the following key findings:

- Some 87 percent of respondents support providing discounts to schools and libraries for educational technology.
- Schools and libraries are eager to adopt technology, but many lacked the funds to do so prior to the E-Rate.

- The need in schools and libraries for funding dramatically outstrips the amount of funds provided. To make the E-Rate work effectively for all schools and libraries, EdLiNC said, full funding for the program is essential.

A steady stream of political leaders petitioned the FCC in support of full funding for the E-Rate. On May 26, 1999, the U.S. Conference of Mayors submitted a letter to FCC Chairman Kennard. "As mayors, we want to deliver a clear, simple message," the letter stated. "E-Rate is working—and should be expanded." Another letter, signed by 94 members of the House of Representatives, encouraged the FCC to fund the E-Rate in full as well. The lobbying campaign and the E-Rate studies paid off; at the end of May, the FCC voted 3-2 to spend the full $2.25 billion on the second round of E-Rate applications.

Reflecting the new political climate, *The New York Times* published an article in August 1999 that would have been unimaginable a year earlier: "Phone Fee for School Internet Service Seems to Be Too Popular to Overturn." The article stated, "The program, officially called the E-Rate, has proved to be so popular that even the harshest critics now agree that further complaints are futile." This sentiment appears to have taken hold in Congress. Rep. Tancredo's E-Rate Termination Act languished. Sen. McCain, initially one of the E-Rate's most strident critics, suggested he had become satisfied with the procedural reforms made within the SLD, though he still recommended requiring schools funded by the E-Rate to filter Internet access to students. Although the House Telecommunications Subcommittee held a hearing on the latest version of Rep. Tauzin's Schools and Libraries Internet Access Act in late September 1999, E-Rate supporters still appeared to have the upper hand.

The E-Rate also cleared a judicial hurdle in July 1999, when the U.S. Court of Appeals for the Fifth Circuit released its ruling in GTE's case against the FCC. The three-judge panel criticized the FCC for its interpretation of the Snowe-Rockefeller Amendment, arguing that the FCC had exceeded its authority. But it said the relevant statutes were ambiguous, and it therefore deferred to the commission. "The best reading of the relevant statutory language indicates that the FCC exceeded its authority by mandating discounts for Internet access and internal connections," the court said. But, it continued, "Although we agree with GTE that the statute and its legislative history do not support the FCC's interpretation, the language of the statute is ambiguous enough to require deference."

Support for the E-Rate has been so strong that in late October 1999 the USAC board announced plans in which all second-year E-Rate applicants would receive the entire funding they requested, totaling around $2.4 billion. "The concept of universal access to the Internet and the world of information it offers has moved much closer to reality today," said K.G. Ouye, chair of the USAC Board's Schools and Libraries Committee. "Universal Service funds are indeed fulfilling the promise for our children and communities." As of November 1999, the SLD had committed over $1.9 billion in second-year funding to approximately 31,000 applicants. Additionally, the SLD began accepting applications for the third year of the E-Rate in October 1999.

Despite many obstacles, the E-Rate program has survived. Even if future attempts to scale back the program succeed, one thing is certain: the E-Rate has brought Internet access in schools and libraries to a previously unattainable level. ■

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"The [E-Rate] program...has proved to be so popular that even the harshest critics now agree that further complaints are futile."

—The New York Times

IV. THE E-RATE IN PRACTICE: RESEARCH FINDINGS IN FOUR MIDWESTERN CITIES

To assess the impact of the E-Rate, The Benton Foundation commissioned researchers from the EDC/Center for Children and Technology to visit four large, urban school districts during the fall semester of the 1999-2000 school year: Chicago, Illinois; Cleveland, Ohio; Detroit, Michigan; and Milwaukee, Wisconsin. These four districts serve approximately 800,000 students, most of whom live in poverty.

COMMON THEMES

While each of the districts has pursued its own path through the process of planning, applying for and using E-Rate funding, several common themes emerge from their experiences:

Network infrastructure deployment accelerated, and Internet access improved dramatically.

The E-Rate initiative has made it possible for these districts to create robust, high-quality networks that would never have been put in place without E-Rate funding. The E-Rate has had an especially high impact for several reasons: the funding it provides was not capped at a certain level; it requires intensive planning and implementation; and it encourages leveraging of multiple funding sources. Several district administrators said E-Rate funding enabled them to make a quantum leap in their districts.

E-Rate funding has enabled school districts to leverage existing financial resources.

Resources freed up by E-Rate funding, as well as money from state-level initiatives, are now being used to pay for elements of technology programs that are not covered by the E-Rate. For example: because of E-Rate subsidies, Detroit has been able to combine money from a state-level program with funds saved at the district level to pay for much of its electrical upgrades.

Professional development needs are increasing geometrically.

Schools must provide adequate professional development to help teachers learn how to use these newly accessible tools. Otherwise, the gap between technologically sophisticated and technologically weak schools will grow wider. Even though the need for training will only grow, departments often must support these efforts on insecure or inadequate funding. District leaders must be convinced of the importance of continuing to emphasize sustained, creative professional development for teachers around the use of these new tools.

School districts are highly dependent on E-Rate funding, even though the advances they are making are highly vulnerable to changes in the political environment.

Although the E-Rate is enabling school districts to leverage important resources, it is not generating significant local expenditures for technology infrastructure. On the contrary, district budgets often rely on the E-Rate to ensure that they will be able to sustain their newly established networks. Several district administrators expressed concern that the Schools and Libraries Division is not yet emphasizing to schools and districts the need to plan how they will meet ongoing costs. For example, as schools make the transition to conducting district-wide administrative business online, telecommunications bills will be high; meeting them will require continuing discounts via the E-Rate program.

The E-Rate has led to changes in school district planning practices.

The E-Rate has forced school administrators to acquire new knowledge and to learn new forms of collaboration. The result has been better planning, new lanes of communication and improvements in billing and accounting practices. In some cases, staff members from educational technology departments have gained significant influence in other departments such as information technology or operations departments. Improved coordination—particularly among curriculum and instruction, educational technology and information technology departments—will be crucial to ensuring that the E-Rate leads to long-term improvements in teaching and learning at the classroom level.

The current E-Rate process taxes relationships with vendors.

In every district, the E-Rate has stretched relationships with vendors to their limits. Many factors complicate the bidding, including payment and reimbursement processes required by the Schools and Libraries Division; the SLD's requirement that districts have in hand the full (pre-discount) cost of the services they request; delays in receiving reimbursements from vendors; the strain placed on vendors' inventories and labor supplies by bidding and awarding processes (described as "hurry up and wait" by some); and the time constraints placed on implementation of annual plans. Implementation phases were so intense that in each of the four cities delays were caused when contractors ran out of qualified labor. As an administrator explained, "We were using every electrician in the city of Chicago. They had to bring people in from downstate to get all of the jobs done."

"Building basics" delay the deployment of information technology.

These school districts faced an acute need for at least two important resources that the E-Rate program does not support: electrical upgrades and hardware. In several of the districts, state grant programs were crucial to creating plans for electrical upgrades. But hardware purchasing is largely the responsibility of individual schools in these districts. District administrators should be careful to track whether individual schools increase their investments in hardware in order to take advantage of the networks that have been brought into their classrooms.

High-level school administrators and community stakeholders need to be made aware of the impact of the E-Rate.

In some districts, though not all, high-ranking administrators were initially dubious that the E-Rate was a "real" program that would produce actual funding. Even now, administrators in some districts report that their superiors are not fully aware of the impact of this program. In order to realize the maximum benefit from the E-Rate program, community members and administrative leaders in these districts need to be better informed about this program and about the work that it is supporting at the local level.

CASE STUDIES

In this section, the impact of two full years of E-Rate funding on the four school districts studied is summarized. Each site visit included meetings with district-level administrators, principals, technology coordinators and teachers. Interviews focused on four sets of issues:

1. **The planning process:** Past technology planning efforts; planning for E-Rate funding; plans for the future.
2. **The application process:** The challenges and opportunities afforded by the application process; the complexities of working with vendors within the constraints of the E-Rate process; the impact of the application process on administrative procedures within the district.
3. **Impact of the E-Rate program:** Impact on technology infrastructure; on financial planning for technology; on instructional programs; on professional development programs.
4. **School/district relationships:** How the district offices communicated with individual schools about the E-Rate process; how new infrastructure supports or changes school/district communication; how school-level input is included in the design and deployment of the networking infrastructure.

The four districts are among the 50 largest school districts in the U.S., ranging from Chicago, the third largest, to Cleveland, which ranks 40th. Large urban districts such as these have a particularly great need for the E-Rate, but they also face major hurdles in taking advantage of it.

The most obvious challenge is the scale of investment needed to bring modern technology into their schools. The four districts each operate between 100 and 600 individual school buildings and thousands of classrooms. Undertaking any systematic capital improvement in such districts is especially daunting because funds are rarely available to support intensive investment. State funding arrangements rarely account for the disproportionate size of large districts. One recent state-level funding program is TEACH—Technology for Educational ACHievement—in Wisconsin (http://www.teachwi.state.wi.us). Since 1997, the governor and state legislature have committed up to $100 million per year in order to support investment in educational technology and telecommunications access for schools, libraries and colleges. This program intentionally complements E-Rate funding in some areas and allows some assistance with electrical service upgrades. However, the financial burden on the local school district is still substantial. The district still bears at least 75 percent of the full cost for internal electrical and network infrastructure.

Even if scale were not an issue, large urban schools are more likely than other districts to face large capital challenges. Their school buildings are more likely to be very old (over 100 years old in many cases), as well as to have inadequate electrical wiring and widespread asbestos problems. The most consistent criticism of the E-Rate program in these districts is that the program does not cover the cost of electrical upgrades. However, these districts have been able to re-allocate other funds to meet—partially or entirely—the need for electrical upgrades.

Three of the four school districts studied (as well as many others) have gone through significant transformations in their systems of governance within the past two to five years. These changes include the takeover and reconstitution of the Chicago Board of Education by Mayor Richard M. Daley in 1995, a move followed by similar actions in Cleveland and Detroit in 1998. These shifts have led to substantial changes in the business practices, educational policies and instructional emphases of these districts. But they have placed burdens on administrators, complicating efforts to undertake long-term planning required if schools are to make the most effective use of the E-Rate program. Many administrators also suggest that the challenge of applying for E-Rate funding has led to changes in planning and budgeting processes that otherwise would not have been nearly as high a priority.

Large urban school districts also face persistent challenges in attracting and retaining highly qualified teachers. The E-Rate program may seem far removed from such issues, but administrators say that installing modern information technology has significantly helped them overcome this problem. Technology gives schools an opportunity to transform the day-to-day communication and information-sharing practices of teachers and administrators in the district and beyond. It enables school administrators to reconceptualize how professional development activities are delivered, sustained and extended into the classroom. Technology also helps attract new teachers, often from outside of the district, because it offers them access to up-to-date resources.

CHICAGO

The Chicago Public School District includes about 578 schools and serves approximately 430,000 students, 84 percent of whom receive free or reduced-price lunches. Many school buildings in the district are over 100 years old, but the district has undertaken a major capital improvement program funded by a bond issue of over $1.9 billion. In the past two years, 15 new schools have been built and 12 more are under construction. Almost all schools have received capital improvements over the past two years, focused largely on upgrading their electrical capacities in anticipation of the installation of E-Rate-funded networks. The budget for the Capital Improvement Program includes significant funding for electrical upgrades.

Before receiving E-Rate funding, the district had developed a plan for a wide area network (WAN), but it never secured adequate funding to support full implementation. Individual schools pursued their own networking on an ad-hoc basis. A few schools had sophisticated networks, while others had partial networks or connections to the Internet. But the large majority of schools did not have Internet access or networking within their buildings.

Every school in Chicago has a Local School Council (LSC) that wields significant control over discretionary funds, makes some curricular and instructional decisions and manages the physical plant of the school. These schools were able to apply for E-Rate funds independent of the district-wide application submitted by the district administration. Information reported here reflects the outcomes of the district-level

E-Rate investment, and does not include the work of those individual schools that have applied for or received E-Rate funding.

Impact of E-Rate. In the first year of the E-Rate, Chicago received $27 million. As of November 1999, Chicago had received over $74 million in E-Rate funding, making it the second largest beneficiary of the program. Only New York City received a higher E-Rate subsidy.

Chicago's plan for E-Rate-funded networking included two major components. First, it established a WAN for both administrative and classroom use (an initiative known as the ShortScope program). This network was completed in September 1999, with T1 lines running to administrative drops in every school. Second, during the second year of the E-Rate program the district moved to establish a "Local School Education Network." This $57 million initiative is intended to complement local school investments in internal wiring. The district estimates that approximately 260 of its schools have received some E-Rate funding, including a total of approximately $40 million for individual school local area networks. The Local School Education Network funds will be used to ensure that all schools meet a minimal technology standard, with a goal of networking at least 10 classrooms, as well as libraries and computer labs, in every school.

Coordinating the district's investments with the plans and applications of individual schools to create a single, uniform district-wide infrastructure has been a complex challenge. For Year Three, the Department of Learning Technologies has asked individual schools in the district to identify their needs for further E-Rate funding and to forward them to the district. They will then submit a single E-Rate application for the entire district, which should streamline the coordination process. E-Rate funding has also generated significant savings in other parts of the district budget, and those savings are being funneled into professional development, educational intranet development efforts and electrical upgrades for the schools.

The administrators described the E-Rate program as a "cross-functional project" because it requires an unusual level of collaboration among many departments that are rarely required to coordinate with one another around an individual project...As one interview subject said, "E-Rate gets into everybody's business."

Challenges of pursuing E-Rate funding. The primary challenge administrators faced in pursuing E-Rate funding was designing and coordinating their application so it was integrated with the capital improvement program, the ShortScope wide area network and individual schools' own networking efforts.

The administrators described the E-Rate program as a "cross-functional project" because it requires an unusual level of collaboration among many departments that are rarely required to coordinate with one another around an individual project. Submitting successful applications to the Schools and Libraries Division has required pulling people from many different departments (such as legal, purchasing, information technology and school operations) into the same room. Many of these departments are rarely asked so explicitly to coordinate their work, and the unusual requirements of the E-Rate application process challenged many of the normal business practices of the district. As one interview subject said, "E-Rate gets into everybody's business."

Instructional issues. The primary focus of Chicago's Department of Learning Technologies is supporting the professional development of teachers. This group has been devoting significant resources to developing tools and resources that will be made available to teachers over the intranet network. A district-wide curriculum resource, organized around the state and city standards and the Chicago structured curriculum, already is available and is growing rapidly. The schools are also rolling out a "Curriculum Wizard" designed to support teachers in writing technology-rich and standards-based curricula.

Chicago has had a district technology plan since 1997, as well as standards and guidelines for technology infrastructures within schools since 1994. Schools are not required to follow these specifications but cannot receive technical support from the district if they

do not follow them. The district office also supports 28 former teachers as a "Technology Resource Network" of consultants responsible for helping the schools develop their infrastructure and improve their use of technology.

CLEVELAND

The Cleveland Municipal School District includes approximately 118 schools and serves 77,000 students, 75 percent of whom are eligible for free or reduced-price lunches. Until 1996, little educational technology was available in the Cleveland schools, and what was available was concentrated in specialized magnet schools. The district had no history of investing local funds in instructional technology other than a network for administrative functions.

The Ohio SchoolNet project gave Cleveland's educational technology infrastructure a major push in 1996. This project made $500 million available to network every elementary school classroom in the state. Cleveland did not apply for the program initially because it was run on a cost-reimbursement basis and the district did not have adequate funding available to cover costs up-front. This requirement was later changed, and Cleveland eventually participated in the program. Another initial obstacle was that SchoolNet did not originally supply computers, but this changed as well. As a result, all K-4 classrooms in Cleveland have now been wired, with each possessing four SchoolNet computers.

Anticipating the introduction of the E-Rate program, Paul Karlin, manager of the district's Educational Technology Office, brought together a cross-departmental group of administrators and teachers in 1997 to develop a technology plan for the district. This effort did not stimulate new funding from the district budget, but the school board set aside $20 million for a new administrative network, which was seen as necessary primarily because of Y2K concerns. At the time, the existing administrative network—which ran over 9600-baud dial-up lines—was still the only inter-school network in the district. The instructional technology staff developed plans to coordinate the upgrading of the administrative network with the implementation of an educational network that would reach into classrooms as well.

Impact of E-Rate. Cleveland received $26 million in E-Rate funding in the first year of the program—the third largest commitment in the country, behind New York City and Chicago. These funds were dedicated to supporting the implementation of a wide area network for the district as well as for internal wiring in all schools not already wired under the SchoolNet project. Some $12.5 million in Year 2 E-Rate funding will support various enhancements to the network.

The district is establishing the largest and most robust school-networking system in Ohio. A T1 network runs throughout the district, and multiple T1 lines run from the district data center to the state Internet provider agency. In addition, all classrooms in the Cleveland public schools are now wired for internal communications and Internet access.

Challenges of pursuing E-Rate funding. Applying for E-Rate funds was an intensive and collaborative process, involving administrative staff from many parts of the district. The process required a high level of coordination across the departments. Going forward with the implementation process is becoming increasingly burdensome because the district continues to pay for the administration and management of its Educational Technology Office exclusively through grants. Schools, therefore, can only seek support from the district for parts of their programs that are supported by specific grants.

Limited access to hardware in the district's 23 middle schools and 16 high schools also constrains implementation of E-Rate funding in Cleveland. Additionally, the cost of electrical

upgrades—met partially but not adequately by state and federal programs—is being addressed incrementally. In the meantime, this problem continues to impede full utilization of the networks the E-Rate program has made available.

Instructional issues. Besides coordinating development of the E-Rate-funded technology, the Educational Technology Office is placing a strong focus on supporting professional development opportunities for teachers. The district is participating in several grant-supported professional development initiatives including the Alliance Program, funded by the Joyce Foundation, and the Savvy CyberTeacher Program led by the Stevens Institute of Technology. The district aims to use a U.S. Department of Education Challenge Grant to train every elementary teacher in the program over five years. The technology office, which oversees these programs, is emphasizing the Savvy CyberTeacher training as a mechanism to familiarize teachers with the Web-based resources that are now available to them in their classrooms.

The efforts of Cleveland's Educational Technology Office are not fully coordinated with the programs of its Curriculum and Instruction Department. This disconnect has limited the influence of the instructional technology group on district-level planning for the use of technology. At the same time, technology initiatives originating in other parts of the district have not been coordinated with the networking initiatives of the Educational Technology Office. For example, the district has invested in test preparation and integrated learning systems (mostly free-standing) and is considering increasing their presence throughout the district. These are technological investments that do not leverage or take advantage of the E-Rate-funded networking infrastructure that has been put into place over the past two years.

DETROIT

The Detroit Public School District includes approximately 250 schools and serves about 175,000 students, 84 percent of whom receive free or reduced-price lunches. Previously organized into six regions of 43 schools each, the district has been reorganized into clusters of elementary and middle schools feeding individual high schools. The average age of a Detroit school building is 66 years, and 20 of the district's 250 schools were built in the 1890s. Some schools are still burning coal for heat.

Before 1996, only a handful of schools in Detroit were connected to the Internet. The district was running an administrative network that supported only dial-up connections. Very few classrooms had Internet access. In 1996, the district received $500,000 from the state of Michigan to support school networking, part of a settlement Ameritech was required to pay as a reimbursement for overcharging customers. The district used funds as seed money to begin the process of establishing prototype networking projects in several high schools. Although some schools were beginning to use Title I funds to purchase computers, the vast majority of Detroit schools had little or no technology in place. The central administration had yet to define standards for technology purchases, its resources were extremely limited and there was no coordinated plan in place for the distribution and deployment of technology. While efforts like Net Day were important catalysts for introducing network technology into some schools, Detroit was not ready to contemplate establishing a robust networking infrastructure that could support instructional practices at the classroom level.

Impact of E-Rate. Detroit Public Schools received $18 million in the first year of E-Rate funding. Their initial goal was to wire half of the schools in the district—all the high schools and middle schools, along with a select group of elementary schools—and to

begin establishing a wide area network. In the second year of the E-Rate, Detroit received just under $18 million. This money will support continuation of the wiring program and completion of the wide area network. The schools aim to have every building wired and the wide area network in place by the spring of 2000. During the third year they will focus on getting every classroom wired.

Jim Davis, director of information systems management for the district, described the E-Rate program as "a godsend." Previous efforts to design and implement a systematic networking structure never had adequate funding behind them. Even now, he reported, the district's technology efforts would come to a "complete standstill" if the E-Rate program were canceled. The E-Rate program has also generated at least $6 million in savings for the Detroit Public Schools. Davis anticipates that these savings will be transferred to the instructional technology department and used to support professional development programs.

Challenges of pursuing E-Rate funding. Other than the E-Rate, the major source of funding for infrastructure in Detroit is a portion of a large bond that was approved in 1995. Eventually this will provide as much as $110 million for technology-related resources, but the money is not yet in hand and it is unclear when it will arrive.

Electrical upgrades are a problem in Detroit as in the other districts, but this problem has been effectively addressed through a state-level fund that was established to make up for past underspending on special education. This resource, called the Durant Fund, has provided $12 million for electrical upgrades in the Detroit schools, largely solving the district's electrical upgrade problem.

Instructional issues. Unlike the other districts in this study, where departments responsible for educational technology have managed the E-Rate program, the Detroit E-Rate program has been managed within the Office of Information Systems Management. The district's instructional technology program falls within the curriculum and instruction department and has not been involved in E-Rate planning or implementation.

Parents and community members have brought significant pressure to bring technology into the district's instructional program. In order to meet this need and to make use of the infrastructure now in place, principals are beginning to spend significant portions of Title I funds—most of which are controlled at the school level—to purchase new computers.

Compounding the challenges of providing technology-related professional development in Detroit is the fact that a large portion of the teaching staff is nearing retirement age. Most teachers in the district are either very experienced or brand new, making the task of designing appropriate professional development activities difficult. No new professional development planning has yet taken place in connection with the increased access being made available by the E-Rate.

There is also a strong local emphasis on developing community technology centers and keeping schools open at night for neighborhood use. District contributions and an $8 million dollar grant from the Annenberg/CPB Projects are supporting 15 new community technology centers, five of which are now in place. IBM and Compaq are also providing hardware for these sites.

Jim Davis, director of information systems management for the district, described the E-Rate program as "a godsend." Even now, he reported, the district's technology efforts would come to a "complete standstill" if the E-Rate program were canceled.

MILWAUKEE

The Milwaukee Public School District includes approximately 160 schools serving 113,000 students, 80 percent of whom are eligible for free or reduced-price lunches. Some 70 of the district's schools were built before 1930, and 20 were built in the 19th century. Five new schools were built in 1991.

In 1995, the district had few computers and almost no networking infrastructure. In order to spur investment in educational technology, a group of teachers, principals, university-based collaborators and district administrators came together to develop a district-wide technology plan that articulated an overall vision for using technology to support teaching and learning. The price tag associated with the plan was around $300 million. The school board supported the plan in principle, but provided little funding to help move it forward.

Over the next three years, the district's Department of Technology pursued other funding sources, including grants from private foundations and federal and state programs. The department also worked with individual schools in allocating their individual budgets. By the fall of 1998, some important components of the plan were in place, including the beginnings of a wide area network and internal wiring in some school buildings.

The statewide TEACH program has also been a key point of financial leverage for the district. This project partially pays for electrical upgrades, which are not eligible for E-Rate funding, as well as other kinds of infrastructure investments.

Impact of E-Rate. In the first year of the E-Rate, Milwaukee received $23.4 million, the fourth highest allocation funds, after New York, Chicago and Cleveland. As of October 1999, approximately half of all district classrooms were wired with fiber-optic cable and had a minimum of 12 drops each. As a result of the first two years of the E-Rate, the district expects to complete a fiber-based wide area network. They hope to have all classrooms fully wired by December 2000. The district is installing in-school wiring in high schools first, followed by middle and elementary schools. District administrators report that the technical infrastructure outlined in the original 1996 technology plan is now 80 percent realized; this result is largely because of the E-Rate program. While the vision articulated in that plan continues to guide the district's technology investments, a revised technology plan is now being developed. This plan will reflect the rapid progress the district has made, as well as help guide new phases of development.

Challenges of pursuing E-Rate funding. Leadership for technology development in Milwaukee is strong. The superintendent and the director of technology both have long histories within the district, and they share a commitment to using technology to support teaching and learning.

The administrators in Milwaukee who have managed the E-Rate process have a variety of backgrounds—some are educators and some are primarily business or technical people. They have collaborated intensively on the E-Rate application process, which they described as highly challenging. In particular, administrators cited difficulties in seeking appropriate bids from vendors, coordinating electrical upgrades with wiring efforts and finding adequate funding to guarantee contracts with vendors who sometimes were unwilling to sign agreements unless the district had money in hand. Administrators had trouble finding enough skilled labor, a problem other districts reported having as well. Vendors also faced problems; there were often time lags between when they signed legal contracts and when the district actually secured its E-Rate funding. Only then could the district authorize vendor work to begin.

In spite of these challenges, the process of applying for the E-Rate has led to new types of relationships among district departments, between the district and local businesses and universities, as well as between the district's central office and individual schools.

Instructional issues. The Milwaukee school district is committed to providing professional development, instructional resources and additional support to ensure the integration of new technology into classroom teaching. For example, the district has developed an intranet site that provides an environment of resources and communication

tools where teachers can collaboratively develop a standards-based curriculum. Bob Nelson, director of the district's Department of Technology, describes his ultimate goal as having students using the technology frequently and taking the lead in helping teachers learn to use the technology. He wants every student to have email and to use these resources frequently. The district also provides teachers with free email but requires them to take a 12-hour training course in order to have their accounts activated. More than 8,000 of the district's approximately 11,000 staff members have taken this course so far.

The growing availability of network resources at the classroom level is raising many new challenges for principals, such as revising curricula to take advantage of the new resources, changing in-school communication practices, setting security and acceptable use policies and providing adequate technical support and professional development for teachers. But one administrator described these challenges as "pleasurable problems" that will require the district to figure out how to maintain and expand the infrastructure—and, more importantly, how to use it on a regular basis to support real progress in day-to-day teaching and learning. ■

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V. AN EDUCATOR'S TOOLKIT: PLANNING AN EVALUATION OF THE IMPACT OF THE E-RATE PROGRAM

The size and scope of the E-Rate program make it an especially important initiative within your overall effort to create and support an information technology infrastructure within your district. This toolkit focuses on how to document the impact of E-Rate funding within your district. It also should help you educate others about your district's overall investments in technology and about their impact on teaching, learning and administrative work within your district.

Specifically, this toolkit will help you to:

- Identify the questions about the impact of the E-Rate that you want to be able to answer;
- Determine what kinds of evidence you want to collect in order to be able to answer those questions; and
- Locate some tools to help you collect that evidence.

In this guide, we address several different audiences. You may work in the central offices of your school district. You may be an information technology coordinator or a director of IT programs. You may have a background as an educator, or you may be a network administrator or a telecommunications specialist. Whoever you are, we assume that you will play an important role in informing your local community and your school board about the development of the district's information technology infrastructure.

INTRODUCTION

Chances are that the E-Rate program has brought your district's technology program the largest single chunk of money it has ever received from a single source. But it still is one of many funding sources. It is your job to make funds from numerous sources work together to help you achieve your goals.

What are your goals? Ultimately, they have to do with helping teachers do their jobs and helping students excel. Having a high-quality technology infrastructure in classrooms helps create schools that are good learning environments. But as you already know, important as it is to have an infrastructure in place, it is even more important to have an infrastructure that is used well and often by teachers and students.

So really, you have many goals, ranging from concrete to abstract, from short-term to long-term. In the tables below, we have outlined one way that you might think about the relationship among different types of goals. You may see them somewhat differently. The important thing is to articulate multiple, related goals that can unfold over time and that do not require you or the teachers and students in your district to accomplish everything at once. Technology generally has the greatest impact in schools when goals related to its use are carefully defined and are closely related to the local community's goals for teaching and learning.

Your plan should proceed gradually, linking material changes (such as infrastructure development) to changes in teaching and learning (such as shifts in instructional practices). Such a plan, in turn, will provide a template that will guide your evaluation of your own progress and the collection of relevant evidence.

Possible Hardware and Connectivity Goals		
	Short-Term	**Long-Term**
Concrete	Improve student/ computer ratio	Bring student/computer ratio to 6:1 or better
Abstract	Raise awareness of networking initiatives	Establish ubiquitous access to computing and communications resources

Possible Software and Resource Goals		
	Short-Term	**Long-Term**
Concrete	Establish a minimum software package for every school and content area	Establish a shared teacher database of software and online resources with reviews and suggestions
Abstract	Increase in-house knowledge of available resources	Ensure all teachers regularly review and experiment with a range of electronic resources, and share information with colleagues

Possible Professional Development Goals		
	Short-Term	**Long-Term**
Concrete	Establish baseline standards of professional development that should be available to all teachers every year	Move all teachers in the district through multiple levels of sustained professional development related to technology integration
Abstract	Examine the relationship of your desired outcomes for professional development activities to existing models of best practices for teaching with technology	Establish a teaching staff with broad expertise in using technology to support their work and enhance student learning

Possible Technology Access and Usage Goals		
	Short-Term	**Long-Term**
Concrete	Establish access to computing and communications resources for all students, teachers and administrators	Establish and then document levels of use that reflect consistent, substantial use of diverse technology resources in the classroom
Abstract	Engage all teachers with a vision of the role technology can play in supporting their teaching	Create schools in which technology is a tool available to all and used by all, for substantive work and focused communication

It is important to remember that people who do not have the responsibilities that you do (i.e., thinking constantly about the relative merits of copper and fiber, creating teachers' email accounts and a district password policy, getting curriculum guides online in a usable format, etc.) may not understand that these goals are different. Nor may they understand that these goals build on one another incrementally and cannot be achieved at once. One of the purposes of this guide is to help you present to others how the E-Rate program has helped you achieve your goals for building a telecommunications infrastructure. This guide will also help you explain which goals related to changes in work practices, teaching practices and student learning you are now are in a position to work toward.

Applying for E-Rate funding was undoubtedly difficult, and implementing your proposed infrastructure plan has been complicated, challenging and time-consuming. But you know how important this funding has been in making it possible to create a district-wide, reliable network infrastructure. It's up to you and your colleagues to get the word out about these successes.

DOCUMENTING WHAT HAS BEEN DONE IN YOUR DISTRICT

In order to explain to others the impact that the E-Rate has had on your district, you will need two things. First, you will need to know what questions you want to be able to answer. Second, you will need to have access to clear evidence that documents the answers to those questions. It is critical that you think ahead of time—before you get a request for a presentation at the next school board meeting, for example—about what types of evidence you need. If you collect relevant data as you move through the implementation process, not only will you be better prepared, you will also have avoided the common mistake of failing to collect certain kinds of data that will enable you to document many important parts of the process.

Examples of Possible Questions and Possible Forms of Evidence

Hardware and Connectivity
Do all students now have access to the Internet in school? *Percentage of instructional rooms in the district with Internet access; the gap between the number of network drops and number of computers in instructional classrooms*
Can all teachers easily use computers and the Internet during their planning time? *Percentage of classrooms with both network drops and computers dedicated to teachers; percentage of schools with other rooms dedicated to teacher planning that have network drops and computers*
How reliable is network access in the classroom? *System administration reports of time spent with the network down; self-reports from teachers of how many of their attempts to use the network are impeded by slow network response or malfunctions*

Software and Resources
Do teachers in various disciplines have the software they need or want to use in their teaching? *Software inventory, classified by discipline and grade level;* *teacher self-reports of awareness and needs regarding software*
Are teachers using software and online resources to support lessons that are aligned with state and local standards? *Teacher lesson plans;* *lesson plans and comments submitted to district-wide curriculum databases*
Are teachers aware of the range of resources available to them on the Internet? *Teacher self-reports of level of familiarity with online educational resources; logs of queries received from teachers by library/media specialists and technology support staff*

Software and Resources
Does the district offer adequate opportunities for teachers to develop basic technology skills? *Total number of workshops offered; total number of teachers attending; self-reports of satisfaction with training from participating teachers; self-reports of teachers' awareness of available training opportunities*
Does existing professional development support teachers in experimenting in the classroom with what they have learned? *Classroom observations; teacher postings to district-sponsored discussion boards related to professional development topics*
Are teachers across the grade levels and across the disciplines taking advantage of available professional development opportunities? *Relevant information from participants at workshops and training sessions*

The core goal of the E-Rate program is to provide schools and school districts with resources they need to create fully-developed networks and access to the Internet in all classrooms. Therefore, the most important question that you will want to answer in any report or presentation about the impact of the E-Rate program will be: "Did the E-Rate funds you received get used to create fully-developed networks and access to the Internet in all classrooms, or are they in the process of doing so?" In the sections that follow, we will discuss some guides and resources available to help you structure your response.

At the same time, we all want to move beyond documenting the *what* of the E-Rate program (building infrastructure) and get to documenting the *why*—namely, your goals for affecting teaching practices and learning outcomes. Even when your infrastructure work is largely done, your work toward these more fundamental goals is really just beginning. Creating reports and presentations on the impact of the E-Rate program will be a key opportunity for you to educate others about how your goals relate to one another.

You will probably want to demonstrate to others both what you have begun to accomplish in terms of having an impact on teaching and learning, and what remains to be done to reach your goals. For example, you may have assigned email accounts to more teachers this year than in previous years, but you may not yet be able to show a proportional increase in use of email within the district because teachers have not yet developed routines for using email regularly. This type of example can demonstrate that new networking resources have made it possible to do something new, but that actually doing something new will require time, effort and motivation. Another example would be creating a Web site for posting and sharing lesson plans and aligning them with your state standards. A number of districts have developed sites like this. With the networking infrastructure you have in place, teachers can gain access to these lesson plans in their classrooms, in media centers or in their offices or planning rooms. But it is probably too early to tell how many teachers are using them, how often they are using them and, most importantly, whether these resources actually are leading teachers to align their practices more closely with your state or local learning standards.

You have probably already collected much of the evidence you will need to explain to others how you have used E-Rate money to create a robust network for your district. Do not forget that achieving that end is the core goal of the E-Rate program. But you will probably have to get creative to think of ways to document the first steps your district is taking toward using these network resources well.

THINKING ABOUT YOUR AUDIENCE

Many different groups may be interested in learning about the impact of the E-Rate in your district. But different groups are likely to have different specific interests. School administrators at a professional meeting might be particularly interested in how you leveraged various funding sources, while your school board may want to know what new educational activities have been made possible by the introduction of the infrastructure that the E-Rate helped to fund. This suggests you may need to share different information with different groups.

This chart illustrates what the primary and secondary interests of various audiences might be. These priorities could be different, of course. What is important is that you be aware of the priorities and interests of your different audiences so you can present them with the information that will be useful and convincing for them.

Primary and Secondary Interests of Various Audiences				
Audiences	Overall transformation of infastructure	Financial impact of E-Rate	Anticipated uses that coordinate with local educational priorities	Impact on administrative & professional development activities
Mayoral/ city officials	**primary**	**primary**	secondary	secondary
School Board	**primary**	**primary**	**primary**	**primary**
Parents and communcity members	**primary**	secondary	**primary**	secondary
Colleagues from other districts	**primary**	secondary	secondary	**primary**

The next step is to determine what indicators—what concrete changes that occurred in your district—correspond to these various areas of interest. In the sections that follow, we discuss ways to identify appropriate indicators, and how to translate these indicators into specific pieces of evidence that can be collected and shared.

DESCRIBING THE MATERIAL IMPACT OF THE E-RATE

Almost every audience is going to be interested in the "bottom line" of the E-Rate program: the material impact of E-Rate funding on your district's technological infrastructure. Different groups, of course, will require different levels of detail, but your first priority for any presentation on the impact of the E-Rate program will be to determine how to explain to others exactly what role the E-Rate program played in creating this infrastructure.

E-Rate funds can be used to purchase specific parts of a complicated suite of services and facilities. You probably already have in hand all the documentation you need to itemize the specific purchases that were subsidized by the E-Rate program. The next step is to determine how to explain the added value that E-Rate funding brought to your district. What, in short, did the E-Rate program allow you to do that you could not otherwise have ever done?

Before E-Rate funding became available, most districts were building their networks in a highly piecemeal fashion—using a small grant to wire one school here and another school there, for instance, or using a portion of the district IT budget to establish a dial-up network for administrative use. The scope and depth of E-Rate funds have allowed schools to move to a different level of planning and execution—to design and deploy entire networks, even in some of the largest and most administratively complicated districts in the country. It is this quality—this "quantum leap"—that you will want to communicate to your community, your local government and your colleagues. Doing this will require beginning with the specific and moving to the general, by discussing:

- What you specifically bought with E-Rate funds: servers, switches, wiring, etc.;
- What those purchases made possible (what other components, both technical and programmatic, of your IT program make sense now that the E-Rate funded equipment is in place);
- What long-term costs (such as telephone bills) you know you will be able to meet as a result of the promise of continued subsidization by the E-Rate program;
- With these technical and programmatic improvements in place, what specific resources and capabilities are now available to students, teachers and administrators in your district? Who has email accounts that didn't have them before? How has this new network changed teachers' access to administrative information and communication among teachers and administrators? What kinds of information resources are now available to students, teachers and administrators that weren't available before?

PLANNING FOR DOCUMENTING THE IMPACT OF YOUR NETWORK ON CLASSROOM PRACTICES

Up to this point, the relationship between indicators (such as increased classroom-level network access) and evidence (the number of classrooms with wiring completed and adequate hardware) has been pretty clear. Your task starts to get a little challenging, though, with the last question described above. On one level, the answer seems simple; students, teachers and administrators now have access to the entire Internet, to local online resources such as curriculum guides and standards and to administrative information and student data. But questions quickly arise. You may be able to say what is available, but do you know what is being used? And further, how is it being used? How much is it being used? Who is using it?

These are the difficult questions. But you have two important things going for you:

- The goal of the E-Rate program was not to revolutionize classroom level technology use in a single sweep. That would be impossible, and no one should be held to such a standard. Access to technology is a necessary but not the only part of the puzzle.
- If you take action now to identify the evidence you want to collect and begin to collect it, you will be able to develop answers to these questions down the road. If you wait until the network is fully built and has been in place for several years, you never will be able to recapture important information about how students and teachers began to use it as part of their day-to-day work.

To determine what questions you want to answer about the impact of your IT infrastructure on teaching and learning, and what kinds of evidence you want to collect, it will help to break teaching and learning down into several components.

- **Impact on professional development offerings.** How have the district's technology-related professional development offerings changed to meet the increased need for technology literacy among teachers? How have all of the district's professional programs changed to take advantage of the communication and resource-sharing opportunities the network provides?
- **Impact on teacher skill and knowledge.** Are teachers taking advantage of the professional development available to them? What do they see as the benefits of gaining technical skills? What new knowledge or opportunities do they report gaining from new levels of access to information available to them through the network?
- **Impact on teacher practice.** What kinds of changes do you expect to see in teachers' practices as a result of the presence of this new technology? Do you expect that all teachers will change in some ways, or will the change occur in only those who have received certain kinds of training?
- **Impact on resources used in teaching.** If you have a local online resource available to teachers that makes standards-aligned curricula available to them, are they using it? How often? Are students using a wider range of information resources in their work? Are students writing more or producing original work products more often because of their increased access to computer-based production tools?
- **Impact on what students are doing.** Increased technology access can often lead not only to changes in the resources students and teachers are utilizing, but the kind of activities students engage in on a day-to-day basis. Many of the strengths of technology make it more possible for students to do a variety of things: write and revise complex compositions, do original research, collect and analyze quantitative data, communicate with a wide range of people and explore and create visual representations of information. However, it is important to bear in mind that technology makes these kinds of activities more possible logistically and technically but not necessarily important in the priorities and goals of the district or school. Be careful to consider the relationship between the kinds of student activity that you prioritize in your investigations, and the kinds of student activity that are encouraged in the district as a whole.

- **Impact on what students are learning.** Technology rarely improves student learning on its own. What students are expected to learn, how ready they are to learn it, how it is taught and how it is assessed are all more important determinants of the outcomes of assessment measures than technology use by itself. However, a wide range of research suggests that when used well, technology can support teachers and students in increasing the diversity and depth of the work they do together. You may be interested in tracking changes over time in areas such as the kinds of activities students are doing, the range of representations of their knowledge they are producing and the level of conceptual and critical thinking they are engaging in.

For each of these areas, one piece of the puzzle is how much the technology is used. Is more email sent throughout the district? How frequently do teachers report that their students use the World Wide Web? How much traffic does your district Web site get?

Another piece of the puzzle requires looking away from the technology. What are the stated goals for improving teaching and learning in your district, and how might the technology be helping students, teachers and administrators meet those goals? For example, there may be a district-wide emphasis on improving students' writing skills at the elementary level, or the district may be pushing for teachers to take an increased number of in-service hours of professional development each year. How can you demonstrate whether and how access to technology is playing a role in working toward those goals?

Information about how much the technology is being used will not be enough to answer these questions. Exploring these questions will require more time-consuming and challenging research, such as documenting changes over time in what school-level staff report about their own activities, observing over time what school-level staff are actually doing in their classrooms, tracking over time how patterns of communication and information-sharing are changing throughout the district and simply asking people at every level of the district how the technology is or isn't changing how they do their work.

ISSUES TO THINK ABOUT IN CHOOSING AND MODIFYING EVALUATION INSTRUMENTS

So what are the steps required to determine exactly what information you want to collect, and how do you go about collecting it?

- **Start with the big, long-term goals.** Begin with your high-level goals. What are the overarching goals of the district for improving the quality of education that students are receiving? What role do you envision the information technology infrastructure playing in helping to achieve those goals?
- **Get explicit about what you and your stakeholders would really like to know.** How do these high-level goals translate into concrete, step-by-step changes in management practices, teaching practices, modes and patterns of communication, types of classroom activities and professional development activities, and varieties of resources used in the curriculum? Move away from thinking of your goals ("All students will be able to use the Web to support original research") and toward thinking of specific processes of change ("Are teachers gradually exposing their students to Web searching skills?" "Are students and teachers discovering ways to ask questions and seek out answers

to them on the Web?"). Then identify concrete evidence that could provide answers to those questions over time ("How often do teachers report that their students do research?" "What resources do they use to do that research?"). A good way to check on whether there is a match between your overall goals and the evidence you are collecting is to ask, "What is our definition of success, and what does success look like in practice?"

- **Don't reinvent the wheel.** Many research groups have developed research tools that educators can use to explore the impact of educational technology initiatives on their schools. The sample survey questions in this report draw on many of these tools. We cite and describe them as well as others at the end of this report. Take time to look at these resources; finding one that is useful to you will save you time in the long run, compared to creating surveys and other research tools from scratch.
- **Don't hesitate to mix and match.** No one existing research tool will be just right for you. Pick and choose among questions in various surveys and other instruments that you review.
- **Stay focused.** Avoid the temptation to collect far more information than you will be able to use. Keep your eye on the core of your argument. You've gone through the arduous process of bringing a complex new infrastructure into existence. Why do you think this investment is important? What changes do you believe can happen as a result of this new resource? Focus on collecting the information that will help you to test and make your case.
- **Don't promise more to your stakeholders than you can deliver.** Good research works in small steps, and meaningful change in complicated institutions like school districts happens gradually. Important material changes have happened quickly through the E-Rate program, but the more important changes—how teaching and learning happens in the classroom and how teachers do their work as professionals—occur more gradually. If you collect evidence that is concrete and clear, you will be able to demonstrate convincingly where specific and incremental changes are happening. In the long run, this is far more valuable than making claims of broad change that you cannot support.

COLLECTING EVIDENCE OF THE IMPACT OF E-RATE FUNDING

You can use many different research tools to help you collect information about the implementation of your E-Rate-funded infrastructure plans, about how that infrastructure gets used and about the impact of that use on teaching, learning and administrative practices in your district.

Documentation is a key step in describing the actual implementation process. Keeping track of purchases, installations and other budgetary and managerial information in ways that you can review and analyze over time is very important.

Qualitative inquiry is important if you are interested in understanding how administrators, teachers and students are making use of the telecommunications infrastructure and how their use of it is changing over time. Qualitative research methods include techniques like classroom observations and interviews. These are time-consuming, but they can give you valuable insight into the process of change.

Surveys are a way to collect uniform information from a large number of people. Well-crafted survey questions can help you both to collect straightforward quantitative

information (such as how many computers a school has, or how frequently a teacher attends professional development workshops) and to gain some insight into the needs, interests, goals and beliefs of the people being surveyed.

The following section of the guide provides some sample questions that can be used to help you document the impact access to reliable technology resources can have on teaching, learning and administrative practices. The survey questions are drawn from existing surveys that practitioners and researchers are using to collect information about how technology is being used and supported at the school and classroom level. Many of the questions come from instruments developed for Teaching, Learning and Computing: A National Survey of Schools and Teachers, a project being conducted by Dr. Hank Becker and others at the Center for Research on Information Technology and Organizations (CRITO) at the University of California, Irvine. Dr. Becker and his colleagues encourage practitioners to use their survey instruments. Complete versions can be found and downloaded at http://www.crito.uci.edu/TLC/html/questionnaires.html.

Because we assume most district offices already have in hand specific data on the costs associated with installing E-Rate-funded infrastructure (the total number of routers, servers and switches installed in the past two years, and so on), we do not provide model questions related to district-level investments. Instead, we focus on providing examples of questions that could be used to collect school- and classroom-level information about:

- The degree of focus on technology issues at the administrative level within schools;
- The nature of technology support activities at the school level;
- The nature and cost of school's information technology infrastructures; and
- Teacher's practices and needs regarding technology.

We encourage you to pick and choose among the survey questions presented here and to put them together into a format that is appropriate to your needs. Add questions, as well, if there is information you need that is not captured in these questions.

RECOMMENDATIONS FOR ADMINISTERING SURVEYS

We have included three kinds of questions: questions for collecting information on school characteristics, questions to be answered by school-level technology coordinators and questions to be answered by classroom teachers.

Questions about school characteristics. It often is useful to break down survey responses by types of schools. For instance, you may want to know whether the kind of school (elementary, middle, high) makes a difference in the kinds of Internet-based activities in which students participate. Therefore, you may want to include questions in your surveys to collect basic demographic information on the schools. If that kind of information exists in an easily-accessible form within the district, make sure that you have a mechanism for connecting survey responses to those data.

Surveys for technology coordinators. Not every school has a full-time technology coordinator, but many have someone who fills that role formally or informally. Send questions for technology coordinators to principals and ask them to pass them on to a school's technology coordinator or another staff member who comes closest to filling that role. It will be helpful to have this person identify him- or herself on the survey form

so that you have a contact if any answers are unclear. Also make sure that the response is identified by school name so that you can correlate responses with other data you may have about individual schools, such as the amount of E-Rate-related infrastructure that was brought into them.

Give people a specific deadline for completing the survey. Provide an easy way for them to return it to you, such as a pre-paid envelope or a convenient drop-off point. If possible, conduct surveys via email or the World Wide Web.

Surveys for teachers. It will be more time-consuming and labor-intensive to administer a survey to every teacher in your district than to collect surveys from one person per school building. Therefore, be judicious in determining what information you really need to collect from teachers and when you want to collect it. Once you have distributed a survey, you are unlikely to be able to get further information from teachers if you find later that you have other questions you wanted to ask. Also, remember that you will receive fewer responses if you distribute surveys just before holidays or during testing periods. Make sure you do not include questions on a teacher survey that require knowledge that a teacher is not likely to have at hand. Save questions about overall school resources or school policies, for instance, for the technology coordinator survey. Also, consider allowing teachers to complete surveys anonymously—identifying only their school and grade level, for example—to avoid the possible perception that they may be evaluated individually on the basis of their responses.

Other recommendations. Bear in mind that many questions will be most useful as ways to measure *change over time*. For example, simply finding out that 30 percent of the principals in the district use email to communicate with their teachers is not very useful. But if the response to this question a year later shows that 50 percent of principals are now doing this, you've documented major growth in the use of email for principal-teacher communication.

Finally, if you are developing and administering surveys without the support of someone with experience in this type of research, consult one of the many guides that are available on the subject. An excellent one is *How to Conduct Surveys: A Step-by-Step Guide* by Arlene Fink and Jacqueline Kosecoff, published by Sage Publications (second edition, 1998). ■

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SURVEY QUESTIONS FOR COLLECTING BASIC SCHOOL INFORMATION

What level is your school? Please check one.

- ☐ Elementary (includes at least grades 1-4)
- ☐ Middle/Intermediate/Junior (includes no grade below 4 or above 10, but includes at least grades 7-8)
- ☐ High (includes at least grades 11 and 12)
- ☐ Combined (combination of one or more of the above categories)

What was the total enrollment in your school at the start of the current school year?

_____ students

How many teachers (full-time instructors) were employed at your school at the start of the current school year?

_____ teachers

How many classrooms/instructional rooms does your school have?

_____ rooms

SURVEY QUESTIONS FOR SCHOOL TECHNOLOGY COORDINATORS

I. *Questions that could be used to track the degree of focus on technology issues at the administrative level within schools.*

One way to demonstrate that technology investments were worthwhile is to document that there is a corresponding growth in interest in technology issues at the school administration level. Your expenditures are more likely to be worthwhile if they intersect with interest in technology use at the school level.

Please check each of the following areas for which there is a policy currently in place at your school.

- ☐ Equity in access to technology (within your school building)
- ☐ Which classes or types of students get to use computers
- ☐ Security from unauthorized system access or entry
- ☐ Honoring intellectual property rights, e.g. copyrights
- ☐ Prohibition of use of adults-only material
- ☐ Student computer-related competency requirement
- ☐ Restriction of software purchases to an approved list
- ☐ Computer game-playing on school computers
- ☐ Installation of software that has not been purchased by school
- ☐ Periodic staff (teacher) development regarding technology

Does your school have a computer technology committee?

☐ Yes ☐ No

If so, who is represented on the committee? Check all that apply.

- ☐ Teachers
- ☐ Parents
- ☐ Students
- ☐ Administrators
- ☐ Other, e.g. community members

Does your school have a budget for technology costs over which you or someone else in your school has sole discretionary authority?

☐ Yes ☐ No

A. How much is this year's technology budget for your school?
This year's technology budget $ _____

B. How much was last year's technology budget for your school?
Last year's technology budget $ _____

II. *Questions that could be used to track the nature of technology support activities at the school level.*

As schools gain access to more technology and become more interested in using it, their need for multiple kinds of support increases as well. You may want to document the level of support currently existing in schools for teachers.

What tasks or work roles does your job include? Check all that apply.

- ☐ Classroom teaching
- ☐ Technology or computer coordinator
- ☐ Networking coordinator
- ☐ General administration
- ☐ Media specialist
- ☐ Other (please describe)_____
- ☐ Other (please describe)_____

Do you or someone else at your school hold the position of technology or computer coordinator? Check all that apply.

- ☐ I formally serve as coordinator
- ☐ I informally serve as coordinator
- ☐ Someone else formally serves as coordinator
- ☐ Someone else informally serves as coordinator
- ☐ There is a coordinator at the district level
- ☐ There is no coordinator at either the school or district level

Roughly how many hours per week, on the average, do you actually spend providing technology, training, coordination and user support in each of the following ways? Think about last week in particular; then adjust if it was different than usual. If you also work at other schools, count only the hours spent for this school.

# of hours	
_____	a. Supervising and assisting computer use by classes of other teachers
_____	b. Supporting or training individual teachers in their use of computers, including impromptu help
_____	c. Installing, troubleshooting and maintaining equipment, networks, operating systems and software
_____	d. Planning and running staff development workshops or in-service activities on technology
_____	e. Writing lesson plans and units with other teachers that integrate computer activities with the curriculum
_____	f. Selecting and acquiring computer-related hardware, software and support materials for the school
_____	g. Other technology coordination and support (please describe)

_____

Since September, on how many occasions have teachers in your school received formal computer technology training, direct tutoring or support? Also, please estimate the average number of teachers served per occasion. Include yourself in those situations where you are a learner rather than a trainer.

	# of occasions	Avg. # of teachers served
a. One-on-one or small group tutoring or training sessions about technology	_____	_____
b. School-presented technology in-service workshops	_____	_____
c. District presented technology in-service workshops	_____	_____
d. State or regionally sponsored workshops or technology conferences	_____	_____
e. Commercially presented workshops or courses on technology	_____	_____
f. College or university courses on technology	_____	_____
g. Other (please describe) _____	_____	_____

III. *Questions that could be used to track the nature and cost of a school's information technology infrastructure.*

As a district administrator you may already have access to much or all of this information. However, these are some questions you could use if you need to collect this type of information. Remember, it is important to be able to demonstrate concretely how far along your school is both in receiving its E-Rate-funded infrastructure, and in donating its own efforts and resources to making that network usable (i.e., buying hardware and software).

How many computers at your school are used primarily by administrators or support staff (not teachers)?

_____ computers ☐ Don't Know

How many of your computers are used primarily as file-servers, print-servers, email-servers, or by students or teachers?

_____ computers ☐ Don't Know

Of all of the rooms in your school used for any instruction, how many have:

_____ a. Sixteen or more computers
_____ b. Exactly one computer
_____ c. No computers at all
_____ d. At least one computer connected to a Local Area Network (LAN) at the school
_____ e. At least one computer connected to the Internet

How many computers at your school:

_____ a. Are laptop or notebook computers
_____ b. Have direct access to a printer whenever used
_____ c. Have an internal or directly attached CD-ROM drive
_____ d. Have an internal or directly attached modem
_____ e. Are attached to a Local Area Network (LAN) for sharing files, etc.
_____ f. Can have simultaneous Internet access
_____ g. Were acquired either this school year or last
_____ h. Were acquired before the last school year

What percent of your school's computer-related hardware acquisitions have come through the following sources?

_____ a. School's regular budget
_____ b. Grants obtained by school or district
_____ c. Other district allocations to the school
_____ d. PTA and other school fund-raising
_____ e. Gifts of community or business organizations
_____ f. Other donations of software
_____ g. Other (please describe)_____

What fraction of the computers in your school have the following software accessible for teachers or students to use? Check the closest choice for each.

	None	Very Few	1/4	1/2	3/4	Almost All	All
a. Word processing	☐	☐	☐	☐	☐	☐	☐
b. Spreadsheet	☐	☐	☐	☐	☐	☐	☐
c. Database	☐	☐	☐	☐	☐	☐	☐
d. Drawing or painting software	☐	☐	☐	☐	☐	☐	☐
e. Desktop publishing, presentation software	☐	☐	☐	☐	☐	☐	☐
f. Image-editing software (e.g., Photoshop)	☐	☐	☐	☐	☐	☐	☐
g. Multimedia development (e.g., Hyperstudio)	☐	☐	☐	☐	☐	☐	☐
h. Reference information on CD-ROM	☐	☐	☐	☐	☐	☐	☐
i. Interactive laserdisc software	☐	☐	☐	☐	☐	☐	☐
j. Internet (e.g., Netscape, email software)	☐	☐	☐	☐	☐	☐	☐
k. Web development tools	☐	☐	☐	☐	☐	☐	☐
l. Programming languages	☐	☐	☐	☐	☐	☐	☐
m. Math-specific programs	☐	☐	☐	☐	☐	☐	☐
n. Science-specific programs	☐	☐	☐	☐	☐	☐	☐
o. English-specific programs	☐	☐	☐	☐	☐	☐	☐
p. Social studies-specific programs	☐	☐	☐	☐	☐	☐	☐
q. Foreign language-specific programs	☐	☐	☐	☐	☐	☐	☐
r. Typing tutor	☐	☐	☐	☐	☐	☐	☐
s. Business education-specific programs	☐	☐	☐	☐	☐	☐	☐
t. CAD-CAM, industrial arts programs	☐	☐	☐	☐	☐	☐	☐

Generally speaking, what percentage of the software at your school has come through the following sources?

	0%	5%	10%	25%	50%	75%	100%
a. School's regular budget	☐	☐	☐	☐	☐	☐	☐
b. Grants obtained by school or district	☐	☐	☐	☐	☐	☐	☐
c. Other district allocations to the school	☐	☐	☐	☐	☐	☐	☐
d. PTA and other school fund-raising	☐	☐	☐	☐	☐	☐	☐
e. Gifts of community and business organizations	☐	☐	☐	☐	☐	☐	☐
f. Other donations of software	☐	☐	☐	☐	☐	☐	☐

Approximately what percentage of the software in use at your school has been acquired in the last two years? Check only one.

- ☐ None
- ☐ 10%
- ☐ 20%
- ☐ 30%
- ☐ 40%
- ☐ 50%
- ☐ 60%
- ☐ 70%+

You have been describing your school's investments in computer-related hardware, software and teacher support for technology. We would now like to know what those investments have cost <u>your school</u> in financial terms in the past two years. Exact figures are not needed; just give rough estimates. If you do not know, write "DK.". If nothing was spent on a given aspect, please enter a "0".

a. Instructional computers used by teachers or students (including any Integrated Learning Systems [ILS] and servers)
$ _____

b. Peripherals (printers, computer projection devices, graphics scanners, CD-ROMS, digital cameras, etc.)
$ _____

c. Video production facilities
$ _____

d. Computer furniture and security equipment
$ _____

e. Local Area Network (LAN) connections and retrofitting
$_____

f. Internet and other outside data communication lines
$ _____

g. Computer maintenance contracts and repair services.
$ _____

Computer software:

h. Individual software purchases, lab-packs and one-time upgrades
$ _____

i. Site licenses and annual contract fees
$ _____

Support and training for teachers:

j. Portion of salary of technology and/or network coordinator
$ _____

k. Portion of salaries of others providing training
$ _____

l. Release time, participant costs and other expenses of training recipients
$ _____

m. Other expenses enabling training and support
$ _____

IV. Questions that could be used to find out about teachers' practices and about their needs.

Even though there is a long way to go to make teachers comfortable using technology in their teaching on a regular basis, you may need to describe to others how teachers and students are currently using technology in the classroom. These data can help you to make the case that these resources are getting used, but that there is still far to go.

In this collection of survey questions we offer only a few examples of questions you could use to collect information about:

- how teachers are using computers in their classrooms;
- the kinds of support they feel they need to use computers; and
- how knowledgeable they feel about using computers.

You should refer to the surveys we cite in the section below if you are interested in tracking more detailed information about teachers' practices with technology.

Roughly what proportion of all student use of computers during this school year will involve each of the following activities?

	0-10%	10-25%	25-50%	50-75%	75-100%
	☐	☐	☐	☐	☐
a. Learning basic skills and facts through drills, tutorials and learning games	☐	☐	☐	☐	☐
b. Learning computer skills such as keyboarding, how to do word processing, the Internet, spreadsheets, etc	☐	☐	☐	☐	☐
c. Learning programming and computer science	☐	☐	☐	☐	☐
d. Applying computers in vocational and business education	☐	☐	☐	☐	☐
e. Writing reports, essays, etc.	☐	☐	☐	☐	☐
f. Simulations in science and social studies using spreadsheets and databases	☐	☐	☐	☐	☐
g. Looking up information on CD-ROMS, the Web and other computer resources	☐	☐	☐	☐	☐
h. Other (please describe) _____					

Below is a list of instructional activities done over the Internet or other networks like AOL. For each activity, please indicate how many teachers at your school have used that activity in their classes and about how many students have been involved during this school year. If "none" for any activity, write "0" in the response space. Do not leave any activities blank.

	# of Teachers	# of Students
a. Email exchanges with classes in other places	_____	_____
b. Collaborative science investigations with classes in other places	_____	_____
c. Publishing class or individual products on the Web	_____	_____

About how many teachers at your school have used the Web in their teaching in some way?

1. None _____
2. A few _____
3. One-quarter _____
4. Half _____
5. Most _____

How many students have been involved in direct use of the Web at school?

1. None _____
2. A few _____
3. One-quarter _____
4. Half _____
5. Most _____

Have the school's networking facilities and connectivity been used in any of the following types of programs?

a. School-to-work transition programs (e.g., database of potential employers, email with worksites)

☐ Yes ☐ No

b. Class or individual projects where the Internet is used to acquire information from community or other group.

☐ Yes ☐ No

c. Communications to parents about the school program, homework assignments, etc. via publication on Web pages or through email

☐ Yes ☐ No

d. Students accessing information on school server from home (e.g., homework assignments)

☐ Yes ☐ No

If you had total control of your school's budget for technology, how would you distribute the funds between these three general areas? Enter three percentages that add to 100%.

a. Computer hardware, related technology equipment, network connections and maintenance _____%
b. Software and information content, subscriptions to online networks and educational projects _____%
c. Training and staff development supervision, release time for staff development, paid time for instructional improvement _____%

TOTAL TECHNOLOGY BUDGET = 100 %

About what proportion of the teachers in your school:

a. Experiment with new teaching methods involving computer technology? _____%
b. Use computers for their own professional tasks? _____%
c. Have their students use computers to complete a curricular assignment? _____%
d. Have been involved in planning or implementing Internet-based activities? _____%
e. Seek your advice about integrating technology and curriculum? _____%

To what extent do the following conditions constrain your ability to achieve your goals for information technology at the present time at your school?

(mark each answer with the letter of your choice)
a. Not at all b. Slightly c. Somewhat d. A great deal

_____ 1. Too few computer labs
_____ 2. Too few computers in classrooms
_____ 3. Obsolete technology
_____ 4. Too little or inadequate software
_____ 5. Students' lack of computer skills
_____ 6. Teachers' lack of computer skills
_____ 7. Teachers' lack of interest
_____ 8. Teachers' lack of experience with technology-oriented pedagogy
_____ 9. Limited budget for technology
_____ 10. Administration's lack of experience with technology
_____ 11. Other (please describe) _____

SURVEY QUESTIONS FOR CLASSROOM TEACHERS

In which of these ways do you use computers in preparing for teaching your classes or in other professional activities?

(mark each answer with the letter of your choice)
a. Do not use b. Occasionally c. Weekly d. Daily

_____ 1. Record or calculate student grades
_____ 2. Make handouts for students
_____ 3. Correspond with parents
_____ 4. Write lesson plans or related notes
_____ 5. Get information or pictures from the Internet for use in lessons
_____ 6. Use camcorders, digital cameras or scanners to prepare for class
_____ 7. Exchange computer files with other teachers
_____ 8. Post student work, suggestions for resources or ideas and opinions on the Web

How important have computers been in your teaching over previous years? (Please mark each answer with the appropriate academic year, i.e. 96-97 or 98-99.)

(mark each answer with the letter of your choice)
a. Did not use computers b. Minor importance
c. Moderately important d. Very important

_____ 1. This year
_____ 2. Last year
_____ 3. Two years ago
_____ 4. Three years ago
_____ 5. Four years ago
_____ 6. Five years ago

Compared to five years ago, are you using computers more frequently or less frequently in these ways?

(mark each answer with the letter of your choice)
a. Less frequently now b. Stayed the same
c. More frequently now d. Much more now

_____ 1. Trying out new software or technologies
_____ 2. Using computers for class preparation (e.g., handouts, overheads)
_____ 3. Using computers for non-work activities
_____ 4. Assigning students to use computers
_____ 5. Suggesting that students use computers in their projects

What kinds of technology resources has the school provided for your use? Check all that apply.

- ☐ A telephone in your room
- ☐ Easy access to photocopying with reasonable limits regarding cost-free use
- ☐ Easy access to a fax machine
- ☐ A desktop computer for your own use while at school
- ☐ A laptop computer for use both at work and at home
- ☐ A computer printer in your room or nearby
- ☐ Access to computers in the teachers' lounge or department office
- ☐ Access to electronic mail from your classroom, lounge or office
- ☐ Modem access to the Internet from your classroom
- ☐ High-speed access to the Internet from your classroom
- ☐ A computer to borrow on occasion to use at home
- ☐ Access to the school's computer network from home
- ☐ Access to the Internet from home through a district Internet connection
- ☐ None of the above
- ☐ Other (please specify) _____

The next three questions ask about support that teachers may need in order to use computer technologies. Please mark each answer with the letter of your choice.

How often do you need each type of support?

a. Not at all b. Seldom c. 1-3 times a month d. Weekly or more

_____ 1. Technical support (e.g., computer and software fixes)
_____ 2. Instructional support (e.g., incorporating technology into your lessons)
_____ 3. Help in supervising students (e.g., aides, volunteers)

How available is each type of support when you need it?

a. Not available b. Sometimes c. Frequently
d. Mostly e. Almost always

_____ 1. Technical support (e.g., computer and software fixes)
_____ 2. Instructional support (e.g., incorporating technology into your lessons)
_____ 3. Help in supervising students (e.g., aides, volunteers)

What is the quality of the support that you receive?

a. No support received b. Poor c. Fair
d. Good e. Very good f. Excellent

_____ 1. Technical support (e.g., computer and software fixes)
_____ 2. Instructional support (e.g., incorporating technology into your lessons)
_____ 3. Help in supervising students (e.g., aides, volunteers)

APPENDIX A

THE E-RATE AND CONGRESS: A RUNDOWN OF LEGISLATIVE PROPOSALS

Since the FCC adopted rules to implement the E-Rate program, there have been numerous congressional efforts to amend the law to place additional requirements on recipients, reorganize the funding mechanisms and administration of the program, or eliminate it all together. Some of the most notable legislative attempts are outlined below.

THE 105TH CONGRESS (1997-1998)

THE SAFE SCHOOLS INTERNET ACT OF 1998

Filed As: HR 3177 and S 1619 (identical bills in House and Senate)

Introduced: February 9, 1998 (S 1719) and February 11, 1998 (HR 3177)

Sponsor (HR 3177): Rep. Bob Franks (R-NJ).

Sponsors (S 1619): Sen. John McCain (R-AR), with initial co-sponsors Dan Coats (R-IN), Ernest Hollings (D-SC) and Patty Murray (D-WA).

Summary: These bills were introduced "to direct the Federal Communications Commission to study systems for filtering or blocking matter on the Internet, to require the installation of such a system on computers in schools and libraries with Internet access, and for other purposes." Both S 1619 and HR 3177 would revise the Snowe-Rockefeller Amendment to mandate that schools and libraries receiving E-Rate subsidies install Internet filtering software. Though libraries would not be required to install filters on every Internet computer, schools would have to install filters across the board. School districts would be allowed to determine the extent of the filtering, based on local community standards.

Status: S 1619 was referred to the Senate Commerce Committee, which approved it in March 1998. After being introduced to the Senate Appropriations Committee, it was approved as an amendment to the FY 1999 Commerce, Justice and State Appropriations Act in July 1998. HR 3177 was referred to the House Commerce Committee though no further action occurred. No joint version of the bills was resolved between the House and Senate, so it could not be enacted into law before the conclusion of the 105th Congress. Both bills would later reappear during the 106th Congress as S 97 and HR 896.

ANTI-FCC PHONE TAX ACT OF 1998

Filed As: HR 4032

Introduced: June 10, 1998

Sponsor: Rep. James Sensenbrenner (R-WI)

Summary: The Anti-FCC Phone Tax Act of 1998 was introduced to "repeal the authority of the Federal Communications Commission to require contributions from telephone carriers for the connection of schools, health care providers and libraries to the Internet." The Act would have removed language from the Telecommunications Act that gave the FCC the authority to implement the E-Rate program.

Status: Not passed.

E-RATE TAX MORATORIUM ACT OF 1998

Filed As: HR 4065

Introduced: June 16, 1998

Sponsors: Rep. Joe Scarborough (R-FL) and eight initial co-sponsors.

Summary: The E-Rate Tax Moratorium Act was introduced "To suspend collections for the connection of schools and libraries to the Internet and for other purposes." If passed, the Act would have prevented the FCC from collecting subsidies from telephone companies that would have been used to support the E-Rate program. It would also have absolved telephone companies from having to contribute to the fund. Subsidies collected prior to the enactment of the bill would have been allowed to be disbursed.

Status: Not passed.

THE SCHOOLS AND LIBRARIES INTERNET ACT

Filed As: HR 4324 and S 2348 (identical bills in House and Senate)

Introduced: July 23, 1998 (both bills)

Sponsors (HR 4324): Rep. Billy Tauzin (R-LA), along with Rep. Jerry Weller (R-IL), Rep. Kenny Hulshof (R-MO) and eight initial co-sponsors.

Sponsors (S 2348): Sen. Conrad Burns (R-MT), co-sponsored by Sen. Al D'Amato (R-NY).

Summary: These identical House and Senate bills attempted to reform the process by which schools and libraries receive Internet access support. The Act would have transferred administrative control of the E-Rate program from the Schools and Libraries

Corporation to the Department of Commerce's National Telecommunications and Information Administration (NTIA). Both bills would have amended the 1996 Telecommunications Act and would have replaced the FCC's E-Rate program with an annual $1.7-billion block grant program. The block grants, funded through the current telephone excise tax, would be distributed directly to the states, which in turn would determine how the funding would be spent to wire schools and libraries.

Status: Neither version of the Act was passed before the end of the 105th Congress. They were reintroduced in 1999 as HR 1746 and S 1004.

THE 106TH CONGRESS (1999-2000)

THE CHILDREN'S INTERNET PROTECTION ACT

Filed As: HR 896 and S 97 (initially as identical bills, though later altered)

Introduced: January 19, 1999 (both bills)

Sponsors: (HR 896): Rep. Bob Franks (R-NJ), co-sponsored by 19 others, including 16 Republicans and three Democrats.

Sponsors (S 97): Sen. John McCain (R-AZ), co-sponsored by Spencer Abraham (R-MI), Kit Bond (R-MO), Conrad Burns (R-MT), Jesse Helms (R-NC), Ernest Hollings (D-SC), Kay Hutchison (R-TX) and Ted Stevens (R-AK).

Summary: HR 896 and S 97 are both re-introductions of HR 3177 and S 1619 from the 105th Congress. The House version strengthened the filtering requirements, mandating that all schools and libraries receiving E-Rate subsidies use Internet filters. This language was then amended by a voice vote so that the filtering requirements be in place when minors used the Internet. S 97 remained largely similar to S 1619, though the Senate Commerce Committee revised it in June 1999 so that that filtering would be required to prevent access to "child pornography" or "material that is obscene." The bill also was amended specifically to ensure filtering when minors accessed the Internet and would allow schools to pay for filters with E-Rate subsidies.

Status: After being referred to the House Commerce Committee and the Telecommunications Subcommittee, the House adopted HR 896 as part of the Juvenile Justice bill, which it passed in June 1999. S 97 was referred to the Senate Commerce Committee in April 1999 and subsequently passed by the committee in June 1999. In August 1999 it was reported to the full Senate.

THE E-RATE TERMINATION ACT

Filed As: HR 692

Introduced: February 10, 1999

Sponsors: Rep. Tom Tancredo (R-CO), with 36 Republican co-sponsors.

Summary: The E-Rate Termination Act was introduced "to terminate the E-Rate program of the Federal Communications Commission that requires providers of telecommunications and information services to provide such services for schools and libraries at a discounted rate." The Act would remove all relevant E-Rate language from the Telecommunications Act of 1996. It would no longer allow schools and libraries to receive telecommunications subsidies, though it would preserve subsidies for health-care providers.

Status: Referred to the House Commerce Committee in February 1999 and the Telecommunications Subcommittee in March 1999. No other action has occurred.

THE TELECOMMUNICATIONS TRUST ACT

Filed As: HR 727

Introduced: February 11, 1999

Sponsors: Rep. Ron Klink (D-PA), along with co-sponsors Robert Brady (D-PA), Jay Dickey (R-AR), Phil English (R-PA), Gene Green (D-TX) and Tim Holden (D-PA).

Summary: The Telecommunications Trust Act would "amend the Communications Act of 1934 to provide for explicit and stable funding for Federal support of universal telecommunications services through the creation of a Telecommunications Trust Fund." HR 727 would shift the E-Rate's funding source to the existing excise tax on telephones.

Status: Referred to both the House Commerce Committee and the House Ways and Means Committee in February 1999, then referred to the Telecommunications Subcommittee in March 1999. No other action has occurred.

THE SCHOOLS AND LIBRARIES INTERNET ACCESS ACT

Filed As: HR 1746 and S 1004 (identical bills in House and Senate)

Introduced: May 11, 1999 (both bills)

Sponsors (HR 1746): Rep. Billy Tauzin (R-LA) and 23 co-sponsors, including 22 Republicans and one Democrat.

Sponsors (S 1004): Sen. Conrad Burns (R-MT), along with Sen. James Inhofe (R-OK) and Sen. Spencer Abraham (R-MI).

Summary: HR 1746 and S 1004 are reintroductions of Rep. Tauzin's HR 4324 and Sen. Burns' S 2348, both of which were not acted on before the end of the 105th Congress. Like the original drafts, the latest versions of the Schools and Libraries Internet Access Act would prevent the FCC and the SLD from managing the current E-Rate program and would instead create a new program funded by the telephone excise tax, distributing block grants to individual states. The excise tax would be reduced from three percent to one percent and then be eliminated after five years. The bills also stipulate that the new program would be managed by the NTIA, though the co-sponsors of HR 1746 have since stated that the program should instead be managed by the U.S. Department of Education.

Status: HR 1746 was referred to both the House Commerce Committee and the House Ways and Means Committee in May 1999, then referred to the Telecommunications Subcommittee later that same month. The Telecommunications Subcommittee conducted a hearing on HR 1746 on September 30, 1999. S 1004 was referred to the Senate Finance Committee. No other action has occurred.

THE CHILD PROTECTION ACT

Filed As: HR 2560

Introduced: July 20, 1999

Sponsors: Rep. Ernest Istook (R-OK), along with co-sponsors Jay Dickey (R-AZ), Bob Franks (R-NJ), Ronnie Shows (D-MS), Mark Souder (R-IN) and Lee Terry (R-NE).

Summary: Similar in spirit to other filtering bills, HR 2560 requires schools and libraries receiving federal funds to use filtering software. Unlike S 97 and HR 846, though, the Child Protection Act specifically focuses on schools and libraries that receive federal money for acquiring computer hardware, as opposed to those that receive E-Rate subsidies.

Status: Referred to the House Committee on Education and the Workforce in July 1999. No other action has occurred.

THE NEIGHBORHOOD CHILDREN'S INTERNET PROTECTION ACT

Filed As: S 1545

Introduced: August 5, 1999

Sponsor: Sen. Rick Santorum (R-PA)

Summary: S 1545 is considered a compromise version of previous filtering bills. Unlike S 97 and HR 846, the Neighborhood Children's Internet Protection Act would allow schools and libraries either to install Internet filters or implement an Acceptable Use Policy (AUP) that would determine the limits of minors' online access. Schools and libraries would be allowed to implement an AUP and not install filters; they could also choose to install filters but not actually use them.

Status: S 1545 was referred to the Senate Commerce Committee in August 1999. No further action has occurred.

THE TRUTH IN TELEPHONE BILLING ACT

Filed As: HR 3011

Introduced: October 5, 1999

Sponsors: Rep. Tom Bliley (R-VA), along with co-sponsors Roy Blunt (R-MO), Mike Oxley (R-OH) and Billy Tauzin (R-LA)

Summary: HR 3011 was introduced "to amend the Communications Act of 1934 to improve the disclosure of information concerning telephone charges, and for other purposes." The Act would require telephone companies that contribute to the E-Rate's Universal Service Fund (as well as to future government-mandated funds) to disclose the particular program being funded, the equations used for determining the amount the consumer is charged and the charge amount itself. These disclosures would be listed on each subscriber's telephone bill.

Status: Referred to the House Commerce Committee in October 1999. No other action has occurred.

THE REST OF THE TRUTH IN TELEPHONE BILLING ACT

Filed As: HR 3022

Introduced: October 5, 1999

Sponsor: Rep. Ed Markey (D-MA)

Summary: Like HR 3011, HR 3022 was introduced "to amend the Communications Act of 1934 to improve the disclosure of information concerning telephone charges, and for other purposes." This particular bill would, in Rep. Markey's words, offer "the other side of the story" as to what consumers really pay for when they subscribe to telecommunications services. Along with the disclosures provided for in HR 3011, the Act would require companies to disclose the average amount per month by which the subscriber's service is reduced because of the subsidy.

Status: Referred to the House Commerce Committee in October 1999. No other action has occurred.

THE PHONE BILL FAIRNESS ACT

Filed As: S 1825

Introduced: October 28, 1999

Sponsor: Sen. Jay Rockefeller (D-WV), along with co-sponsors Sens. Ernest Hollings (D-SC) and Harry Reid (D-NV)

Summary: Described as "a bill to empower telephone consumers," the Phone Bill Fairness Act would have the FCC and FTC require that telecommunications service billing statements (including information on Universal Service Fund line-item charges) be "both accurate and comprehensible" to consumers. An earlier version of the Act was attached as an amendment to Sen. John McCain's Anti-slamming Amendments Act (S 1618), which passed the Senate but was never enacted into law.

Status: Referred to the Senate Commerce Committee.

Sources: Tech Law Journal, The Library of Congress (http://thomas.loc.gov)

APPENDIX B
E-RATE ONLINE RESOURCES

PROFILED SCHOOL DISTRICTS

Chicago Public Schools
http://www.cps.k12.il.us

Cleveland Public Schools
http://www.cleveland.k12.oh.us

Detroit Public Schools
http://dpsnet.detpub.k12.mi.us

Milwaukee Public Schools
http://www.milwaukee.k12.wi.us

THE E-RATE IN CONTEXT: UNIVERSAL SERVICE AND EDUCATION TECHNOLOGY ISSUES

The National Information Infrastructure Advisory Committee (NIIAC)
http://www.benton.org/Library/KickStart/nation.appendix.html

Information on NIIAC members and the formation of the committee.

The KickStart Initiative
http://www.benton.org/Library/KickStart/kick.home.html

NIIAC's project to get communities onto the Internet.

A Nation of Opportunity
http://www.benton.org/Library/KickStart/nation.home.html

NIIAC's final report on the development of the National Information Infrastructure.

The Snowe-Rockefeller Amendment
http://www.techlawjournal.com/telecom/47usc254.htm

Section 254 of the Telecommunications Act of 1996, or the Snowe-Rockefeller Amendment, led directly to the creation of the E-Rate.

The New Definition of Universal Service
http://www.benton.org/Updates/summary.html

The Benton Foundation summarizes the Federal Communications Commission's decisions concerning the principles on which universal service policies (including the E-Rate) are based, what package of services constitutes basic service and the support provided low-income consumers.

E-Rate: Don't Let the Flame Expire
http://www.benton.org/DigitalVoices/dv052499.html

Tony Wilhelm, Director of Benton's Communications Policy & Practice program, argues why a continued E-Rate program is paramount. (5/24/99)

Boon or boondoggle?
http://www.salonmagazine.com/21st/feature/1998/12/16feature.html

This article in Salon Magazine documents attempts to kill the E-Rate. (December 1998)

The Learning Connection: Schools in the Information Age
http://www.benton.org/Library/Schools

This Benton report examines how educators are grappling with the difficult interplay of technological change and educational values. Its online companion piece, What's Working in Education (http://www.benton.org/Practice/Edu), includes interviews with education technology practitioners about their experience implementing technology in the classroom.

Technology Counts '99
http://www.edweek.org/sreports/tc99

This annual Education Week report goes into great detail about the status and impact of technology in the classroom around the nation. (September 1999)

Technology and the New Professional Teacher
http://www.ncate.org/specfoc/techrpt.html

A report from NCATE, the National Council for Accreditation of Teacher Education. (1997)

Technology, Communities and Learning
http://millennium.aed.org/gomez.shtml

An article by Northwestern University's Louis Gomez, published by the AED Millennium Project. (1998)

Report to the President on the Use of Technology to Strengthen K-12 Education in the United States
http://www.whitehouse.gov/WH/EOP/OSTP/NSTC/PCAST/k-12ed.html

From the President's Committee of Advisors on Science and Technology. (March 1997)

What's at Stake in Education Technology
http://www.benton.org/Ed-tech

This site is where the Benton Foundation tracks communications policy and practice as they pertain to education technology.

THE E-RATE IN ACTION

Connecting Kids and Communities
http://www.edlinc.org/pubs/eratereport.html

EdLiNC's report on the benefits of the first year of the E-Rate program. (May 1999)

1999 E-Rate Survey of the States
http://www.benton.org/Erate/ccssosurvey.html

From the Council of Chief State School Officers. (April 1999)

The E-Rate and Beyond
http://www.thejournal.com/features/erate/default.asp

Published by T.H.E. Journal. (1997)

Seven Dimensions for Gauging Progress of Technology in the Schools
http://www.milkenexchange.org/projects.taf

"The Seven Dimensions outline how schools can begin to measure their own progress in transforming classrooms into active, stimulating and academically sound learning environments that use technology." The seven dimensions identified in this report can be used to help structure a technology plan, or to guide your selection of important topics to cover in a survey or in presentations about the impact of the technology infrastructure on the schools.

Taking TCO to the Classroom
http://www.cosn.org/tco/

"The goal of Taking TCO to the Classroom is to provide school administrators and technology directors with tools so that they can better estimate the total cost involved when they build a network of computers and wire their classrooms to the Internet." Total cost of ownership is a mechanism that has long been used in the corporate world to estimate and project costs beyond initial capital investments. As the report says: "When a school district purchases computers or installs a network, the cost of the hardware is only one small part of the expenses it can expect in subsequent years if it is going to use those technological resources effectively." The report also summarizes findings from several studies that have projected the cost of wiring the nation's schools on a per-student basis. This report is particularly useful for helping to make the case for more complex and long-term budgetary planning around technology implementation.

E-RATE AND THE DIGITAL DIVIDE

Falling Through the Net: Defining the Digital Divide
http://www.ntia.doc.gov/ntiahome/digitaldivide

Published by the NTIA, "Falling Through the Net III" is the third in a series of studies on the telecommunications and information technology gap in America. (8 July 1999)

The Digital Beat: The Digital Divide
http://www.benton.org/DigitalBeat/db070899.html

This Digital Beat is the first installment in a new series relating to the Digital Divide. Here we provide an overview of this critical issue and once per month in the coming year we'll discuss the technology gap and some of the barriers to bridging it. (Digital Beat, vol. 1, no. 11, 8 July 1999)

The Digital Beat: Technology Professional Development for Teachers
http://www.benton.org/DigitalBeat/db093099.html

As the majority of US schools go online, attention must turn towards preparing America's teachers for using Internet technology successfully. The challenges and issues policymakers must face include educators' varying attitudes towards instruction, the importance of interaction with their teaching colleagues and the need for innovative professional development approaches. (Digital Beat, vol. 1, no. 16, 30 September 1999)

The Digital Beat: Education Technology - Beyond the E-Rate
http://www.benton.org/DigitalBeat/db061099.html.

The E-Rate debate—with its arguments over dollars and cents and its tax rhetoric—nearly obscured the real decisions we face: What should education look like and what skills will citizens need in the 21st century? (Digital Beat, vol. 1, no. 9, 10 June, 1999)

The Digital Beat: E-Rate is Closing the Digital Divide
http://www.benton.org/DigitalBeat/db030599.html

An early installment of Benton's Digital Beat series. (Vol. 1, No. 2, 5 March 1999)

Losing Ground Bit by Bit: Low-Income Communities in the Information Age
http://www.benton.org/Library/Low-Income

The Losing Ground report looks at the barriers (beyond just income) that are slowing the spread of new technology in low-income communities. (1998)

The Digital Divide Confronts The Telecommunications Act Of 1996
http://www.consunion.org/other/telecom4-0299.htm

A study conducted by the Consumers Union and Consumer Federation of America discovered that fewer than one in four Americans is positioned to receive the lower prices or expanded choice in telecommunications and TV services that the Telecommunications Act of 1996 framers promised from "increased competition." (February 1999)

The Digital Divide Network
http://www.DigitalDivideNetwork.org

Developed by the Benton Foundation in conjunction with the National Urban League, The Digital Divide Network (DDN) tackles the growing gap between those who have access to technology and information skills and those who do not through a powerful knowledge network. The purpose of the DDN is to enable and facilitate the sharing of ideas, information and creative solutions among industry partners, private foundations, nonprofit organizations and governments.

Focus on Generic Skills for Information Technology Literacy
http://www.rand.org/publications/P/P8018

Robert H. Anderson and Tora K. Bikson argue that generic, rather than application-specific, knowledge and skills should be the focus of computer literacy efforts, both for citizen participation as well as for job-related skills. From the Rand Corporation. (January 1998)

Society's Digital Divide
http://www.news.com/News/Item/0,4,8834,00.html

A C|Net interview with James Katz, who argues that the digital divide for the economically impoverished, ethnic minorities and women is cause for serious concern and will get worse instead of better in the future. (14 March 1997)

Universal Access to Email: Feasibility and Societal Implication
http://www.rand.org/publications/MR/MR650/note.html

This article by Robert H. Anderson, Tora K. Bikson, Sally Ann Law and Bridger M. Mitchell explores the value of universal email and recommends all citizens have access to technology, focusing on fundamental social, economic, international and technical issues related to providing universal access to email within the United States. Rand Corporation. (1995)

RELEVANT ORGANIZATIONS AND ONLINE RESOURCES

AED Millennium Project
http://millennium.aed.org

The Academy for Education and Development's Millennium Project offers an ongoing online debate looking at the evolving role of education in technology.

American Library Association
Washington Office Newsline (ALAWON)
http://www.ala.org/washoff/alawon

ALAWON follows E-Rate-related activities and legislation. Also available via email.

CEO Forum on Education and Technology
http://www.ceoforum.org

The CEO Forum consists primarily of chief executive officers from technology companies that have joined to "ensure that America's schools effectively prepare all students to be contributing citizens and effective workers in the 21st century." The Forum's annual report (the current, Year Two report focuses on professional development) takes a high-level view of the challenges involved in moving from improved access to technology to effective use of technology in schools.

Center for Media Education
http://www.cme.org

CME's Universal Service program enables child advocates to contribute to the development of state-level policies that provide basic and advanced telecommunications to rural and low-income citizens.

Consortium for School Networking (CoSN)
http://www.cosn.org

A pioneer in E-Rate advocacy, CoSN provides a wide range of resources that offer valuable information about the E-Rate.

Council of Great City Schools
http://www.cgcs.org

CGCS is an organization of the nation's largest urban public school systems, advocating K-12 education in inner-city schools, and governed by superintendents and board of education members from 50 cities across the country.

Council of Chief State School Officers
http://www.ccsso.org

The CCSSO played an active role in the establishment of the E-Rate.

Education and Libraries Network Coalition (EdLiNC)
http://www.edlinc.org

EdLiNC was formed to represent the viewpoint of schools and libraries in the FCC proceedings dealing with the implementation of the Telecommunications Act of 1996. See also its E-Rate Hotline (http://www.eratehotline.org).

Education Development Center/
Center for Children and Technology
http://www.edc.org/CCT/ccthome

CCT served as the co-authors of this report.

Education Week on the Web
http://www.edweek.org

EdWeek.org, in addition to covering national education news, has an excellent area on education technology (http://www.edweek.org/context/topics/internet.htm).

An Educator's Guide to Evaluating the Use of Technology in Schools and Classrooms
http://www.ed.gov/pubs/EdTechGuide

Published by the Department of Education in December 1998, this is a step-by-step guide to developing a local evaluation plan, with lots of worksheets, checklists, etc.

eSchool News
http://www.eschoolnews.org

An e-publication aimed at school technology decision-makers. eSchool News also hosts a variety of conferences pertaining to funding and managing education technology. It has recently added a subscription service called E-Rate Update, which for $99/year keeps readers informed of current developments concerning the E-Rate. A free trial subscription is available.

EdvanceNet
http://www.edvancenet.org

This site, sponsored by the Consortium for School Networking and the American Association of School Administrators, includes several useful resources including an adaptable PowerPoint presentation about the importance of information technology development in school districts.

Funds For Learning
http://www.fundsforlearning.com

Funds For Learning seeks to be education's one-stop connection to government funding for education technology.

Leadership and the New Technologies
http://www.edc.org/LNT

This Web site, sponsored by the Education Development Center, is the home of the annual Leadership and the New Technologies summer workshops. It provides many resources, including archives of past summer workshops, pointers to online resources for technology planning, implementation and evaluation, and a library of recommended readings. This site is particularly helpful if you are looking for more resources to support your evaluation work or if you wish to gain more background knowledge about educational technology planning.

Learning with Technology Profile Tool
http://www.ncrtec.org/capacity/profile/profwww.htm

This tool provides a set of indicators that can be used to describe how technology is being used in classrooms. If this tool is used periodically in the same classrooms, it can be used to chart changes in how students and teachers are working and the kinds of learning activities that are taking place. The tool was developed by the North Central Regional Technology Education Center. It is particularly helpful if you are interested in doing in-classroom observations and if you anticipate that technology will be used to support collaborative, project-based work by students.

LearnNet
http://www.fcc.gov/learnnet

LearnNet, the FCC's informal education page, is about important FCC policy and education initiatives. It contains links to universal service email lists, press releases, orders and recent public notices regarding issues related to E-Rate implementation.

Milken Exchange on Education Technology
http://www.milkenexchange.org

The Milken Exchange has several ongoing initiatives aimed at helping states develop and implement educationally sound technology programs.

National Center on Educational Statistics
http://www.nces.ed.gov

The U.S. Department of Education's online archive of education statistics.

National Education Association
http://www.nea.org

NEA boasts 2.3 million members working at every level of education, from pre-school to university and graduate programs, and has affiliates in every state. See especially its e-publication, Teaching, Learning and Technology (http://www.nea.org/cet).

National Urban League
http://www.nul.org

NUL's Technology Programs and Policy department works with industry, government and other community-based organizations to bring the benefits of information and communications technologies to underserved communities.

Schools and Libraries Division
(formerly the Schools and Libraries Corporation)
http://www.sl.universalservice.org

SLD is the arm of the Universal Service Administration Company that processes all E-Rate applications.

State Departments of Education Contacts
http://www.siia.net/program/education/contacts.htm

Each of the 50 state departments of education provides support in planning, implementation and assessment of educational technology programs. Increasing numbers of states are now working with their public utilities and service commissions and telecommunications service providers and telephone companies to provide increased access and lower costs to schools. In addition, many states offer grants for regional and local staff development and school-based educational technology grants. The Software Publishers Association maintains the Web site of state departments listed here.

Tomas Rivera Policy Institute
http://www.trpi.org

Tomas Rivera conducts research and publishes reports about issues concerning the nation's Latino communities, including studies about computer ownership and Internet access by Hispanics.

Teaching, Learning and Computing: A National Survey of Schools and Teachers
http://www.crito.uci.edu/tlc

This is Hank Becker's research project on the use of Internet computing in K-12 schools. The project is located at the Center for Research on Information Technology and Organizations (CRITO) at the University of California, Irvine. The survey instruments themselves are available for downloading at http://www.crito.uci.edu/TLC/html/questionnaires.html.

U.S. Department of Education
http://www.ed.gov

The Department of Education maintains an entire area about education technology.

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)

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