education
technology

DEVELOPING AN EDUCATION TECHNOLOGY AGENDA FOR ILLINOIS

APRIL 2002

PREPARED FOR NETWORK 21:

QUALITY SCHOOLS AND

STRONGER COMMUNITIES

Founded in 1934, the Metropolitan Planning Council is a nonprofit, nonpartisan group of business and
civic leaders commited to serving the public interest through the promotion and implementation
of sensible planning and development policies necessary for a world-class Chicago region.

Network 21: Quality Schools and Stronger Communities is a coalition of education, business,
labor, civic and civil rights organizations that share a common interest in reforming Illinois' school
finance system and improving education outcomes through quality reforms.

FROM THE TECHNOLOGY WORKING GROUP
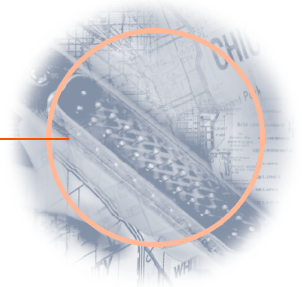
In this report, Network 21: Quality Schools and Stronger Communities and the Metropolitan Planning Council assess technology integration in Illinois schools. We recommend measures to ensure that technology investments are used effectively in improving educational achievement for *all* children in Illinois. These recommendations were presented to more than 60 educational and civic leaders at a Network 21 forum on education technology in November 2001. Feedback from the forum, which was sponsored by the Joyce Foundation and AT&T, figures prominently in this final report.

Why is technology in our public schools important to the Chicago region and the state of Illinois? Technology capabilities are already essential to our children's abilities to compete effectively in the modern world. Successful high school graduates must be able to post resumes online, collaborate over the Internet on joint projects and conduct research on the Web. Effective engagement in 21st century culture requires a heightened level of digital literacy and problem-solving abilities. Our education system must be equipped to provide our children with these new life skills.

No stranger to advocating for educational reform, the Metropolitan Planning Council (MPC) is engaged in this effort as never before. In 1996, we began actively advocating for a school finance system less reliant on the local property tax. We followed our successful Reform '97 initiative by organizing the Network 21: Quality Schools and Stronger Communities coalition. Concurrently, MPC examined the role of technology in the region's growth, releasing in 1998 *The Digital Network Infrastructure and Metropolitan Chicago*, a report exploring the status of the region's digital infrastructure and identifying pathways to digital, economic and social opportunity.

The present study looks at how technology can be leveraged to better prepare all of our children to compete in the modern world. More people in Chicago are employed in information technology jobs than any other city in the country. Our education system must continue to develop the skills in students essential to maintaining this strong regional economy.

It will take time and resources for the public education system to make the investments in training and curriculum development that will be necessary for teachers and administrators to effectively change how technology is used in Illinois schools. This report establishes some important starting points. We have no time to waste.
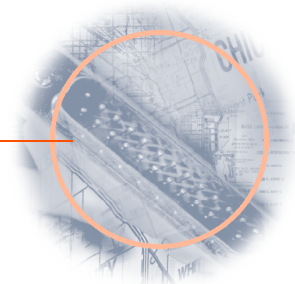
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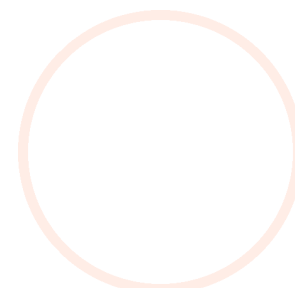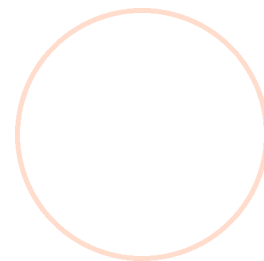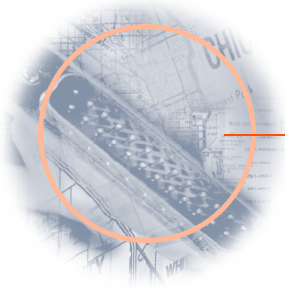*Senior Director, Global Consulting*
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Technology can be a powerful tool in improving student learning, advancing education reform efforts, and preparing students to meet the demands of 21st century society and the modern workplace. Investments in education technology have great potential to improve the quality of education in Illinois. The Metropolitan Planning Council and the Network 21: Quality Schools and Stronger Communities coalition seek to ensure that current and future technology investments enhance student learning, making the region more attractive for living and working and promoting equal access to opportunity across the region and the state.

While investments are being made in education technology in Illinois, it remains a challenge for schools and teachers to incorporate technology tools to ensure they work to the benefit of every student. Though Illinois schools are becoming increasingly Internet connected and wired, some students have greater access to the Internet in their schools than others. A recent survey of Illinois school districts shows that Illinois overall provides one Internet-capable instructional computer for every 6.3 students, and one instructional computer for every 5.2 students — close to the nationally recommended guidelines. However, Chicago and high-poverty schools have notably fewer Internet-capable instructional computers — 10.4 and 10.5 students for each computer respectively. Research also shows these technologies should be available in the classroom, not a remote area such as a computer lab. Yet, in Illinois, most computers are located in media centers or labs. Compared to other states, Illinois ranks in the lowest quartile for students per classroom-based instructional computer.

Educational technology investments will be deemed unwarranted unless they affect the teaching and learning process in schools. Overall, Illinois schools and districts are not taking full advantage of technology's potential to improve the school teaching and learning environment. Many Illinois teachers still do not use technology for class preparation work. Only 41.8 percent of Illinois principals said that a majority of their teachers are using technology to improve the quality of classroom instruction. In schools with poorer student populations, urban schools and Chicago public schools, teacher use of technology for instructional preparation and to improve the classroom learning experience was far less frequent than in Illinois schools overall.

Computer-based technologies offer opportunities for more engaging, interactive, project-based and problem-based learning experiences that can build higher-order skills such as critical thinking and problem solving. However, recent data suggests that much of Illinois students' classroom learning experiences with technology are focused on lower-order thinking skills, such as using drill and practice software. Few teachers are using technology to develop higher-order thinking skills.

Though teacher training is a critical variable influencing student learning and achievement, Illinois' teachers are lagging in their technology and technology integration skills. Research shows that the amount and extent of teacher technology training determines whether technology has a positive impact on student achievement. However, according to assessments by school districts' technology coordinators, less than 27 percent of Illinois teachers have advanced skills in computer use and less than 11 percent of Illinois teachers have advanced skills in integrating technology into classroom learning. Over 53 percent of Illinois principals said that lack of teacher awareness regarding technology integration was a major barrier to incorporating learning technologies at their school. Only half of teachers surveyed said that their technology training was designed to support Illinois Learning Standards.

Only recently have education technology skills been considered a potential requirement to become certified as a teacher. Illinois' new teacher certification process is currently being established. Presently, teachers must demonstrate some proficiency in technology to obtain their first year teaching certificate. However, at the test for the Standard
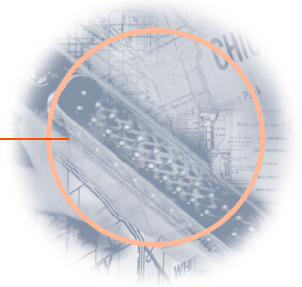
Teaching Certificate, teachers are not required to demonstrate actual classroom skills with respect to technology integration, as they would be in other subjects and with other skills. There are no current requirements for teacher recertification that ensure that teachers obtain skills in technology integration.

Though Illinois schools require additional support and resources in integrating education technology into Illinois' classrooms, state funding for education technology has remained stagnant. Compared to other states with large student populations, Illinois ranks low in its per pupil expenditures for education technology. Growth in education technology funding from the state of Illinois, through Technology for Success, its main education technology program, has declined significantly since 1999 with no increase in funding in FY 2002. Over the past three years, general fund spending on education in Illinois grew 12 percent. General State Aid (GSA), which provides flexible state aid to schools, grew eight percent. Technology appropriations, as represented through Technology for Success, grew only one percent during that same period. With the exception of FY 98, growth in Technology for Success funding has been continually less than growth in total general education funding in Illinois. At the same time, Illinois may receive less money from federal programs for education technology, including the E-Rate program and the U.S. Department of Education's Technology Literacy Challenge Fund, as federal programs and priorities shift.

Creative integration of technology into the classroom offers exciting potential for student learning, equipping students for the demands of 21st century society and the modern workplace. Systematic change is required at the state and district levels if Illinois is to reap educational returns on its technology investments. It is imperative that organizations invested in education quality in Illinois emphasize technology deployment. Since education technology can play a critical role in shaping the quality of tomorrow's workforce, it is important that the Illinois business community become engaged in the issue. Without such support for reform, technology will offer only an empty promise for thousands of learners across Chicago and Illinois.

RELATIVE GROWTH OF TECHNOLOGY APPROPRIATIONS IN ILLINOIS					
($ in thousands)					
Program	FY 00	FY 01	FY 02	$ Increase FY 00-02	Percent Increase FY 00-02
General State Aid	$2,982,564	$2,994,715	$3,231,728	$249,164	8 %
Technology for Success	48,750	49,250	49,250	500	1 %
General Fund Spending	5,557,033	5,919,292	6,207,650	650,617	12 %

Source: Illinois State Board of Education

The following are key policy recommendations from the Metropolitan Planning Council and Network 21: Quality Schools and Stronger Communities coalition to ensure that investments in technology improve the learning process and heighten student achievement in Illinois.

1. ESTABLISH EDUCATION TECHNOLOGY BENCHMARKS STATEWIDE

Currently, Illinois State Board of Education (ISBE) technology programs do not identify technology goals for engaged and dynamic learning at the school district and school levels. ISBE should establish targets or benchmarks based on best practices, representing a continuum of both inputs and outputs around the use of education technology tools. School districts should adopt technology benchmarks to measure their progress on technology integration.

2. IMPROVE TEACHER TRAINING

Teacher skill levels in technology use and application must be raised in Illinois if student achievement is to be furthered through technology investments. Teacher licensing and certification processes should assess and require proficiency in

technology skills to ensure that incoming teachers can use technology in the classroom to improve student learning. ISBE should create criteria and guidelines for school districts and schools on effective professional training that develops these skills among teachers. Additionally, ISBE's direct technology funding to school districts should require that a portion of state funds be used for professional development. Schools of education should build and expand programs that

"TECHNOLOGY HAS TO BE TRANSPARENT WITHIN THE CURRICULUM AND PROFESSIONAL DEVELOPMENT." — ELAINE WILLIAMS, CHIEF INFORMATION OFFICER, CHICAGO PUBLIC SCHOOLS

focus on technology integration. On a local basis, school districts and schools should ensure that their professional development programs include technology and technology integration training.

3. BUILD ADMINISTRATIVE LEADERSHIP

Technology tools also present new challenges to educators and administrators. ISBE should develop and adopt technology standards for school administrators. ISBE should invest in programs that develop administrative leadership for superintendents, principals and school boards on education technology issues. School districts should adopt technology standards for their administrators and seek to provide district leadership experiences and training to meet these standards.

4. MEASURE AND EVALUATE EDUCATION TECHNOLOGY PROGRESS

The State of Illinois currently does not regularly collect baseline data from schools on their technology infrastructure, teacher and student use of technology or student outcomes as reflected in a broad range of student abilities including higher-order thinking skills. ISBE should require this data from schools in order to receive state funding. Schools

should be evaluated regularly on their technology integration progress. This evaluation should be included in Illinois' school report card[1] and within the Illinois School Improvement Web site for stakeholders to assess and use.

5. INCREASE AVAILABLE RESOURCES

Additional resources are required to ensure that Illinois moves from developing a basic technology infrastructure in schools to the next step of using technology to improve student learning and achievement. It is important that in the short term, state funding for education technology grow at the rate of general funds for education. In the long term, ISBE must determine: the level of funding required to support education technology, what the funding will be used for (e.g., direct funds to districts to support identified benchmarks, teacher training, leadership development, evaluation, etc.) and viable sources for funding. School districts and schools should strategically plan for both the short and long term costs of technology and actively pursue funding for technology-based initiatives from public and private sources.

6. PROMOTE PARTNERSHIPS AND COLLABORATIONS

Partnerships are playing an increasingly important role in building school capacity to integrate technology. School districts and schools should strategically develop and leverage these relationships to improve their technology integration efforts. ISBE should identify successful collaborative approaches and provide financial resources and incentives for both schools and their partners. Illinois businesses should build on and expand collaborations with school districts by sharing appropriate best practices from the business world with teacher colleges and school administrators. ISBE should consider setting up technology-based mechanisms for districts to share experiences and improve the quality and efficacy of partnerships and collaborations.

[1]Illinois law requires public school districts to provide yearly school report cards, making available information on student characteristics, the instructional setting, the school districts' finances, and student performance on state assessments. Report cards are available at the ISBE Web site: http://www.isbe.net.

INTRODUCTION
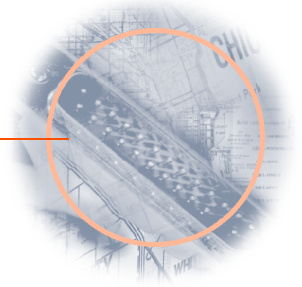
Having already acted as a catalyst for improvements in business practices and productivity in the private sector, technology is increasingly being viewed and used by educational institutions as a means to advance education reform efforts. Indeed, technology can be a powerful tool in improving student learning and preparing students to meet the demands of 21st century society and the modern workplace. Schools across Illinois and the Chicago region are increasingly turning to technology as a resource to improve public education outcomes. Millions of dollars are being invested in education technology statewide, producing a variety of results.

Education technology, in the context of this paper, describes the effective use of technology, including but not limited to computers and the Internet, to improve the teaching and learning process in elementary and secondary schools. Investments in education technology have great

> **"TECHNOLOGY IS IMPORTANT FOR PRE-SERVING OUR DEMOCRACY, STRENGTHENING COMMUNAL BONDS, AND HELPING IN THE QUEST FOR KNOWLEDGE." — REP. CONNIE HOWARD, (D-CHICAGO)**

A student at the Prairie-Hills Primary Academic Center.

potential to improve the quality of education in Illinois and across the Chicago region. The Metropolitan Planning Council and the Network 21: Quality Schools and Stronger Communities coalition seek to ensure that these technology investments enhance student learning, making the region more attractive for living and working and promoting equal access to opportunity across the region and the state.

In June 2000, the Illinois State Board of Education (ISBE) released an important study that evaluated the use of technology in Illinois public schools. More than 400 principals and 700 teachers were surveyed in Illinois over a two-year period regarding technology use.[2] Results from this and other surveys suggest that though significant investments are being made in education technology in Illinois, it remains a challenge for schools and teachers to incorporate technology tools to ensure they benefit every student.

Prairie-Hills Junior High students working at the Rocketry and Space Module.

This paper highlights the specific benefits of technology in schools, explores the state of technology in Illinois schools, and identifies local, state, and federal resources available for financing and integrating technology into the classroom. Based on this research, we make policy recommendations to ensure that current and future investments in education technology in Illinois improve student achievement and outcomes.

[2] Silverstein, Gary, Joy Frechtling and Atsushi Miyaoka, *Evaluation of the Use of Technology in Illinois Public Schools: Final Report* (Rockville: Westat, June 2000). http://www.isbe.net/research/pdffiles/westat.PDF

Why use technology in the school and classroom at all? Howard Gardner of the Harvard Graduate School of Education suggests that technology in itself is not an outcome, nor can it be used to set educational goals. "A pencil can be used to write Shakespearean sonnets or to copy someone else's homework. The Internet can be used to engender enlightenment or hatred. Before embracing any new technology, we need to declare our educational goals and demonstrate how a particular technology can help us to achieve them."[3] Technology is not a silver bullet for the vast prob-

> **"TECHNOLOGY HAS PLAYED A SIGNIFICANT ROLE IN THE SHIFT TO GLOBALIZATION. WHILE THERE IS AN INCREASING RELIANCE ON TECHNOLOGY, THE LAG IN SOCIAL AND CULTURAL SHIFTS PREVENTS US FROM TAKING FULL ADVANTAGE OF THE POSSIBILITIES TECHNOLOGY OFFERS... [CREATING] A CRITICAL NEED FOR INVESTMENT IN HUMAN CAPITAL" — CHERYL LEMKE, METIRI GROUP**

lems plaguing the nation's schools, but it can be a tool to help achieve educational goals.

Used effectively, technology can affect three key areas of education: student achievement and learning, teaching and school administration. The CEO Forum on Education and Technology, a national group of corporate and education executives focused on improving the use of technology in the nation's schools, summarizes the vast potential of education technology in student achievement. The Forum states that technology can help student educational achievement through:

- improved production and application of knowledge for the real world;
- better tools for students to manage learning;
- programs tailored for special needs students;
- improved access to information; and
- programs that help students build digital-age literacy skills and those that promote inventive thinking, effective communication, and high productivity.[4]

Additionally, research shows that in some states where technology was integrated statewide into the curriculum, scores on standardized tests improved.[5] The Illinois State Board of Education's 1995 K-12 Information Technology Plan outlines six competencies for students to master to compete in a digital and information age including critical thinking, creating knowledge and communicating through appropriate technologies and media.[6]

Technology can dramatically affect how teachers approach classroom teaching. Technology-based teaching offers more opportunities for alternative student-centered pedagogies, where students play a more active role in the learning process. Technology also provides teachers with opportunities to tailor instruction toward individual student needs and paces of learning. Through technology, teachers can continually assess students and intervene to provide prescriptive tutoring. Technology can also expand professional development opportunities for teachers through online courses, collaborations, e-mail and video communications technology.[7] Though beyond the scope of this paper, technology can revolutionize school administration. Examples include enabling better communication with parents and improved outcomes through better data management and tracking.

Technology is also an important tool for meeting Illinois Learning Standards. Adopted in 1997, these standards reflect what all Illinois students are expected to know in six key learning areas: English, Math, Science, Social Science, Health and Physical Development and Fine Arts. The State of Illinois and ISBE are advanced compared to many other states in identifying technology as an important tool to achieve many learning goals.[8]

[3] Gardner, Howard, "Can Technology Exploit Our Many Ways of Knowing?" *The Digital Classroom* (Cambridge: Harvard Education Letter, 2000), 33-34.
[4] CEO Forum on Education and Technology, Year 4 Report: *Key Building Blocks for Student Achievement in the 21st Century*, June 2001. http://www.ceoforum.org/reports.cfm?RID=6
[5] *Ibid*, 6.
[6] Illinois State Board of Education, *K-12 Information Technology Plan*, 1995. http://www.isbe.state.il.us/learn-technology/technopages/ncsa/k12.html
[7] Education Commission of the States, *Investing in K-12 Technology Equipment: Strategies for State Policymakers*, January 2001, 6. http://www.ecs.org/clearinghouse/23/39/2339.htm
[8] Illinois State Board of Education, *Illinois Learning Standards*, 1997. http://www.isbe.state.il.us/ils/

CRITICAL INGREDIENTS TO TECHNOLOGY INTEGRATION IN SCHOOLS: WHERE DOES ILLINOIS STAND?
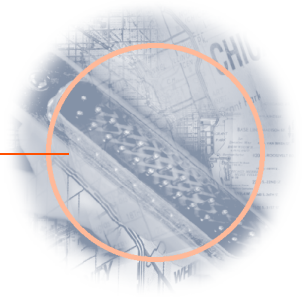
Successful technology integration requires attention to several critical factors in each school's learning environment, including: access to technology infrastructure, appropriate uses of technology in the classroom, and teacher training on understanding and using technology in the classroom.[9] Data from various surveys, including an ISBE-commissioned survey and the Milken Family Foundation's "Progress of Technology in the Schools: Report on 27 States," (includ-

School districts were chosen based on geographical diversity, with four districts selected from the six-county Chicago region and two districts selected from downstate Illinois. Since statewide data suggests economically disadvantaged districts with high levels of student poverty have greater challenges with technology integration, low to moderate resource school districts were selected with moderate to high levels of low-income students. Additionally, since they

SCHOOL DISTRICTS INTERVIEWED FOR THIS REPORT			
School District	Location	Local Resource Level*	Level of Low-Income Students^
Dolton Elementary School District #148	South Suburban Cook County	Low	Moderate
Bethalto Community Unit School District #8	Madison County	Low	Moderate
School District U46 (Elgin)	Kane County	Above Median	Low
LaSalle Elementary School District #122	LaSalle County	Moderate	High
Prairie-Hills Elementary School District #144	South Suburban Cook County	Low	Moderate
Waukegan Community Unit School District #144	Lake County	Moderate	Moderate

*For the purposes of this paper, districts where the level of local resources ranked in the poorest quartile of districts of that type (i.e., elementary or unit) in Illinois were deemed low-resource. Districts in the second poorest quartile were deemed moderate-resource.
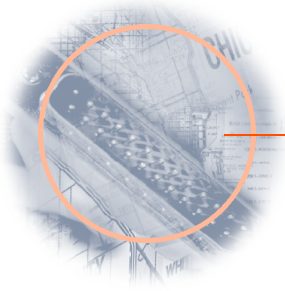
^ For the purposes of this paper, districts where the percentage of low-income students ranked in the poorest (in terms of resources) quartile of districts of that type in Illinois were deemed to have high levels of low-income students. Districts in the second poorest quartile were deemed to have moderate levels of low-income students.

ing Illinois) was analyzed by MPC to assess where Illinois stands in these three areas.

Additionally, interviews were conducted with six district technology coordinators in Illinois to help illustrate the successes and challenges individual school districts face in integrating technology into the teaching and learning processes.

have historically had fewer resources per pupil than high school districts, elementary and unit school districts were the focus of these interviews. School District U46 (Elgin) was included to help illustrate the issues facing larger, diverse school districts.

[9] The North Central Regional Educational Laboratory's enGauge framework offers a more in-depth exploration of essential conditions. See www.ncrel.org/engauge.

Technology infrastructure involves many components, including hardware. Best practices show that one computer for every four or five students is recommended to achieve significant gains in student learning.[10] Additionally, research shows these technologies should be in the classroom, versus in a remote area such as a computer lab. Connections to the Internet must also be prevalent. Schools must invest in the infrastructure that enables using the hardware, such as adequate electricity and internal wiring. This is a challenge in many older school buildings. Finally and perhaps most importantly, school districts need to invest in technology staff to provide maintenance and user support.

Illinois has made great strides in building schools' technology infrastructure capacity. Recent data from the *Education Week* "Technology Counts 2001" survey shows that Illinois schools are increasingly becoming digitally connected: 90 percent of Illinois schools have Internet access, and 80 percent of Illinois schools have at least one classroom with Internet access.[11] ISBE reports that 70 percent of Illinois' schools are taking advantage of the Illinois Century Network, a program providing T1 access, dedicated phone connections supporting bandwidth or data rates of over 1.5 megabits per second to educational institutions at below-market costs.[12]

Though more Illinois schools are becoming Internet connected and wired, some students have greater access to the Internet in their schools than others. Results from ISBE's survey of Illinois school districts shows that Illinois overall has one Internet-capable instructional computer for every 6.3 students, and one instructional computer for every 5.2 students. This is close to the nationally recommended guidelines. However, Chicago schools and high-poverty schools have notably higher student to Internet-capable instructional computer ratios, at one for every 10.4 or 10.5 students respectively. These figures represent Internet-connected computers *located anywhere in the school* made available for student use.

Most district technology coordinators interviewed from the Chicago region said their school districts' student-to-computer

ratios are closer to nationally recommended standards. With the exception of Prairie-Hills Elementary District #144 (Prairie-Hills), districts ranged from 5.3 students per Internet-connected computer in Waukegan Community Unit School District #144 (Waukegan) and LaSalle Elementary School District #122 (LaSalle) to eight students per Internet-connected computer in Elgin. However, maintaining these levels has proven to be a challenge for several districts. Because of a growing student population, Elgin has only managed to maintain its current Internet-connected computer per student ratio in the past six years. Additionally, though Waukegan has approximately five Internet-connected computers per student, many of these computers are nearly five years old and limited in their capabilities, requiring significant upgrades if they are to support current applications and software. Prairie-Hills appeared to be the exception with three students per Internet-connected computer.

It is also important to examine the placement of Internet-connected computers *in the classroom* itself, since classroom-based computers allow teachers to more actively use technology as part of classroom learning. Across Illinois, there is an average of 1.5 Internet-capable computers per classroom. Numbers in Chicago and poor districts are lower at 1.2 and 1.3 Internet-capable computers per classroom, while affluent schools have up to 2.0 Internet-capable computers per classroom.[13] In Illinois, most computers are located in media centers or labs. Compared to other states, Illinois ranks in the lowest quartile of students per classroom-based instructional computer.[14]

All technology coordinators interviewed said that all classrooms in their respective districts had at least one Internet-connected computer. However, many classrooms had only one, making it difficult for students to use the com-

[10] Valdez, Gilbert, Mary McNabb, Mary Foertsch, et al, *Computer Based Technology and Learning: Evolving Uses and Expectations* (Oak Brook, Ill.: North Central Regional Educational Laboratory, May 2000), 26.

[11] "Technology Counts 2001," *Education Week*, May 10, 2001, 58. http://www.edweek.org/sreports/tc01/tc2001_default.html

[12] Illinois State Board of Education, *Making Illinois Second to None: 2000 Annual Report & Fiscal Year 2002 Proposed Budget*, January 2001, 16. http://www.isbe.state.il.us/pdf/Budget.pdf

[13] Silverstein, section 2-7.

[14] "Technology Counts 2001," 56.

puter during class time. In addition, computer labs in school districts such as Dolton Elementary School District #148 (Dolton) in southern Cook County were overcrowded. There have been some significant exceptions such as Waukegan, where all science classrooms from grades 5 to 12 have clusters of six computers; LaSalle, where all K-6 classrooms have four computers; and Prairie-Hills, which began placing computers directly in classrooms instead of labs and media centers. Some school districts, such as Dolton and Elgin, are also piloting and/or increasing use of portable wireless laptop labs that can be moved across classrooms.

STUDENTS FOR EVERY INTERNET-CONNECTED INSTRUCTIONAL COMPUTER

^Affluent defined as schools where 11 percent or less of students are eligible for free or reduced price lunch.
*Poor schools defined as schools where over 59 percent of students are eligible for free or reduced price lunch.
Source: Silverstein, Gary, Joy Frechtling and Atsushi Miyaoka, Evaluation of the Use of Technology in Illinois Public Schools: Final Report *(Rockville: Westat, June 2000)*
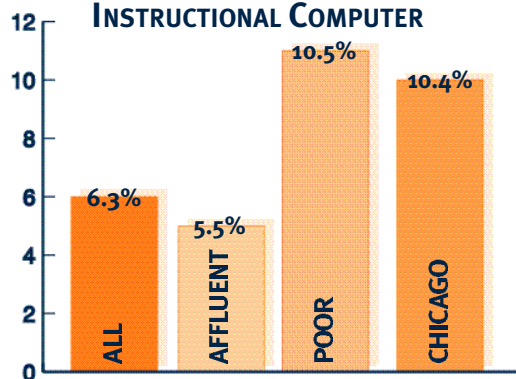
Adequate technical support staff to maintain the infrastructure and networks is necessary for teachers and students to have consistent, reliable use of these technologies. Districts interviewed varied widely in the number of technical staff, including network administrators, computer technicians and lab aides they have. In one district interviewed, lack of adequate technical support staff is a major barrier to increasing use of technology in the classroom. Network problems have not been addressed sufficiently and many teachers, as a result, view technology tools as unreliable. Prairie-Hills, to some extent, has reduced the number of technical staff required by subscribing to applications through the World Wide Web rather than licensing software. Maintenance and support is provided through subscription contracts and the district does not require dedicated staff to install software.

Quality of Internet connections is also important for schools to leverage technology for learning. Broadband access, which allows the transmission of large amounts of data electronically, increases learning opportunities by elim-

inating lengthy downloading times and allowing distance learning opportunities. A majority of Illinois schools are making progress here: Over 71.1 percent of Illinois schools reported using T1, T3, DS1 and DS3 lines.[15]

Most districts interviewed had connection speeds of at least T1 bandwidth at both the district and classroom levels. LaSalle has a wireless connection into the district and both LaSalle and Waukegan have established wireless networks within their respective districts. Elgin has its own fiber-based infrastructure within the district. Elgin is currently setting up a video infrastructure across 12 of its middle and high schools. The district will be able to use this fiber infrastructure for activities across various schools such as student council meetings and live, interactive panel discussions with speakers. A majority of the districts' schools were networked through a local area network (LAN), which in most cases reached the classroom.

Chicago Public Schools (CPS) will also have an unprecedented opportunity to utilize high-performance broadband through the City of Chicago's CivicNet initiative, which will connect city neighborhoods and City agencies with a fiber-optic broadband infrastructure.[16] This will allow CPS and other Chicago schools to plan for and capitalize on new learning opportunities, including distance learning, that CivicNet's broadband technology can enable.

[15] Silverstein, xviii.
[16] CivicNet will leverage approximately $32 million of City of Chicago telecommunications and technology annual expenses to create a citywide digital network infrastructure that will provide high performance, high speed telecommunications access to all 2,000 schools, parks, libraries and government locations as well as non-profit organizations and private businesses. CivicNet is being implemented by the City of Chicago under recommendation of the Mayor's Council of Technology Advisors. These recommendations can be reviewed in the "Digital Network Infrastructure and Metropolitan Chicago" at http://www.metroplanning.org.
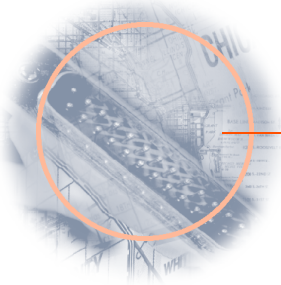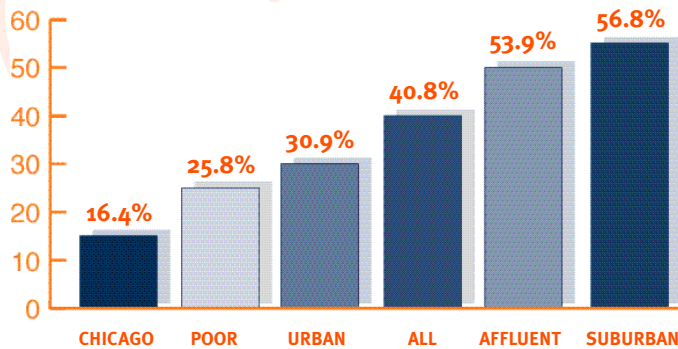
Educational technology investments will be deemed unwarranted unless they affect the teaching and learning process in schools. Across Illinois, there are wide differences in how technology is used in the classroom. Many Illinois teachers still do not use technology for class preparation work. Only 40.8 percent of Illinois principals said that a majority of their teachers are using technology to develop instructional materials and handouts. In schools with poorer student populations, urban, and Chicago public schools, levels of teacher use of technology for instructional preparation was far less than the state as a whole.

Results are similar regarding classroom instruction. Only 41.8 percent of Illinois principals stated that a majority of
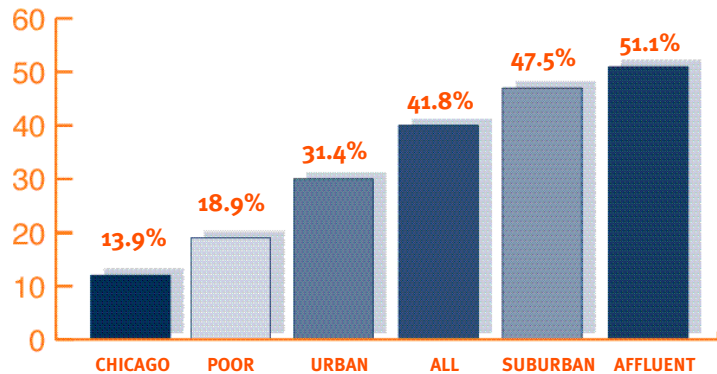
PERCENT OF TEACHERS USING TECHNOLOGY TO ENHANCE QUALITY OF CLASSROOM INSTRUCTION

Bar chart showing: CHICAGO 13.9%, POOR 18.9%, URBAN 31.4%, ALL 41.8%, SUBURBAN 47.5%, AFFLUENT 51.1%

Source: Silverstein, 110

PERCENT OF CLASSROOM TEACHERS USING TECHNOLOGY TO CREATE INSTRUCTIONAL MATERIALS

Bar chart showing: CHICAGO 16.4%, POOR 25.8%, URBAN 30.9%, ALL 40.8%, AFFLUENT 53.9%, SUBURBAN 56.8%

Source: Silverstein, 109

their teachers are using technology to improve the quality of classroom instruction. Technology use in classrooms is dramatically lower in schools with poor student populations (25.8 percent), urban schools (30.9 percent) and Chicago schools (13.9 percent). A lack of infrastructure access in many of these schools only exacerbates the problem. Additionally, professional development has not focused enough on integrating technology tools into the curriculum, a topic discussed further in the next section.

What are students learning when they use computers? Computer-based technologies offer opportunities for more engaging, interactive, project-based and problem-based learning experiences that can build higher-order skills such as critical thinking and problem solving. However, ISBE's survey suggests that much of Illinois students' classroom learning experiences with technology are focused on lower-order thinking skills, such as using drill and practice software. Fewer teachers are helping students maximize use of technology to develop higher-order thinking skills. Illinois teachers reported that only a small fraction (see chart on p. 15) of their students demonstrated competency in using technology for many advanced skills such as problem-solving and data analysis. This appears to be especially true in Chicago, where the Milken survey found that 73 percent of technology coordinators in Chicago Public Schools said students use drill and practice programs frequently, much more often than the rest of Illinois where only 18 percent of district technology coordinators said that students use these programs with such frequency. [17]

School districts interviewed differ in how technology is used in the classroom. In Bethalto, LaSalle and Dolton districts, technology coordinators estimated that only a small

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[17] Solmon, Lewis C. and Judith A. Wiederhorn, *Progress of Technology in the Schools: 1999 Report on 27 States* (Santa Monica, Calif.: Milken Family Foundation, May 2000), 44. http://www.mff.org/publications/publications.taf?page=282
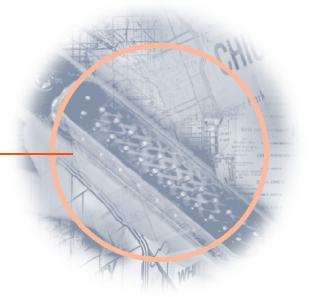
percentage of their teachers, ranging from 15 percent to 20 percent, are using the Internet to develop instructional materials. In the Prairie-Hills district, where technology has played a significant role in the district's education plan and in many of their individual schools' efforts for comprehensive reform, all teachers use the Internet to develop lessons. In this district, the curriculum guide is available only online, and teachers develop lesson plans online as well.

Approximately one-half of Dolton, Prairie-Hills, and Waukegan's teachers are using technology to enhance the classroom learning experience. Only about one-quarter and one-fifth of Bethalto's and LaSalle's teachers respectively are using technology to enhance the classroom learning experience. Teachers across many districts are using word processing and spreadsheet software with their students. Research is a common use of the Internet by students in most districts. A few districts were also using the Internet for project and problem-based learning as well. Teachers in the Dolton and LaSalle districts still commonly use drill and practice applications of technology. However, most coordinators expressed interest in increasing project and problem-based learning and uses of technology focused on higher-order thinking skills. Prairie-Hills has made significant progress on this front, last year requiring all teachers to create one project-based lesson leveraging technology.[18] Elgin's

infrastructure supports live video in its elementary schools, where students frequently use this medium for projects.

Coordinators had unique insights on and challenges in using technology for student learning. Both Elgin and Dolton coordinators said school computer labs were often crowded, discouraging teachers from using them. Elgin is working to obtain computer projection facilities in classrooms to support teachers' use of computers in the classroom. The Dolton coordinator noticed that schools in the district with block scheduling tended to use technology tools more. In another district, network problems were frequent and difficult to address due to a lack of adequate technical support staff, preventing and discouraging many teachers from using computers. Lack of adequate teacher training was also cited as a challenge by the Bethalto and LaSalle technology coordinators.

Efforts need to continue at local and state levels to identify effective uses of technology in the classroom and methods to scale applications of these programs to classrooms across Illinois. As will be discussed in the next section, teacher training is a significant factor in affecting how technology is used in the classroom.

| STUDENT USE OF COMPUTERS	
Competency	**Percentage of Students with Moderate to High Competency**
Use drill & practice software	46.1
Use computer applications such as word processing, spreadsheets, etc.	40.5
Retrieve information/data from a variety of sources	33.5
Create/present ideas, stories and other representations of thought through the appropriate use of technology	24.4
Collect, manipulate, analyze and interpret data	20.5
Use variety of technology tools to solve problems and transform data/information into useful knowledge	14.7

Source: Silverstein, 60

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[18] Prairie-Hills has also designated 12 classrooms in its district as high technology classrooms. These classrooms take extra initiative to use technology to improve teaching and learning processes. Best practices from these classrooms are often expanded to other classrooms in the district. See http://phsd144.s-cook.k12.il.us/ for more detail on Prairie-Hills Elementary District's technology supported activities.
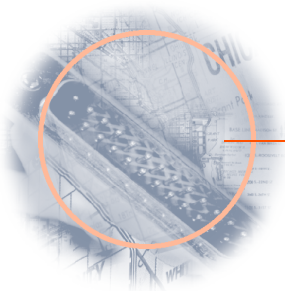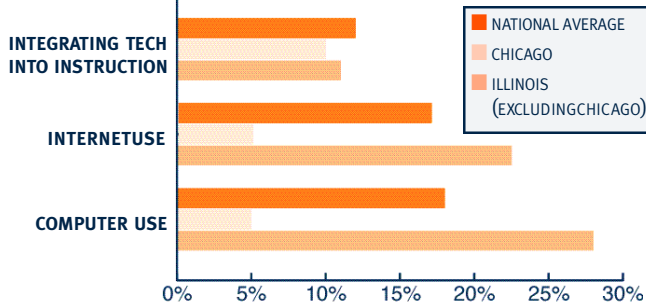
Teacher training is perhaps the most important variable influencing student learning and achievement. Research shows that the amount and extent of teacher technology training determines whether technology has a positive impact on student achievement.[19] Training involves more than learning basic skills to operate and use computers and other devices. Good technology training also focuses on how to integrate these tools into the curriculum and lesson plans to improve learning.

Throughout Illinois, only a small percentage of teachers have advanced skills in computer use, Internet use and integrating technology into their instruction, according to district technology coordinators' assessments. In Illinois, excluding Chicago, only 26.5 percent of coordinators rated their typical teacher as having more advanced computer use skills, and only 5 percent of Chicago technology coordinators rated their typical teacher as having this level of proficiency.[20] Only 22.3 percent of Illinois technology coordinators (excluding Chicago) rated their typical teacher as having more advanced skills in Internet use and only 5 percent of Chicago technology coordinators rated their typical teacher as having more advanced skills in Internet use. Approximately 10 percent of technology coordinators in Illinois including Chicago rated their typical teacher as having advanced skills in integrating technology into the classroom, putting the state slightly behind the national average of 11 percent.[21] The low percentages of teachers having advanced technology skills in all three areas has serious

implications for Illinois schools. Teachers' lack of skills limit how students benefit from the sizable technology investments being made in schools and classrooms throughout the state.

In Illinois as a whole, technology-related training for teachers is focused more toward using computers and software than on integrating education technology into the curriculum. The ISBE survey shows that over a one-year period, 67.7 percent of teachers received training on how to use computers and software, while 52.2 percent received training on integrating technology into the curriculum. Teachers in urban schools and schools with a high percentage of poor students received less training — in both basic

PERCENT OF TEACHERS RECEIVING TECHNOLOGY-FOCUSED PROFESSIONAL DEVELOPMENT, 1998-1999
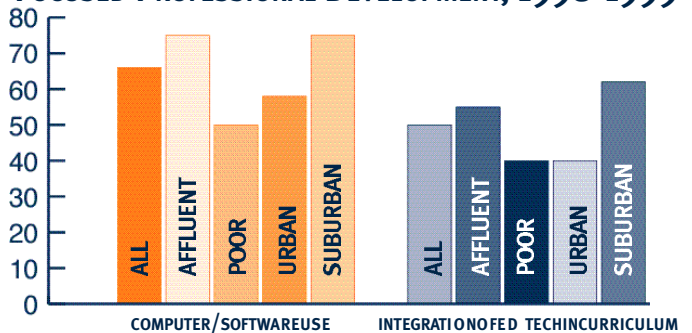
Source: Silverstein, 20

technology skills and technology integration — than their counterparts in suburban schools and schools with wealthier student populations.

Yet the need for more training on technology integration ranks high as a major obstacle to successfully using technology in Illinois' classrooms. The ISBE survey found that over 53 percent of Illinois principals said that lack of teacher awareness regarding technology integration was a major barrier to incorporating learning technologies at their school.[22] Only half of teachers surveyed said that their technology training was designed to support Illinois Learning Standards.

DISTRICTS REPORTING TEACHERS WITH ADVANCED TECHNOLOGY SKILLS

Source: Milken Family Foundation, Progress of Technology in the Schools: Report on 27 States, 2000
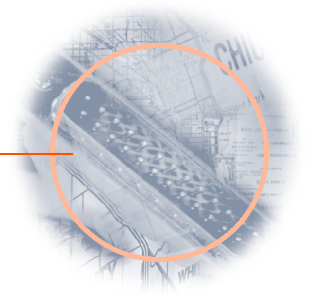
[19] Valdez, 26.
[20] Milken Family Foundation, *Progress of Technology in the Schools: Report on 27 States*, 2000.
[21] Teachers with advanced skills were those who, on a scale of 1 to 5 with 1 representing beginner skills and 5 representing advanced skills, were rated 4 or 5.
[22] Silverstein, 72.

The Chicago Public Schools new technology strategy plan, entitled Technology in the Service of Teaching and Learning, aims to improve the teaching and learning process through the use of technology. Lead by e-Brigade, a group of school board and senior management officials, the plan is the result of extensive investigation of successful education technology programs in other districts across the country, as well as interviews and focus groups with CPS stakeholders and discussions with leaders in the education technology field nationally. The plan focuses heavily on strategies that integrate technology into classroom teaching and address the human capital component of technology.

One major recommendation of the plan suggests having technology savvy curriculum specialists in all subject areas, instead of having a separate learning technologies unit. These specialists would guide teachers on subject matter, instructional materials including software, and professional development. The plan also emphasizes moving teachers along a continuum of professional development ranging from improving basic technology skills to developing technology integration skills, to training other teachers on technology integration.[23] Adoption of this plan could lead to major improvements in how CPS teachers use technology to improve student learning.[24]

Of the six district technology coordinators interviewed, four indicated that a majority of their teachers have intermediate level skills in operating computers. Approximately one-half of Prairie-Hills teachers have more advanced computer skills, while in Elgin the coordinator estimated that one-half of teachers are at a beginner level with computer skills.

The bigger challenge for most districts interviewed was training teachers on integrating technology into instruction. Most districts' teacher training over the past year has been in computer and software skills. In LaSalle, 100 percent of teachers get training in basic skills, but only approximately 10 percent are learning technology integration skills. In Elgin, district training has focused increasingly on technology integration with 25 to 30 percent of teachers getting such training over the past year.
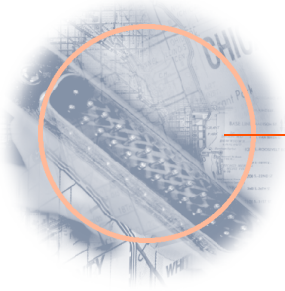
Approximately 50 percent of teachers receive computer skills training and all teachers are trained to use the Internet and e-mail. In Waukegan, about 80 percent of K-8 teachers received basic skills training over the past year and 50 percent received integration skills training. The Waukegan technology coordinator noted that teachers in grades K-8 elected to get training in both computer skills and integration skills more frequently than their high school counterparts. In Prairie-Hills, since a majority of teachers already have basic skills training, more emphasis is placed on integration skills. Approximately 50 percent of teachers receive integration skills training and 100 percent receive training on creating lesson plans online. Bethalto still faces challenges in training in both areas, with 20 percent of teachers receiving training in computer and software skills and 10 percent in integration skills.

Four of the six districts have train-the-trainer models to instruct other teachers on these skills. In Waukegan, two teachers per school are designated as technology leaders, providing after-school workshops for teachers. Prairie-Hills also relies on internal staff to provide training. A key benefit of this model for the district has been having an on-site resource to assist teachers on an as-needed basis, which teachers seem to use more than external consultants. This model has also increased the credibility of training programs among participating teachers since teachers perceive the trainers as having a good understanding of the school and its learning environment. Dolton has two full-time teachers who rotate through classrooms, modeling technology integration and assisting other teachers. Elgin has one teacher for every 500 students who, in addition to carrying a full teaching load, serves as a technology trainer for other teachers.

Three of the six technology coordinators interviewed cited lack of funding for teacher training and lack of adequate staff as major barriers in getting staff training. Two coordi-

[23] Other key recommendations include ensuring each classroom can access and use the Internet, starting with high schools; updating the education plan to incorporate the e-Brigade technology plan recommendations; adopting national education technology standards (NETS) for student learning; and improving evaluation of teacher and student technology skills and ensuring these processes are tied to standards.
[24] Clare Muñana, Chicago Board of Education, Board Member, interview by author, Chicago, September 2001.

nators also cited a lack of substitute teacher availability as a barrier to training teachers. In Dolton, high teacher mobility makes training teaching staff difficult. One coordinator said that resistant and hesitant teacher attitudes toward technology, especially among older teachers, were the biggest challenge to technology integration in the classroom. Many also said that time was a constraint, with many other professional and non-professional activities competing for their teachers' time.

Evaluation and assessment of teachers on technology use is critical for professional development to translate into enhanced classroom learning experiences. Almost all district technology coordinators interviewed said that there had been a gap in schools evaluating teachers on technology use and a lack of teacher accountability in using technology in the classroom. The Waukegan technology coordinator said that though teachers received some technology skills and integration training, administrators neither evaluated teachers on technology use nor held them accountable for implementing good technology models. In Elgin, district administrators have only this year pushed for greater accountability and are establishing assessments for teacher use of technology. Prairie-Hills and LaSalle districts are also in the process of developing evaluation tools to assess teacher use of technology in the classroom.

Illinois has recently made progress on establishing technology standards for incoming teachers through new standards on learning technologies.[25] These standards are reflected in the recently revamped teacher certification process.[26] The new certification process, whose tests are still under development, requires individuals to pass a basic skills test, a common core test and a content test in a subject area to receive the Initial Teaching Certificate. One component of this common core test will measure teaching candidates' technology knowledge and skills.[27] Teachers must take another test after four years to obtain the Standard Teaching Certificate. This test is currently being reviewed, but it is ultimately intended to be performance based, evaluating teachers on their work in the classroom and requiring teachers to do a reflective analysis. However, there are no technology requirements to receive the Standard Teaching Certificate.[28]

Though these changes clearly reflect progress in incorporating technology use and integration skills into teachers' repertoire, teachers are not required in this process to demonstrate their actual classroom skills with respect to technology integration. Thus, it is important that the Illinois State Board of Education adopt technology integration skills into the requirements and performance-based assessment for the Standard Teaching Certificate. This assessment should reflect both basic technology skills and skills in integration of technology into the curriculum.

The re-certification process also includes no technology training standards or requirements for Illinois teachers. Currently, teachers must set a professional development plan for themselves, which both improves their skills and knowledge in a subject area and addresses at least one of the state priorities for education. Technology integration skills are one of these state priorities. However, since teachers choose their own priority, the re-certification process does not ensure that teachers build any technology skills.

At the local level, only 12 percent of schools across Illinois have a school, district or teacher certification agency mandate regarding technology professional development.[29] Some districts interviewed have mandated some level of basic skills training for teachers. However, most encourage teachers to attend training through other incentives, such as stipends for after-school training, credits toward re-certification, credits for increased pay, provision of substitute teachers to offer release time from class and paid registration to teacher conferences. Whether teacher technology training is accomplished through mandate or incentives, all of these options require financial investments in professional training.

[25] Ricardo Tostado, Policy Analyst, Learning Technologies, Illinois State Board of Education, interview by author, Chicago, July 2001.
[26] *Ibid.*
[27] Zanele Sibanda, Director of Program and Policy Initiatives, Education, Chicago United, telephone interview by author, September 2001.
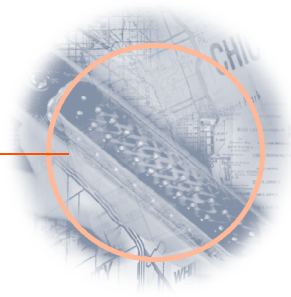[28] *Ibid.*
[29] Silverstein, 30.

Resources:
Local Funding

State and local level resources cover close to 85 percent of the total investment for creating a new technology infrastructure for schools nationwide.[30] Much of the cost is allocated from school districts' general funds. Many schools and school districts fall short of funding their entire technology plan. The Milken Family Foundation survey shows that in Illinois only 49 percent of the respondents' district school technology plans were being fully funded.[31] In the ISBE survey, over 50 percent of the more than 400 principals surveyed indicated that insufficient funding allocated for technology was a major barrier to integrating technology. Chicago public schools, high-poverty schools and other urban schools highlighted funding as a barrier more than other schools.[32] In Illinois, this is exacerbated by property tax based financing of schools, leaving property-poor districts with fewer local dollars for educational technology.

Most of the school districts interviewed rely heavily on grant dollars to fund their technology programs. All of these school districts, with the exception of Bethalto, financed approximately one-third to one-half of their past year's technology budget through local district funds. Bethalto finances almost 100 percent of its technology budget locally, a result of both supportive administrative leadership on the technology effort and limited staff to pursue grant opportunities. The Elgin, Dolton, Prairie-Hills, and Waukegan school districts all rely heavily on grant dollars, mostly federal and state and some private, to fund the balance.

Two districts generated some additional local funding for education technology expenditures through user fees (Elgin) and a levy for equipment leasing (LaSalle). With the exception of Prairie-Hills, technology expenditures (including both operational and capital expenses) in these districts in the 2000-2001 academic year generally ranged from approximately $110 per student in Waukegan to over $187 per student in the LaSalle school district. Prairie-Hills has invested much more heavily in technology in their education reform program and spends approximately $460 per student.

Many districts view technology as a one-time expense, accounting only for the acquisition cost of hardware and software, which amount to only 25 percent of the lifetime cost of technology integration.[33] Studies have suggested various funding models that take a more comprehensive approach. The Total Cost of Ownership model suggests that schools and districts take a comprehensive approach to education technology funding that includes funding

> "THE PIONEERS IN EDUCATION TECHNOLOGY HAVE SHOWN US THAT, UNDER THE RIGHT CONDITIONS, TECHNOLOGY DOES STRENGTHEN ACADEMIC ACHIEVEMENT. WE MUST ALLOCATE FUNDS FOR EDUCATION TECHNOLOGY TO EXTEND SUCH BENEFITS TO ALL CHILDREN." — CHERYL LEMKE, METIRI GROUP

Prairie-Hills Junior High students working at the Energy, Power and Mechanics Module in their Applied Technology Lab.

[30] Vincent, Phil and Rachel Kaberon, "Sustaining Educational Technology: Funding Challenges and Opportunities for Policymakers," *Policy Issues*, North Central Regional Educational Laboratory, Issue 4, February 2000, 1.
[31] Solmon, 30. This excludes Chicago.
[32] Silverstein, 74.
[33] Education Commission of the States, 23.

soft operational costs along with the hard capital costs of technology ownership. These often overlooked costs include training staff, retrofitting buildings, buying new software, replacing hardware, installing and maintaining connectivity to other schools and the Internet, and maintaining the computers and network.[34] The enGauge model, created by the North Central Regional Educational Laboratory (NCREL), recommends that school administrators account for both the hard and soft costs of technology ownership on a multiyear basis. The soft ongoing costs, especially in professional development, technical support, and software upgrades, should be individual line items in a district's regular budget cycle and integrated into the budgets for other general categories.[35]

"WE NEED TO PUSH AND MEASURE THE USE OF TECHNOLOGY IN THE CLASSROOM. WE NEED TO GET INTO FACT-BASED DECISIONS WITH ON-LINE ASSESSMENT TOOLS TO SET-UP BENCHMARKS AND CONDUCT EVALUATIONS." —ELAINE WILLIAMS, CHIEF INFORMATION OFFICER, CHICAGO PUBLIC SCHOOLS

Integrating the total cost of ownership into district budgets appears to be a common challenge among the school districts interviewed. The Dolton, LaSalle and Waukegan districts, all low-resource school districts, have not fully addressed the total cost of ownership within their districts' technology budgets. Dolton's technology coordinator said that funding the ongoing operational costs of technology, such as staffing for technical support and professional development, was a particular challenge, since many competitive grants for technology finance only one-time costs. In Waukegan, though technology-related salaries and some equipment are line items in the district budget, there is no ongoing technology-related professional development line item or allocation. In fact, most districts interviewed were concerned about obtaining future funding to increase technology staffing and professional development opportunities for teachers. Four of the six districts were spending less than 20 percent of their technology budget on professional development, significantly below recommendations of 30 to 40 percent from groups such as the National Education Association.[36] Addressing and financing the total cost of ownership of technology is a necessity and an important policy concern if these and other Illinois school districts are to sustain their technology programs and ensure that they improve the student learning process in the long term.


Prairie-Hills Junior High students working at the Research and Development Module of their Applied Technology Lab.

[34] Consortium for School Networking, *Taking TCO to the Classroom: A School Administrator's Guide to Planning for the Total Cost of New Technology*, July 2001, 5. http://www.cosn.org/tco/tco2class.pdf
[35] North Central Regional Educational Laboratory, *enGauge*, 2001. http://www.ncrel.org/engauge/framewk/sys/fund/sysfunpr.htm
[36] Web-based Education Commission, *The Power of the Internet for Learning:Moving from Promise to Practice, Report of the Web-based Education Commission to the President and Congress of the United States*, 2000. http://www.hpcnet.org/webcommission
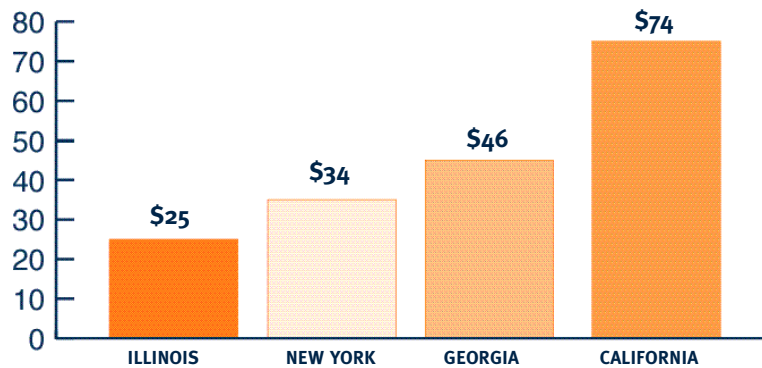
RESOURCES:
STATE OF ILLINOIS
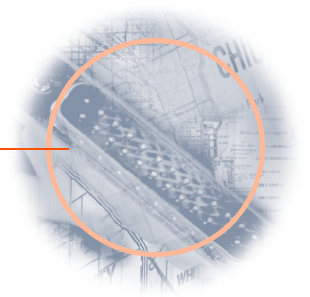
The Illinois State Board of Education has recognized the importance of addressing technology in K–12 schools. Learning technologies are a component of ISBE's education

State Education Technology Expenditures Per Student ($)

Source: "Technology Counts 2001," Education Week*, May 10, 2001*

system goal that "all Illinois students have equitable access to high-quality, standards-led educational programs and support services."[37] ISBE distributes state funding specifically for learning technology. These appropriations consist of two broad categories: grants (channeled directly to school districts) and administrative funds (used at the state level and not channeled directly to school districts).[38] There is no mandate from the state on how these funds are used.

Relative to other states with large student populations, Illinois lags behind in per pupil expenditures on learning technologies. ISBE spent $49 million on education technology in FY 2001, or approximately $25 per enrolled student.[39] This is considerably less than many states such as New York ($34 per enrolled student), Georgia ($46 per enrolled student) and California ($74 per enrolled student).

The vision and direction of use of Illinois' learning technology funds is outlined in an information technology plan for K–12 developed by ISBE. The agency is currently completing its plan for 2002-2007.[40] Most of Illinois' technology

programs are housed in its Technology for Success initiative. This includes direct allocation programs to school districts for technology, the Illinois Century Network (providing T1 Internet connections to local schools), and instructional and technical assistance to local schools through Regional Learning Technology Centers.

Technology for Success initiatives grew 31 percent in FY 1998. However, since then its growth rate has declined significantly with no increase in funding in FY 2002. Over the past three years, general fund spending on education grew 12 percent with General State Aid (GSA), which provides flexible state aid to schools, growing 8 percent. Technology appropriations, as represented through Technology for Success, grew only 1 percent during that same period. With the exception of FY 98, growth in Technology for Success funding has been continually less than growth in total general education funding in Illinois. With major disparities among Illinois dis-

| RELATIVE GROWTH OF TECHNOLOGY APPROPRIATIONS ($ in thousands)					
Program	FY 00	FY 01	FY 02	$ Increase FY 00-02	Percent Increase FY 00-02
General State Aid	$2,982,564	$2,994,715	$3,231,728	$249,164	8 %
Technology for Success	48,750	49,250	49,250	500	1 %
General Fund Spending	5,557,033	5,919,292	6,207,650	650,617	12 %

Source: Illinois State Board of Education

[37] Illinois State Board of Education, *Making Illinois Second to None: 2000 Annual Report & Fiscal Year 2002 Proposed Budget*, 60.

[38] Dave McDermott, Acting Division Administrator of Budget, Illinois State Board of Education, telephone interview by author, August 2001.

[39] Illinois State Board of Education, *Making Illinois Second to None: 2000 Annual Report & Fiscal Year 2002 Proposed Budget*, 129. This excludes the School Technology Revolving Loan Program.

[40] The draft plan as of December 2001, entitled "A Renewed Commitment," is available at the Illinois State Board of Education Web site at http://www.isbe.state.il.us/board/meetings/dec01meeting/techplan.pdf.
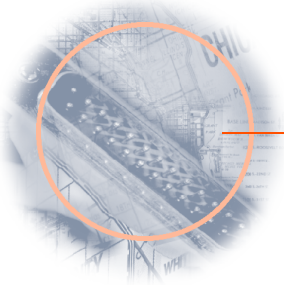
tricts in terms of basic technology infrastructure and significant needs in improving professional development and effective uses of technology in the classroom, it is important that funding for technology programs continues to grow if technology investments are to help students meet Illinois Learning Standards. This

RELATIVE GROWTH OF TECHNOLOGY FOR SUCCESS APPROPRIATIONS

Legend:
- TECHNOLOGY FOR SUCCESS
- TOTAL EDUCATION GENERAL FUNDS
- GENERAL STATE AID

X-axis: FISCAL YEAR — FY 1998, 1999, 2000, 2001, 2002
Y-axis: 0% to 35%

Source: Illinois State Board of Education

- instructional resources; and
- community involvement and awareness activities that relate to the technology plan.

Under this entitlement program, funding is based on per pupil allocations: each district is allocated $25,000 plus $75 per student according to average daily attendance rates, with districts
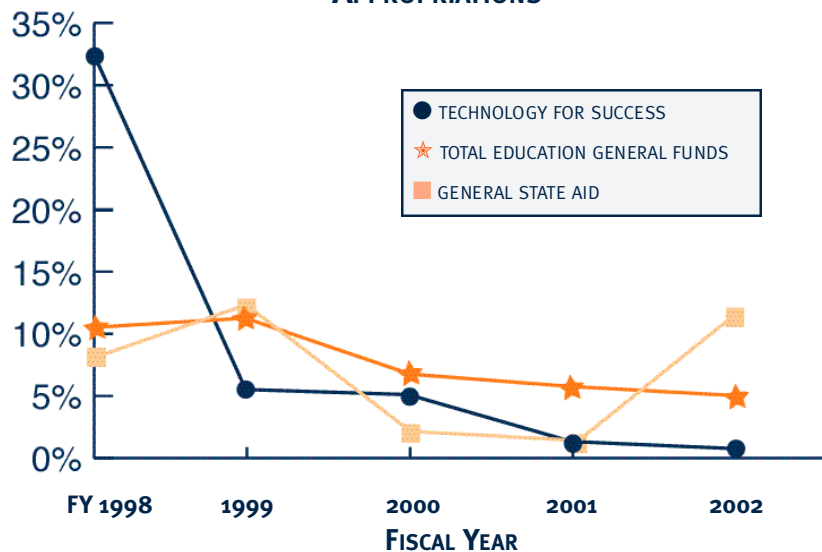
growth, however, should be in addition to and not at the expense of General State Aid to school districts.

Illinois' major grant allocation to school districts for learning technologies is through the Technology Integration Program (TIP), which is housed in the Technology for Success initiative. Additional direct support is available through the School Technology Revolving Loan program, which provides affordable loans for school technology hardware improvements.

TIP is a four-year, grant-based program, started in 1998 and ended in 2001, intended to support school districts' technology plans. The grant money can be used for:

- computer hardware, networking and telecommunications costs for classroom learning environments (no more than 50 percent of the total district grant amount);
- professional development to integrate technology in the school curriculum (no less than 25 percent of the total district grant amount);

having to provide a sliding scale match based on their wealth. Annual allocations to school districts in Illinois have been approximately $25 million.[41] The program is based on a formula that divides the state into four quartiles, with the poorest quartiles funded in the first years. FY 2001 represents the fourth year of the program and is funding the wealthiest quartile.[42]

Schools must submit a technology plan to obtain TIP funds. However, schools are not evaluated regarding their overall use of technology in the classroom or the impact of these expenditures. Though this program offers an opportu-

[41] Glenda Bequette, principal technology consultant, Learning Technologies, Illinois State Board of Education, telephone interview by author, August 2001.
[42] ISBE has continued this program in FY 2002 through a slightly different format called "Closing the Gap." Key differences include abridging the program to a two-year cycle, where the first two quartiles are funded in the first year, and the second two quartiles are funded in the second year. The annual budget will continue to be approximately $25 million. However, the amount of funds per school district will be smaller and diluted due to both more districts being eligible per year and an increase in types of entities eligible for the program (which will now include vocational centers). The "Closing the Gap" program will eliminate any percentage restrictions requiring funds for professional development and will not fund recurring expenses such as technology staff salaries or lease-purchase programs.
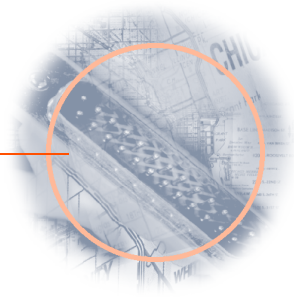
nity to collect data from school districts on their technology infrastructure, teacher and student uses of technology, and student outcomes, ISBE does not collect such data regularly from school districts. This is a shortcoming of the program since such data would allow a clearer understanding of the current state of education technology in Illinois schools, and allow for comparison within and across districts. It would also highlight local best practices. Perhaps most importantly, it would allow better planning, supported by quantitative and qualitative data, to ensure that future investments in technology result in students meeting the Illinois Learning Standards.

Currently, ISBE technology programs do not ensure that school districts across the state are meeting any type of minimum technology foundation that can enable engaged and dynamic learning through the use of technology. In other states, education technology funding models attempt to establish more uniform standards within the funding structure. The state of Kentucky, for example, has established specific education technology goals for schools, such as student-to-computer ratios and funds based on unmet needs in these areas.[43] West Virginia, as a result of a court ruling to restructure their funding formula, distributes technology resources based on a combination of factors including enrollment, technology need, poverty and achievement objectives.[44]

At this point, ISBE provides only a minimal guideline for Internet connections through its provision of TI lines through the Illinois Century Network program. Implementing a funding structure that in part ties funding streams to minimum benchmarks can help ensure that all Illinois schools,

including its more technologically challenged ones, build a technology foundation that equips teachers and students to meet learning standards.

In Illinois, many school districts lack the tools to develop leadership and vision on integrating technology in the school and classroom. One district technology coordinator, for instance, said it was a challenge to convince administrators and the school board that technology was an integral component of the learning process and not simply an independent subject. Prior to TIP, ISBE provided some leadership development through a short-lived program that helped 36 of the most economically challenged school districts in the state build technology plans. Under this program, leaders from these school districts were guided through an intensive three-month program to develop a comprehensive community-based technology plan for their district. Funding was directly linked to school districts' participation in this process, and districts received a total of almost $2 million to begin implementing their plans upon completion.[45]

The State of Pennsylvania is attempting to develop administrator leadership on education technology through its Technology Leadership Academy. This three-year program seeks to train all state superintendents, thousands of principals, and hundreds of school board members on how districts can plan, manage and budget for technology and raise student achievement using technology as a tool.[46]

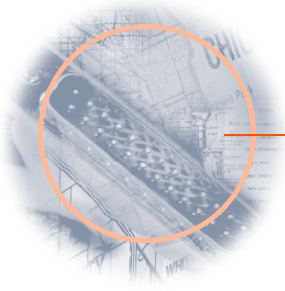| MAJOR STATE TECHNOLOGY FUNDING ($ in t housand s)				
	FY 99	FY 2000	FY 2001	FY 2002
Technology for Success	$46,250	48,750	49,250	49,250
School Technology Revolving Loan	$30,000	50,000	50,000	50,000
Total	$76,250	98,750	99,250	99,250

Source: Illinois State Board of Education

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43 "Technology Counts 2001," 87.
44 *Ibid*, 103.
45 Illinois State Board of Education, *K-12 Information Technology Plan*, 52 and 147.
46 "Technology Counts 2001," 98.

Illinois schools also rely heavily on funds from the federal government. Federal programs have generally sought to target funding to those districts with the greatest need. The two largest sources of federal funding are the Federal Communications Commission's E-Rate program and the Department of Education's Technology Literacy Challenge Fund program. Since 1998, E-Rate has provided public schools with discounts for telecommunications services, including Internet access, videoconferencing, high-speed data connections, phone services and certain types of internal wiring and network equipment. The program does not cover hardware or electrical upgrades. Discounts are tied to the school's percentage of students in the federal school lunch program.[47] In FY 2001, the State of Illinois received over $115 million in E-Rate funding.[48] Chicago has received over $83 million in the past year of program funding, one of the largest contributions to a single district.[49]

In addition to E-Rate, the Technology Literacy Challenge Fund is a five-year federal initiative supporting the integration of technology into teaching and learning. The Fund offers states an opportunity to provide school districts — especially those with high rates of poverty and a need for technology — with competitive funds that will help them improve student achievement. ISBE received $21 million through the Fund in FY 2001, one-third of which was earmarked for school districts with high student poverty rates and/or great technology needs.[50]

Though the E-Rate and Technology Literacy Challenge Fund programs have been a boon to many school districts in Illinois, they are currently under scrutiny by the federal government. Though total funding for E-Rate in FY 2002 is likely to continue at similar levels, funding priority areas have shifted and the benchmark for receiving funds for important internal LAN/WAN connections has risen. Illinois school districts may receive less funding as a result of these changes.[51]

The future of the Technology Literacy Challenge Fund and other Department of Education programs is currently in flux

> **"EDUCATION ADMINISTRATORS MUST VISION, FACILITATE, MODEL AND EMBRACE TECHNOLOGY."**
> **—KEN REED, ILLINOIS PRINCIPALS ASSOCIATION**

and some programs are in jeopardy. After steadily increasing appropriations for educational technology since 1991, overall federal funding for educational technology through the Department of Education has de-creased for FY 2002.[52] Final educational technology appropriations for FY 2002, under the educational technology line item, reflect a $87 million or 10 percent decrease from FY 2001 appropriations.[53]

Details of federal education technology programs have been delineated in the reauthorization of the Elementary and Secondary Education Act. Through this bill, two key federal education technology programs, the Technology Literacy Challenge Grant and the Technology Innovation Challenge Grant, have been consolidated as a block grant program to states. Half of these state block grant funds will be determined by Title I formula and the other half will be competitively determined.[54] Final FY 2002 appropriations for the state block grant program reflect an increase of over $100 million over the combined appropriations of the two programs it consolidates. However, many other federal programs, such as the Preparing Tomorrow's Teachers for Today grants, sustained significant cuts. Districts will be allowed to transfer up to 50 percent of their Title I-based federal education technology dollars for other uses.[55] Such provisions may leave even fewer federal dollars for education technology in Illinois.

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[47] See the *E-Rate in America: A Tale of Four Cities* (Washington D.C.: Benton Foundation, February 2000) for a discussion of the E-Rate, including its use in Chicago Public Schools. http://www.benton.org/E-Rate/E-Rate.4cities.pdf
[48] Tostado.
[49] Universal Service Fund.http://www.sl.universalservice.org/funding/y3
[50] Illinois State Board of Education, *Making Illinois Second to None: 2000 Annual Report & Fiscal Year 2002 Proposed Budget*, 130.
[51] Tostado.
[52] U.S. Department of Education, FY 2002 President's Budget Request for the U.S Department of Education. http://www.ed.gov/offices/OUS/Budget02/History.xls
[53] U.S. Department of Education, Department of Education Fiscal Year 2002 Congressional Action,http://www.ed.gov/offices/OUS/Budget02/02app.pdf. This does not reflect appropriations for the Community Technology Centers, Star Schools or Ready to Teach programs, which were moved into the Fund for the Improvement of Education program. Even if these programs are included, overall appropriations for education technology purposes decreased.
[54] International Society for Technology in Education, *December 2001 Washington Notes*, 2001.
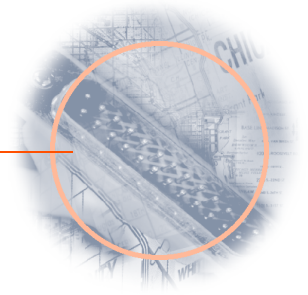[55] *Ibid*.

RESOURCES: PUBLIC-PRIVATE PARTNERSHIPS

A recent study by the National Partners in Education (NAPE) showed that over the past 10 years, schools districts have increasingly used partnerships with other institutions to support technology training and use in the classroom. Three-quarters of the country's school districts that used partnerships for a variety of programs focus some of their activities on technology. In 1990, fewer than half did.[56] Education technology partnerships bridge a variety of institutions, including other schools and school districts, businesses, universities, nonprofit organizations and community-based organizations. Functions of these partnerships vary. The NAPE survey showed that technology partnerships strengthened student technology skills, increased school technology use, allowed teachers to be trained on technology and students to be mentored/tutored on-line.[57] Technology-oriented partnerships also provided research and evaluation, offered technical assistance and/or directly delivered services. Corporations, based on their own experiences with technology integration, offered schools organizational and operational insights and approaches to effective technology use.

In the Chicago region, there are a variety of education technology partnerships that offer significant resources for the region's schools. The South Cook Education Consortium, a partnership of eight of the most resource-poor school districts in the Chicago area's south suburbs — including the Dolton school district — offers participating school districts opportunities to collaborate and leverage technology in a larger, comprehensive school reform agenda. The school districts work collectively to provide technology-related professional development, develop curricula that use technology, establish a baseline infrastructure for all participating schools, apply for funding together and aggregate demand to reduce costs on software and other technology needs.[58] The Dolton technology coordinator said that the partnership played a crucial role in her district's technology progress.

Partnerships with universities and academic institutions have also been important resources for schools in the Chicago region. Through the Chicago Public Schools/ University of Chicago Internet Program, 29 public schools on Chicago's South Side have received refurbished computers, maintenance, training and hands-on assistance through university graduate assistants. The program has helped these schools integrate technology into their curricula with projects that include real-time Internet communication and guided Internet research.[59] Additionally, the Chicago region's higher education consortia institutions have partnered high schools with colleges and universities to deliver distance learning classes through two-way interactive video rooms, making courses available (including advanced placement classes) even when there was little student demand at the school building level.

Community-based organizations can also complement school programs through technology-enhanced after-school services to students, and by offering expertise to schools regarding technology integration. Street-Level Youth Media in Chicago works with city schools to integrate media arts training into school curriculum to encourage creative and critical thinking and learning. Street-Level partners with schools for both long- and short-term timeframes, working with teachers to develop student-centered curricula and integrate new learning methods through tools such as digital publishing, video and audio production, script writing and animation. These and other local partnerships can inform the K-12 education community on effective uses of technology and perhaps offer scalability to other schools and districts across Illinois.

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[56] *Partnerships 2000: A Decade of Growth and Change* (Alexandria: The National Association of Partners in Education), 22, 2000. http://www.partnersineducation.org

[57] *Ibid*, 31.

[58] Bill Kling, South Cook Education Consortium, interview by author, Chicago, July 2001.

[59] See Chicago Public Schools/University of Chicago Internet Program Web site for more detail at http://cuip.uchicago.edu/

Creative integration of technology into the classroom offers exciting potential for student learning, equipping students for the demands of 21st century society and the modern workplace. Illinois has significant room for improvement in reaching this potential. Hardware and connectivity are still key issues for many urban, high-poverty schools in Illinois. These issues, however, must be viewed in the larger context of how technology can be integrated into the activities of teachers and students to improve learning. This is a challenge for all public schools, including those that are wired and connected. Resources must be channeled toward capacity-building to improve technology application and increase teacher training. The additional challenges and needs of Illinois' technologically challenged schools, often with high percentages of low-income students, must be considered in this reform process. The issues faced by the Catholic school system, which educates a significant number of low to moderate income, minority, urban, and non-Catholic students, must be further examined to help overcome barriers in integrating technology into their teaching and learning processes.

Systematic change is required at the state and district level if Illinois is to reap high quality educational returns on its technology investments. Organizations invested in education quality in Illinois must emphasize technology deployment. Since education technology can play a critical role in shaping the quality of tomorrow's workforce, it is paramount that the Illinois business community become actively engaged in this issue. This can expand and strengthen the advocacy base for these issues and help ensure that educational technology investments in Illinois are adequate and linked to improved outcomes in teaching and learning in the long term. Without such support for reform, technology will be only an empty promise for thousands of learners across Chicago and Illinois.

The following are key policy recommendations from the Metropolitan Planning Council and Network 21: Quality Schools and Stronger Communities to ensure that investments in technology improve the learning process and heighten student achievement in Illinois.

1. ESTABLISH EDUCATION TECHNOLOGY BENCHMARKS STATEWIDE

Though Illinois has made overall progress in developing its education technology infrastructure, many districts lag behind in the extent of their basic technology infrastructure, level of teacher and administrator technology skills training, and use of technology in the classroom. Currently, ISBE technology programs do not identify technology goals for engaged and dynamic learning to serve as guideposts at the school district and school levels. The current draft of the 2002-2007 pre-kindergarten through 12th grade (P-12) technology plan discusses appointing a standing advisory committee to provide advice and recommendations on technology in Illinois P-12 education, and includes measures for determining progress and success. These measurements are discussed in the context of benchmarks to evaluate ISBE's success at the state level. ISBE, however, should develop technology-related targets and benchmarks that can serve as guideposts *at the school district and school levels*.

Though there is no magic formula for successfully integrating technology into learning, school districts that are successfully incorporating technology in their curricula share some traits. ISBE should identify these best practices and use them to establish measurable benchmarks and clear technology standards for administrators, teachers and students. These should represent a continuum of both inputs and outputs around the use of education technology tools. Input-focused benchmarks could include minimum infrastructure (such as presence of a LAN, number of students per Internet-capable computer, and/or number of Internet-capable computers per classroom), minimum hours of technology-related professional development for teachers, and minimum technology support staff required to integrate technology into the classroom learning environment. Output-focused targets could include Illinois Standards Achievement Test (ISAT) scores and measures of the six essential competencies identified in ISBE's 1995 K-12 Information Technology Plan, including skills on information seeking, critical thinking, creating knowledge, and communicating through appropriate technologies and media.
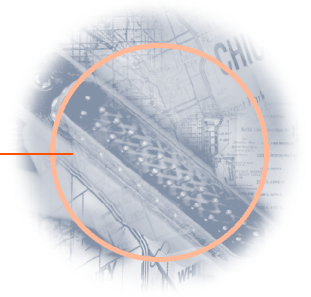
On the local level, school districts should adopt, customize or develop technology benchmarks to measure and chart district and school level progress on technology integration.

Illinois can develop these benchmarks using best practices identified in its Illinois NextSteps initiative (an evaluation tool developed by the North Central Regional Educational Laboratory (NCREL) for ISBE to help districts assess their technology integration), the NCREL enGauge framework, and the lessons learned from pioneering states such as Maryland. The development of benchmarks should include feedback from major stakeholders in the education, higher education and business communities.

A combination of local, state and federal funding must be identified to meet these standards. The State of Illinois can play a significant role in ensuring that all schools are developing an adequate technology foundation and that the technology gaps between school districts are reduced. State funding will be necessary to assist districts with few resources in meeting these benchmarks.

2. IMPROVE TEACHER TRAINING

Teacher skill levels in technology use and application must be raised in Illinois if student achievement is to be furthered through technology investments. Teacher licensing and certification processes should assess and require proficiency in technology skills to ensure that incoming teachers use technology in the classroom to improve student learning. Already a component of the Initial Teaching Certificate, ISBE should also adopt technology integration skills into the requirements and performance-based assessment for the Standard Teaching Certificate. ISBE should develop teacher technology standards, including standards for integrating technology into the curriculum, for veteran teachers as part of the re-certification process.

ISBE should create standardized criteria and guidelines for school districts and schools on effective professional development that improves these skills among teachers (e.g., job-embedded training, assessments before and after training, incentive structures built into training, and continuous profes-

sional development through content specific virtual learning communities). Additionally, ISBE's direct technology funding to school districts should require that a portion of state funds be used for professional development. While national guidelines suggest that at least 30 percent of technology funding focus on professional development, ISBE recently removed requirements that a percentage of state grants to school districts be dedicated to professional development.
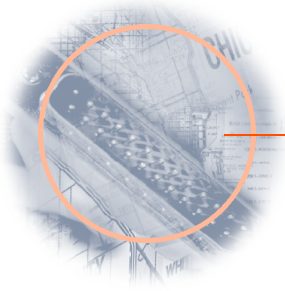
The state should also allocate funding for research and development, both to identify successful models or programs of professional development and effective digital content and curricula that have been proven to help meet state learning standards, and to increase student achievement. The state could also act as a clearinghouse of professional development programs and digital content to help guide local educators toward quality products that align with the Illinois Learning Standards and other state education goals. This content could be added to the Illinois School Improvement (ILSI) Web site.

Schools of education should build and expand programs that focus on technology integration. These schools in Illinois must work to ensure that technology integration skills are a component of their teacher training curriculum by providing their faculty with appropriate resources and professional development. State funding for higher education must include resources to support such efforts.

On a local basis, school districts and schools should ensure that their professional development programs include technology training. Teachers should be encouraged to develop technology skills through incentives such as stipends for after-school training or release time from class (through substitute teachers).

3. BUILD ADMINISTRATIVE LEADERSHIP

Technology can enable improvements in education on the student learning, teaching and administrative fronts. However, technology tools also present new challenges, different from other educational inputs, to educators and administrators. Schools must assure that adequate infrastructure is in place to support technology tools; provide appropriate professional

development opportunities for teachers; integrate dynamic, engaged and interactive approaches to teaching using technology tools; and address the financial and budgetary challenges that the total cost of ownership of technology presents. Without tackling such challenges, the potential for technology to help educators address Illinois Learning Standards will not be realized.

Illinois education administrators must envision, facilitate, model and embrace the comprehensive use of technology in order to promote and utilize the teaching and learning benefits of technology tools. ISBE should invest in programs that develop administrative leadership for superintendents, principals and school boards on education technology issues. ISBE should develop and adopt technology standards for school administrators. The current curriculum redevelopment at the Illinois Administrator's Academy provides an opportunity to define new technology-informed content to aid administrators in executing their responsibilities. Technology Standards for School Administrators, released in November of 2001 by the Technology Standards for School Administrators (TSSA) Collaborative, should be adopted in Illinois. ISBE should provide evaluative tools for administrators to use to assess teachers' skills and create accountability in technology use. ISBE can also build on elements of its previous program of providing capacity-building technical assistance to administrators in economically disadvantaged school districts, and borrow best practices from other states' approaches.

4. MEASURE AND EVALUATE EDUCATION TECHNOLOGY PROGRESS

The State of Illinois does not currently collect baseline data from schools regarding their technology infrastructure, teacher and student use of technology, or student outcomes with respect to technology use as reflected in a broad range of student abilities including higher-order thinking skills. Nor do technology funding agencies require such data. However, such information is necessary to allow a clearer understanding of the current state of education technology in Illinois schools to emerge. This data will also allow for comparison within and across districts, and a better understanding of local best practices. Perhaps most importantly, it can allow for better planning and continuous improvement, supported by quantitative and qualitative data, to ensure that future investments in technology result in overall improvements in meeting Illinois Learning Standards.
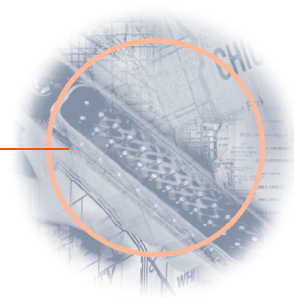
The state's current draft of the 2002-2007 P-12 technology plan calls for strategies to establish state and local accountability regarding technology in Illinois P-12 education, including a strategy for data collection and reporting. ISBE should collect and track this basic technology data on a regular basis at the school level as a requirement to obtain state funding. Data collected will inform where schools and school districts stand in meeting established benchmarks. It should also account for demographic and resource variances. The State Department of Education in Maryland provides one model for collecting such data.[60] It can also be used to chart schools' progress over time and build accountability. Schools should be evaluated regularly on their technology integration progress. This evaluation should be included in Illinois' school report card and within the ILSI Web site for stakeholders to assess and use.[61]

5. INCREASE AVAILABLE RESOURCES TO MEET BENCHMARKS

Additional resources are required to ensure that Illinois moves from developing a basic technology infrastructure in schools to the next step of integrating technology into the curriculum to improve student learning and achievement. With current education technology expenditures at approximately $25 per enrolled student, Illinois lags behind other states with significant student enrollments. Over the past three years, state

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[60] A current draft of Maryland's plan for education technology is available at http://docushare.msde.state.md.us/docushare/dscgi/ds.py/View/Collection=1951.
[61] Illinois law requires public school districts to provide yearly school report cards making available information on student characteristics, the instructional setting, the school districts' finances, and student performance on state assessments. Report cards are available at the ISBE Web site: http://www.isbe.net.

education technology appropriations have increased at a mere one percent, less than the rate of inflation, and far less than the 12 percent growth of general funding for education over the same period of time. Additionally, both E-Rate and Department of Education technology programs are being restructured, which could mean fewer dollars for Illinois.

The state's current draft of the 2002-2007 state P-12 technology plan calls for annual increases in state funding levels at least proportionate to increases in General State Aid. It is important, however, that in the short term, state funding for education technology enhancements grow at the rate of general funds for education (five percent in FY 2002) so that ISBE offers school districts increased financial support and resources for technology. In the long term, ISBE must determine the level of funding required to fully support education technology, what the funding will be used for (e.g., direct funds to districts to support identified benchmarks, teacher training, leadership development, evaluation, etc.) and viable sources for funding. Increases in learning technologies funding, however, should not come at the expense of General State Aid funds for classrooms.

Over the long term, technology should be integrated into education delivery, and specific funding through the education technology categorical should be merged into General State Aid. However, many school districts are far from this level of technology integration. Thus, in the short term, education technology funding should remain as a separate funding stream under the education technology categorical.

In both the short and long term, increases to state level funding and resources for education technology should partially come through increased integration of education technology into other ISBE and Illinois Board of Higher Education program areas. Long-term increases for education technology must be tied to a comprehensive school reform package. School districts and schools should strategically plan for the short- and long-term costs of technology, assessing the total costs of ownership of technology and better integrating tech-
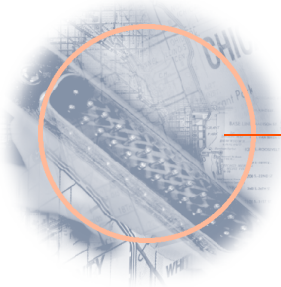
nology costs into their budgets. They should also pursue funding from public and private sources for technology-based initiatives to supplement local available resources.

State funding to school districts should encourage both equity of opportunity across districts and innovative and proven uses of education technology. Additional resources, through both funding and technical assistance, should be provided to districts struggling to reach benchmarks or with low local resources and higher percentages of students in poverty. Additionally, through incentive programs, such as additional funding and awards programs, the state should encourage innovative technology-based work at the local level that has been proven to assist in education reform and improvement.

6. PROMOTE PARTNERSHIPS AND COLLABORATIONS

Public-private partnerships are playing an increasingly important role in building school capacity to integrate technology. These include collaborations with other schools and school districts, businesses, universities, nonprofit organizations and community-based organizations to provide technical assistance, direct services, research and/or funding on education technology to schools and school districts.

School districts and schools should strategically develop and leverage these relationships to improve their technology integration efforts. ISBE should identify successful collaborative approaches and provide financial resources and incentives for both schools and partners that establish such partnerships. Illinois businesses should build on and expand collaborations with school districts by sharing appropriate best practices from the business world with teacher colleges and school administrators. ISBE also has a role to play in setting up technology-based mechanisms for districts to share experiences and improve the quality and efficacy of partnerships and collaborations.

The following is a list of resources regarding select education technology initiatives and programs in Illinois and nationally.

Illinois State Board of Education (ISBE)
The vision and direction regarding use of technology in Illinois schools is outlined in the Illinois K-12 Information Technology Plan. ISBE is in the process of completing the plan for 2002-2007. The draft plan as of December 2001, "A Renewed Commitment," as well as the initial K-12 Information Technology Plan from 1995 are available.
http://www.isbe.state.il.us/

Illinois State Board of Education Learning Technologies Division
This division of ISBE provides support for improving student learning through the use of technology and telecommunications. Service areas include infrastructure, network, and system design; public/private interaction; professional development; and integrating teaching, learning, and assessment into systems.
http://www.isbe.state.il.us/learn-technology/

Illinois School Improvement (ILSI)
ILSI's Web site was designed to help Illinois educators make data driven decisions in their school improvement processes. The site provides customized data by school, providing an interactive and analytic framework to approach the data.
http://206.166.105.86/

Chicago Public Schools (CPS)
CPS has developed a new technology strategy plan, entitled Technology in the Service of Teaching and Learning, to improve the teaching and learning processes through technology use. Contact the CPS Office of Technology Services at (773) 553-1300.

Chicago United
Chicago United is actively involved with policy reform regarding teacher quality issues across Illinois. Recent advocacy efforts have focused on ensuring the effectiveness of Illinois' new teacher certification guidelines, including appropriate assessment of teacher technology skills. Contact Chicago United at (312) 977-3060.

ElearningIllinois
A Web site providing resources and links related to online education in Illinois.
http://elearning.illinois.net

enGauge
This Web site was developed by the North Central Regional Educational Laboratory and Metiri Group to help districts and schools plan for and evaluate the system wide use of educational technology.
http://www.ncrel.org/engauge/

Illinois Computing Educators
This membership organization aims to encourage the development and use of computers and technology in all facets of the educational process in Illinois.
http://www.iceberg.org/

Illinois Technology and Leadership for Change
This Illinois State University administered leadership development and technology training program serves 1,500 Illinois public and private school principals and superintendents. Training focuses on giving school leaders the knowledge and skills to use technology more effectively to promote student learning and to affect broad, whole-systems change.
http://www.sadi.ilstu.edu

International Society for Technology in Education
ISTE is a national membership organization dedicated to promoting appropriate uses of information technology to support and improve learning, teaching, and administration in K–12 education and teacher education. ISTE has developed the National Educational Technology Standards, national standards for educational uses of technology that facilitate school improvement in P–12 education in the United States.
http://cnets.iste.org/

NCREL's Educational Technology Resources Online
The NCREL Web site includes educational technology resources created by NCREL and its partners. Resources focus on technology and its use in education.
http://www.ncrel.org/tech/

North Central Regional Technology in Education Consortium
One of 10 Regional Technology in Education Consortia, NCRTEC helps schools and adult literacy programs to develop technology-embedded practices that lead to improved and engaged learning for students.
http://www.ncrtec.org/

Tech 2002
This program allows lawmakers, business leaders and others to see first-hand how technology is used in classrooms across Illinois through an annual day of technology demonstrations at the Illinois state capitol in Springfield.
http://www.springfieldtech2000.org/

"Developing an Education Technology Agenda for Illinois" Policy Forum
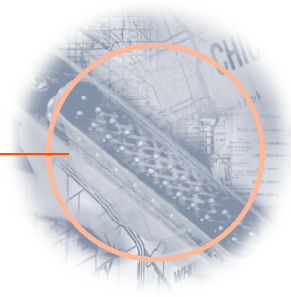
If we want to ensure that technology in our public schools is being used effectively to improve student achievement, we have to think and act beyond the issues of "boxes and wires."

This was the message from speakers and 60 participants and leaders from the education, business, foundation and civic communities at "Developing an Education Technology Agenda for Illinois," a policy forum held on Nov. 8, 2001. The event was hosted by the Metropolitan Planning Council and Network 21: Quality Schools and Stronger Communities in collaboration with the Illinois Institute of Technology. Speakers and discussions in break-out sessions examined the key challenges in integrating technology into classroom use, and helped define a state-level policy agenda to improve the use of technology in Illinois' schools.

Photo by Bindu Batchu

Cheryl Lemke, forum keynote speaker, discusses effective use of technology in classrooms and state level policies that can encourage effective use of technology.

"Technology has played a significant role in the shift to globalization," remarked Cheryl Lemke, the forum's keynote speaker, a national expert on learning technology. "While there is an increasing reliance on technology, the lag in social and cultural shifts prevents us from taking full advantage of the possibilities technology offers … [creating] a critical need for investment in human capital," continued Lemke, who is also former associate superintendent for Learning Technologies for the Illinois State Board of Education.

Through video streaming technologies, Lemke showed a clip (available online at http://wise.berkeley.edu) of a science classroom using technology, demonstrating the value technology can bring to learning. Technology tools, she commented, offer children the opportunity to learn visually, often providing a more powerful and deeper understanding of the subject matter.

For technology to be used effectively, Lemke offered six essential conditions that must be in place: vision, practice, proficiency, equity, access and systems. These conditions form a basis for creating technology benchmarks and assessment tools. Lemke also discussed policy actions that can be taken at the state level to encourage the effective use of technology in schools. First and foremost, a forward-looking, shared, informed vision that focuses on globalization and skills for the 21st century is needed, she said. Additionally, states should develop the capacity to research, prototype, assess and scale effective professional development and digital content for educators. She also suggested that conditions be attached to public education technology funds in order to encourage informed decision-making, and that states allocate funds to address the challenges of the Digital Divide and honor the work of innovators and pioneers.

A panel session, moderated by Ricardo Tostado, policy analyst in Learning Technologies at the Illinois State Board of Education, addressed the role of teacher and administrator training on effectively integrating technology, the challenges of developing these skills, and how the new teacher certification process addresses some of these issues. Panelists included: Steve Kozlowski, assistant superintendent at Prairie-Hills Elementary District #144; Elaine Williams, chief information officer at Chicago Public Schools; and Zanele Sibanda, director of policy & program initiatives-education at Chicago United. Panelists agreed that providing teachers with opportunities for professional development that incorporates technology is critical. Kozlowski suggested that school districts must spend at least 30 percent of their technology budgets on professional development. Additionally, he said, districts should have two technology coordinators, one focused on infrastructure and administrative procedures and another focused on instruction and integration of technology into the curriculum and classroom. Williams commented that the challenge in Chicago Public Schools is
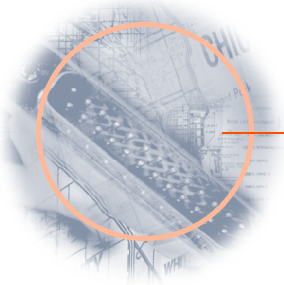
to also establish infrastructure, collaboration and coordination to ensure that there is follow-through into the classroom. Sibanda explained how the common core test in the new teacher certification process will have some assessment of technology skills. She also explained the role and importance of a performance-based assessment of teachers, an issue Chicago United is actively advocating, to ensure teachers are making use of technology tools in the classroom.

State Rep. Connie Howard (D-Chicago) highlighted many of the political challenges and opportunities in better integrating technology into the public education system. Rep. Howard, known as an advocate for technology in the state General Assembly, commented that education technology issues are politically viewed as "stepchildren." She said that educators and advocates must make a strong case for technology in education, especially in light of the current tight state budget.

Participants responded to, and elaborated on, specific policy recommendations outlined in the working version of this paper. Several priority areas surfaced in these discussions. Participants believed the State should develop guidelines for technology-infused professional development, including online training. Additionally, the group felt the state should act as a clearinghouse on professional development programs and digital content to help guide local educators toward quality products that align with the Illinois Learning Standards and other state education goals. Participants also believed it was important for the State to help build administrative leadership around technology. Key state-level measures included developing technology-oriented standards for administrators, and providing them with assessment and evaluation tools that can help build accountability around technology use in their schools and classrooms.

"POLICY MAKERS SHOULD REQUIRE SUFFICIENT 'STRINGS' TO ENSURE THAT SCHOOLS MAKE INFORMED CHOICES THAT RESULT IN EFFECTIVE USES OF TECHNOLOGY BY STUDENTS AND TEACHERS." —CHERYL LEMKE, METIRI GROUP

Participants strongly recommended that the State develop measurable benchmarks on education technology to ensure resources are effectively and efficiently used to support student achievement. These targets should represent a continuum of both inputs and outputs around the use of education technology tools. For these targets to be useful at both the state and local levels, participants agreed the State should regularly collect and track data, helping districts build a framework for assessing their progress. The group agreed that funding increases for education technology will be necessary. The legislative strategy for K-12 education technology funding must be part of a larger comprehensive education reform package, better linked with higher education and uniting key stakeholders, including the business community. Existing funding has to be used more effectively, better integrating technology into other programs and agencies within the Illinois State Board of Education, such as special education. The State should target additional funding and technical assistance to under-performing and low resource school districts, while also creating incentives for innovators in education technology. The feedback provided by forum participants has been incorporated into the final recommendations in this paper.

Michael Scott, chair of the Chicago Board of Education, summarized key themes of the forum in a closing address, commenting that "technology is pervasive, needs funding and needs innovative and creative approaches."
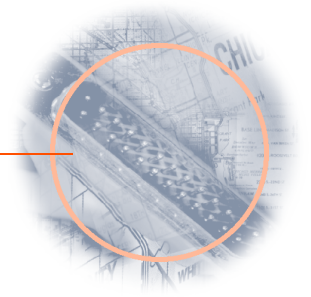
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Network 21 convened an Education Technology Working Group in January 2002 to help facilitate action in these important areas and attract resources, both human capital and financial, to make the effective use of technology a reality in all of Illinois' schools.

POLICY FORUM
PARTICIPANTS

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Bindu Batchu	Metropolitan Planning Council
Arthur Berman	Law Department, Chicago Public Schools
Kathy Bjelland	Area IV Learning Technology Center
Tom Bookler	Illinois Computing Educators
Laurie Borders	Chicago Public Schools
Walter Briggs	Chicago Public Schools
Arlene Burke	IBM Corporation
Beth Burke	Illinois Computing Educators
Willie Cade	Computers for Schools
Dean Clark	Graphic Chemical & Ink Company
Darryl Cobb	DiamondCluster International
Clarisse Croteau-Chonka	Chicago Consortium for Higher Education
Alicia Menchaca de Cerda	McCormick Tribune Foundation
Kristi DeLaurentiis	Metropolitan Planning Council
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