

Massachusetts



Department of
Education

Educational Technology in Massachusetts *1999-2000*

March 2000



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Massachusetts Department of Education

This document was prepared by the Massachusetts Department of Education
Dr. David P. Driscoll, Commissioner of Education

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David P. Driscoll
Commissioner of Education

March 20, 2000

Dear Educators, Parents, and Interested Parties:

I am happy to share with you this document which includes the results from the latest District Technology Plan updates. As the data show, our state is making great strides in improving technology access for educators and students. Especially impressive is the growth in Internet access. With the majority of classrooms now connected to the Internet via high-speed local area networks, students and teachers have greater opportunities to incorporate the state learning standards into daily classroom experiences.

The Department of Education has been working closely with the Governor, the legislature, and educational and business leaders to ensure that a comprehensive, efficient, and cost-effective network of educational technology services is provided for schools and districts. For several years we have been working toward creating a statewide infrastructure that will bring network information technology directly to our schools. For example, Mass Community Network (MCN), our statewide dedicated network for schools, municipal buildings, libraries, and community centers, will enable districts to purchase high-speed connections at tremendous savings. Virtual Education Space (VES) will help educators and parents to implement standards based curriculum for higher student achievement. The Technology Literacy Challenge Fund (TLCF) will continue to offer grants to districts.

I look forward to continuing to work with you in partnership to provide high-quality educational technology for all students in all schools. We have much more to accomplish in our programs to raise student achievement.

Sincerely,

A handwritten signature in black ink, appearing to read "David P. Driscoll".

David P. Driscoll
Commissioner of Education

Internet address: www.doe.mass.edu

**EDUCATIONAL TECHNOLOGY
IN MASSACHUSETTS
1999-2000**

Background

Over the past four years there has been a dramatic increase in technology in Massachusetts schools. The number of students sharing a high-speed computer has been cut in half. Classroom access to the Internet has nearly tripled. During FY 99 the state spent over \$30 million on educational technology. Districts spent an additional \$200 million. This sizeable investment has been made on good faith that all this technology will eventually have an impact on learning. Has it? Who is benefiting so far? When will we know it is working?

Stories abound of elementary students publishing their written reports on the Web, high school students going online to access “live” information such as current debates in the House or Senate, e-mail exchanges between classrooms on opposite sides of the globe, or students working together to tackle real-world problems with technology projects. The fortunate students in a classroom outfitted with up-to-date hardware and software have an unparalleled range of academic resources to connect them to the larger world.

Yet for every success story there is a tale of frustration over problems encountered with technology in the classroom. Waiting for a turn at the computer can test the patience of students eager to learn. When an unreliable server crashes, it can hold students’ work hostage until the problem is fixed. In schools with inadequate support personnel, the problem can last for weeks. At the same time, teachers who have not yet experienced for themselves the benefits of technology are unlikely to use it in their everyday classroom teaching.

As with any significant reform initiative, all the pieces must fit together. Is there adequate technical support and access to updated equipment? Are teachers receiving professional development that helps them incorporate technology into the curriculum they are required to teach? Do all the students have equal access to computer resources? This includes students with special needs as well as those in urban and rural systems. All these conditions must be in place before we will see widespread adoption of educational technology that measurably supports teaching and learning.

Providing Enough Computers for all the Students

Research studies confirm what is obvious to most teachers: If computers are going to have any effect at all on students’ writing abilities, then students need frequent practice writing on computers. If elementary students visit a computer lab once a week, they won’t make rapid progress with word processing. The same is true if twenty-four children are required to share four or five computers in the classroom. That was the frustration of teachers at the Bancroft School in Andover until last year when they received a Lighthouse grant to create four mobile publishing centers for grades 3-5. With thirty new AlphaSmart 2000 portable computers, students began to use word processing on a regular basis in every subject area. They took the AlphaSmarts on field trips and recorded their observations. They published newsletters, recorded science experiment observations, and wrote pen pal letters, journals and math poems. As they became more proficient with the keyboard, students’ writing abilities strengthened. Especially remarkable was the improvement seen in children who had previously struggled to write because of weak handwriting skills.

During the following school year, students from Andover traveled to Westford to help students at the Norman E. Day School get started with their new AlphaSmarts. Westford Public Schools received an Adoption Grant to replicate Andover’s Lighthouse project.

Creating the right conditions is a long-term process. Realizing this, the Massachusetts Department of Education offers a variety of programs and services to help districts acclimate to the Information Age. The Technology Literacy Challenge Fund (TLCF) grants have been helping thousands of teachers incorporate technology into their teaching of the curriculum frameworks. Through the Lighthouse and Adoption TLCF grant programs, innovative classroom projects are spreading from one classroom to another. Other statewide initiatives are helping to make technology affordable to schools and educators. ETIS (EdTech Integration Services) is saving districts an average of 7% on the procurement of technology goods and services. Through MassEd.Net, every teacher in the state is offered a dial-up Internet account for \$25 per year. ⁽¹⁾

As needs change, the Department's technology programs evolve to meet these new challenges. Taken as a whole these programs form a cohesive, focused effort that has helped to bring our state's education technology ranking out of its weak position of five years ago to the higher place we hold today. With the infrastructure in place, many schools are now poised to offer students the competitive edge that technology will give them.

For five years, the Department has been tracking data on technology access in schools. Beginning in 1998, the surveys of district technology plans and school technology profiles have been conducted online. Because of the high response rate to these online surveys and the consistency of questions asked, we have gained a clear picture of the technology capacity in our schools and how it has changed over the past two years. This report incorporates the latest data gathered in the fall of 1999. Additionally, we draw on the findings of a comprehensive survey conducted by the Milken Exchange on Education Technology.⁽²⁾ *Educational Technology in Massachusetts, 1999-2000* focuses on the survey's findings in three areas:

1. Access to technology
2. Professional development and curriculum support
3. Technical support

**Bringing Curriculum Resources to an
Isolated Community**

Frontier Regional/Union 38 is a rural district serving four towns in western Massachusetts. Last year the district networked all the schools in the system and installed updated computers and state-of-the-art software. Teachers who formerly struggled with donated equipment in constant need of repair are seizing this new opportunity to provide exciting resources to meet the new curriculum frameworks. One such project is a web-based curriculum unit that links students to a rich archive of primary resources in a local history museum. In the past, field trips to the museum were limited because of their cost. Now every student is conducting research using the museum's primary documents that have been digitized with the help of the University of Massachusetts. Elementary students examine maps, probate inventories, and accounts and diaries of people who lived in Deerfield prior to the 1800s. From the evidence found in these primary sources, students piece together an understanding of life during that time period. Older students investigate issues in industrialization such as immigration, women's rights, labor relations, and child labor. Working collaboratively on such projects, students of all abilities are motivated to become active learners, sharing their research results with others, and becoming more engaged with their community. Throughout the year, 100 teachers attended workshop sessions to learn how to create similar projects in their own classrooms.

1. Access to Technology

The most recent data, summarized in Table 1, show that Massachusetts is holding a steady course toward improving ratios of students to high-speed computers and connecting classrooms to the Internet. The use of Local Area Networks (LANs), which provide school-wide networking for communications and shared printers, has also risen significantly.

How do the data from Massachusetts compare with nationwide statistics? Because of the inconsistency of data collection methods from state to state, it is difficult to make a direct comparison. The Milken Survey found 12.8 students per Internet-connected computer in Massachusetts, as compared to an average of 18.5 for the 27 states surveyed. It also reported that the expenditure per student per year to implement a technology plan was \$185.09 in Massachusetts, as compared to a national average of \$144.38.⁽³⁾

Technology Access in Massachusetts School Districts – Statewide Averages	FY '97	FY '98	FY '99*	FY '00**
Average number of students per high-speed "A" or B" computer (those with Intel Pentium or Apple Power PC processors, their equivalent or newer)	15.6	15.1	10.6	7.4
Number of students per any computer type	8.4	7.2	5.9	5.1
Percentage of classrooms with access to the Internet	23%	41%	51%	69.2%
Percentage of classrooms with access to a Local Area Network (LAN)	26%	46%	54%	68.5%
<p>*Reported in EdTech Updated 1998. Data were drawn from online survey completed by 55% of the active school districts during the fall of 1998.</p> <p>**Based on a response rate of 97.3% of school districts that updated their technology plans online either in the spring of 1999 or the fall of 1999.</p>				

Student Access to High-Speed Computers -- 70% Improvement

The number of students per any computer type has leveled off over the past year, improving only slightly from 5.9 to 5.1. There are a number of possible explanations for this. The inventory reported in the previous year most likely included a number of old computers such as Apple IIe's kept in the classroom for tutorial software or games. It is possible that many of these outmoded computers were replaced with newer systems, keeping the numbers fairly steady.

More significantly, there is a marked improvement in the average number of students per high-speed "A" or "B" type computer. These are the computers that are useful for running multimedia software or accessing the Internet. In one year the ratio has fallen from 10.6 students per computer to 7.4 students per computer. Two years ago, the average number of students sharing this type of computer was twice as high.

Nearly 70% of Classrooms Connected to the Internet

Massachusetts has seen a dramatic increase in the number of classrooms connected to the Internet. Table 1 shows that 69.2% of classrooms are connected through various means. Some schools have high-speed connections in every classroom. Others dial up through a modem. This was typically the case until very recently with many schools having newly-installed T1 lines. Through initiatives such as NetDay and the E-Rate program, many schools have wired their buildings for high-speed data transfer. The advantages for the latter group are clear: faster access without tying up telephone lines.

The recent dramatic increase in Internet access in Massachusetts schools reflects a national trend. In a February 1999 report, the National Center for Education Statistics estimates that by the end of the current school year, 99% of all schools and 88% of all classrooms will have at least one Internet connection.⁽⁴⁾ The report was based on data collected between 1994 and 1997, a time period during which Internet access increased more than 100%.

Remarkable about the findings from the Massachusetts online survey is that respondents were reporting the number of classrooms that have access to the Internet. When students can go online from the classroom, teachers are more likely to require Internet research than when access is limited to the computer lab or library media center. The advantages of classroom access are highlighted in a national study conducted by Henry Becker at the University of California/Irvine. In 1997-1998 researchers investigated how teachers use computers and the Internet in their instruction. They found that when the Internet was accessible from the classroom, 32% of teachers had their students use the Web at least 10 times, or in at least three lessons during the year, and would choose a Web browser as one of the three most valuable pieces of software used in their teaching. This compares to 10% when the Internet was accessible elsewhere in the school.⁽⁵⁾

Does this widespread access to the Internet mean that students are actually using it? For how much time and for what purpose? The Milken survey found that 69.7% of Massachusetts students are developing online research expertise. This was higher than the overall percentage for the national sample surveyed.⁽⁶⁾

More and more teachers across Massachusetts are discovering the power of Web-based classroom projects. Many of the Lighthouse technology grants, as well as others supported by the state, incorporate e-mail, Internet research, and Web publishing. These innovative projects are spreading to other classrooms, through dissemination workshops and now through the Adoption grants. Other programs have emphasized use of the Internet. Project MEET (Massachusetts Empowering Educators with Technology), a statewide technology professional development program, helps teachers develop their own Internet-based curriculum projects. Virtual High School (VHS) offers courses over the Internet, bringing together a “virtual” classroom of students from different geographic locations. Through the state’s Teacher Training Professional Development (TTPD) Web site, teachers across the state can access up-to-date information on all professional development activities. VES (Virtual Education Space) will provide a set of online tools for implementing standards-based curriculum. (Visit our Web site for updates on these and other programs.)

Virtual High School: Expanding curricular offerings cost-effectively

Few high schools have the resources to offer specialized courses such as Paleontology, Evolutionary Genetics, Aviation History, or Exploring Themes in African-American Literature. Now students in participating high schools can choose from a wide range of Internet-based courses through Virtual High School (VHS).

A student enrolled in a Virtual High School course daily logs onto his or her “NetCourse” through the VHS Web site. Although the teacher and other students in the course are located in different states across the country, they get to know each other by collaborating on research projects and sharing notes in the “CourseRoom” discussion area. Here they read and comment on each other’s posted work; the various discussion “threads” are moderated by the teacher. The teacher suggests Web sites for background research, and communicates with each student through e-mail.

Besides extending their learning beyond the school’s course offerings, VHS students are collaborating across geographic boundaries. They are building their skills with communications and research tools — which they will use throughout their lives.

As more teachers learn about the Virtual High School Project, it is growing exponentially. Hudson High School, in collaboration with The Concord Consortium, was one of 33 high schools in the US that received federal funding to develop the program. With additional state funding through a Lighthouse grant during the 1998-1999 school year, Hudson disseminated VHS through teacher training workshops to over 133 participants across the state. Many of these teachers developed course outlines and are now offering their own courses through the program. In exchange for teaching a NetCourse, a school can enroll students in any VHS NetCourse being offered.

The World Wide Web is so new that its full potential has not yet been fully recognized. Yet, in Massachusetts, many teachers are quickly seeing the value of connecting to such a vast world of information. The Becker study found that over the past two years, Web-searching has become the third most common use of computers by students at school, after word processing and the use of CD-ROMS.⁽⁷⁾

Closing the Digital Divide

Traditionally there has been a serious disparity in access to technology between school systems with high levels of low-income enrollment and those with low levels of low-income enrollment. This so-called “digital divide” is a nationwide problem and was seen in Massachusetts data gathered from the districts two years ago. After investing \$6 billion in education reform with a special focus on areas of need, what progress is our state making toward closing the gap? Summarized in Table 2, our most recent findings show that the “digital divide” no longer is evident in the student-to-computer ratios themselves. In fact, the 20% of districts with the highest enrollment of low-income students have a slight advantage over the 20% of districts with the lowest enrollment of low-income students, even with the high-speed computers. There is still a gap, however, when one examines the data on access to the Internet and LANs.

A similar trend at the national level is reported by Education Week in the latest report, “Technology Counts ’99.”⁽⁸⁾ Based on 1998 statistics published by the U.S. Department of Education, Education Week reported fairly consistent access to stand-alone, instructional computers in schools with high and low rates of poverty. With computers that are connected to the Internet, however, the gap was more pronounced. In schools with 71% or more disadvantaged students there was a ratio of 17 students to one Internet-connected computer. In schools with fewer than 11% disadvantaged students, the ratio was 10 students to one Internet-connected computer.

Although Massachusetts has made considerable progress in narrowing the gap, this issue will remain a priority until every student, regardless of family income level, has equal access to technology. That access involves more than student-to-computer ratios. Teacher professional development, adequate technical support, and other factors all must join together to make technology work for everyone. Broad initiatives on both the federal and state level have narrowed the gap. For example, the E-rate, the federally-financed program for providing discounts for telecommunications services and products to schools, benefits most those schools with higher levels of low-income enrollment. On the state level, VES will provide every student with a virtual personal computer accessible on the Internet.

Table 2		
Technology Access in Massachusetts School Districts: The Digital Divide	Fall 1997*	Fall 1999**
Average number of students per high speed "A" or "B" Computer*	Statewide average: 10.6	Statewide average: 7.4
In districts with lowest enrollment of low-income students	13.0	9.5
In districts with highest enrollment of low-income students	22.5	8.5
Number of students per any computer type	Statewide average: 5.9	Statewide average: 5.1
In districts with lowest enrollment of low-income students	7.8	5.8
In districts with highest enrollment of low-income students	11.0	5.3
Percentage of classrooms with access to the Internet	Statewide average: 51%	Statewide average: 69.2%
In districts with lowest enrollment of low-income students	Data not available	78.7%
In districts with highest enrollment of low-income students	Data not available	70.6%
Percentage of classrooms with access to a Local Area network (LAN)	Statewide average: 54%	Statewide average: 68.5%
In districts with lowest enrollment of low-income students	Data not available	76.5%
In districts with highest enrollment of low-income students	Data not available	69.3%
<p>*This comparison of student-to-computer ratios was reported in <i>Educational Technology in Massachusetts Schools, 1997</i>. Comparisons are given for the top and bottom 20% of the districts in terms of low-income enrollment (defined as those eligible for the federal free and reduced lunch program).</p> <p>**Similarly, the 20% of districts with the lowest enrollment of low-income students and the 20% of districts with the highest enrollment of low-income students is based on eligibility for the free and reduced lunch program. Averages are culled from the data reported by districts in either the June 1999 or October 1999 online update.</p>		

Equal Access for Students with Special Needs

In a model inclusion classroom, students with and without special needs work side by side with teachers who understand that every child must have equal access to the curriculum. Because disabilities are so diverse, schools must offer a broad array of adaptive devices and software for these children, each of whom may have a unique set of special needs. A visually-impaired child might need a braille keyboard and a word processing program with spoken text. A speech synthesizer within a specialized word processing program can enable a student with autism to communicate. A child with limited mobility might be helped with something as simple as a touch screen, a keyboard overlay, or an easily manipulated switch instead of a mouse.

The online updates of the Tech Plan Survey gathered data on the availability of assistive technologies for students with disabilities. Table 3 shows the percentages of districts reporting the availability of certain technologies. To address the need for assistive technologies in schools across the state, the Assistive Technologies program was added to the TLCF grants in 1999.

Table 3 Percentage of schools reporting the availability of the following assistive technologies for students with disabilities	1999
Alternative input methods for computer use (e.g. modifications to standard keyboards, touch screens, microphones, switches)	8.4%
Alternative output methods for computer use (e.g. speech synthesizers, large print output, refreshable Braille or text-to-speech)	6.8%
Universally designed software (designed with built-in alternatives for students with disabilities)	9.3%
Closed caption for video	4.2%

Universal Design Ensures Access for All

The Boston Public Schools maintains 800 substantially separate special education classrooms with approximately 1,600 special needs students. With a TLCF grant received during the 1998-1999 school year, Boston provided assistive technology training to teachers during the summer. At these training sessions, teachers learned to apply the principles of "Universal Design" to their instructional strategies and curriculum development. Universal Design applies a broad range of low-tech to high-tech tools that support a diversity of learning styles. Participants at these workshops learned to identify appropriate technologies for each student. Text-to-speech programs, graphic organizers, and word prediction software were among the applications they learned to incorporate into their teaching. They also learned to use alternative communication devices, keyboard overlays, and curriculum resources on the Internet that utilize assistive technologies. The Universal Design concept is now an important feature of new and continuing programs at the Department of Education.

2. Supporting Teachers with Ongoing Technology Training and Professional Development

Having access to the latest hardware doesn't always result in students using it effectively, or indeed at all, unless another essential component is in place. Teachers' skill with technology is widely recognized as a key factor in ensuring that this investment will have an impact on learning. However, simply training educators in the use of an Internet browser, for example, is no guarantee that they will start assigning Web-based educational projects to students.

Curriculum Integration

Quality professional development in technology goes beyond increasing fluency with the basic applications such as word processing, databases or presentation software. Once they have gained the skills, teachers need help applying technologies to the learning standards of the curriculum frameworks. For example, middle school math teachers might join together to learn how technology can help low-performing students understand algebraic concepts, enabling them to perform better on the MCAS. If teachers see an immediate benefit to their students, they are more likely to bring the enabling technology into their classrooms.

Research supports the idea that technology training should be tailored to the curriculum. Education Week's 1999 National Survey of Teachers' Use of Digital Content compared two types of training: "curriculum integration" and "basic technology skills" training. The survey found that curriculum integration training had a greater effect on teachers' sense of preparedness than basic skills training. Teachers who had both kinds of training reported feeling the most prepared.⁽⁹⁾

Aligning Local Curriculum with the State Frameworks

When teachers and curriculum directors develop their local curriculum guidelines, they need to correlate lesson planning with the state standards and MCAS requirements. To assist educators, the Department of Education will provide an online curriculum resource to help teachers locate technology-enriched lesson plans that fulfill the requirements of the state frameworks and MCAS standards. CLASP, or the Curriculum Library Alignment and Sharing Project, grew out of a curriculum database developed by the North Andover school system, partly under a Lighthouse Grant. This database is expected to grow into a statewide curriculum library through which teachers can share their best lesson plan ideas and receive feedback. The initiative is part of VES (Virtual Education Space), the state's coordinated effort to provide a set of online applications to educators, students, and parents. Through any standard browser, educators will easily access digital resources that will enable them to implement the standards-based curriculum for higher student achievement.

In their professional development training schedules, Massachusetts school districts are providing a stronger focus on curriculum as seen in recent data. Almost a third of district staff who received professional development had concentrated their learning on integrating technology into the curriculum. This represents a 21% increase over the previous year. Table 4 shows the percentages of district staff who received training that was focused on several areas.

Table 4 Percentage of District Staff Receiving Technology Training in Three Areas of Focus	Personal and Professional Use*	Integration into the Curriculum **	Computers and Network Operations***	Other Technology Training
1998	32%	26.5%	13.2%	4.5%
1999	34.3%	32.1%	14.2%	4.8%

***Personal and Professional Use** – training in the use of tools for personal productivity, presentations, telecommunications, creativity technologies, assistive technologies, as well as tools for research and data manipulation. This area also includes training in legal and ethical issues.

****Integration into the Curriculum** – training focused on one or more of the subject areas of the Frameworks (English Language Arts, Mathematics, Science and Technology, History and Social Science, Foreign Languages, Arts and Health). Activities in this area also might include other issues of classroom practice, such as electronic portfolio assessment and pedagogical approaches.

*** **Computers and Network Operations** -- training in computer basics, networks, and multimedia tools.

Technology Support that is Embedded in Teaching Activities

The Department of Education supports professional development activities aimed at integrating technology with the curriculum standards. The most cost-effective and sustainable models are on-site programs that offer continuous support from mentors and teacher leaders during the school day. Teachers who are beginning to use technology in the curriculum benefit through collaboration with an Instructional Technology Specialist or Library Media Specialist. Together they might engage in team teaching in the classroom.

Teachers become proficient more quickly if technology professional development is embedded in everyday teaching activities. For example, when Project MEET trains a school-based team of teachers, one team member

is designated as a Technology Professional Development (TPD) specialist who commits 50% of his or her time to supporting fellow teachers in the school and district. Professional development programs such as Project MEET also address pedagogical strategies that strengthen learning.

District Spending on Technology Training up 36%

During the 1998-1999 school year, districts spent on average \$188 per staff person for technology professional development, up 36% from the previous year. Districts reported that 60.8% of staff (including administrators, support staff and teachers) participated in technology professional development sponsored by the districts. This was a 14% increase over the figures reported for the previous school year. For those who received technology professional development, an average of 13.5 hours of training was provided, a 2% increase over the previous year. Table 5 shows the hours of training provided in each area.

Table 5 Average number of staff hours per district of technology training provided in different areas of focus	Persona and Professional Use*	Integration into the Curriculum**	Computers and Network Operations***	Other Technology Training
1998	6.9	8.1	7.3	9.8
1999	7.0	9.1	17.3	7.8

*Personal and Professional Use – training in the use of tools for personal productivity, presentations, telecommunications, creativity technologies, assistive technologies, as well as tools for research and data manipulation. This area also includes training in legal and ethical issues.
 **Integration into the Curriculum – training focused on one or more of the subject areas of the Frameworks (English Language Arts, Mathematics, Science and Technology, History and Social Science, Foreign Languages, Arts and Health). Activities in this area also might include other issues of classroom practice, such as electronic portfolio assessment and pedagogical approaches.
 *** Computers and Network Operations -- training in computer basics, networks, and multimedia tools.

“Within our own school several teachers began to model our project. Four second grade classes conducted research on endangered species and created a KidPix slideshow.”

(1998-1999 Lighthouse grant recipient)

3. Meeting the Challenge of Technical Support

When a printer won't work, who is expected to fix it? When a virus is downloaded from the Internet or a computer crashes repeatedly, who is close by with the technical knowledge to keep the machines running?

In the 1999 Milken survey of district technology coordinators, 11.3% of the Massachusetts respondents said that classroom teachers "frequently" provide technical support or maintenance. In addition, 21.6% reported that the library media teacher was "frequently" called in, while 29.6% reported that other school staff with additional responsibilities were often used.⁽¹⁰⁾ Aside from the frustrations of coping with computer downtime in the classroom, teachers who provide this level of support are being pulled away from their primary responsibility, educating students.

In June 1999, the Massachusetts Department of Education's District Technology Plan survey gathered information on the number of technology specialists (based on a full-time equivalent) in a variety of areas. As shown in Table 6, the numbers reported were small, on average, suggesting inadequate support in many districts. More striking is that the numbers of technical support staff did not increase significantly over those reported in 1998. When schools install networks and upgrade hardware and software, as many have done in the past year, they face more complex issues which require increased support.

Table 6	
Average Number of Technology Specialists (FTE) per District in Massachusetts, by Function	1999
Leadership (assistant superintendent, technology director, etc.)	1.3
Curriculum Specialist (library/media specialist, technology specialist, etc.)	4.9
Curriculum Support (aides, tutors, etc.)	7.5
Application Developer/Programmer	0.2
Data Manager/Operator	0.7
Network/System Manager Coordinator	0.6
Network/Technical Support: Maintenance and Repair Specialist	0.9

Many schools take the burden off their staff by using outside resources to support technology. Table 7 shows the percentages of districts reporting that they provide technical support through contracted services and other means (such as volunteers).

Table 7		
Percentage of School Districts Obtaining Technology Support Services from Outside Sources	Contracted	Other (voluntary, etc.)
Leadership (assistant superintendent, technology director, etc.)	26%	15%
Curriculum Specialist (library/media specialist, technology specialist, etc.)	30%	15%
Curriculum Support (aides, tutors, etc.)	23%	22%
Application Developer/Programmer	20%	5%
Data Manager/Operator	20%	5%
Network/System Manager Coordinator	38%	17%
Network/Technical Support: Maintenance and Repair Specialist	51%	24%

A 1999 report by the Consortium for School Networking compares technical support in various settings. In a business environment, “a full-time computer support person is generally required for every 50 to 75 computer users.” Compare this with the education world where levels of support are much lower, typically one person for every 500 computer users.⁽¹¹⁾

The result is a lot of downtime in our schools. In the Milken Survey of Technology in the Schools, Massachusetts respondents reported that when technology at schools breaks down, it typically takes 42.3 hours to fix the problem.⁽¹²⁾ In business, a computer is usually repaired or replaced within a few hours, for the simple reason that the worker will be unproductive without it.⁽¹³⁾

Many forward-thinking schools are beginning to tap the potential of an important resource for tech support -- their own students. Students are often eager to gain technical skills and to take on the responsibility for the computers at their schools. Programs that both empower students to be technology leaders in their schools and communities, while at the same time boosting their academic achievement and MCAS scores, have far-reaching benefits for both students and their schools. Besides providing schools with the tech support they need, students gain experience that will help them in the job market and college. One such model is Youth Tech Entrepreneurs (YTE), a Department of Education program piloted in Malden High School in 1998. The program has expanded and now includes four districts (Malden, Medford, Waltham, and Concord-Carlisle).

Recognizing the potential of this resource, YTE and Mass Networks Education Partnership (MNEP) founded the Students as Technology Leaders (SaTL) program with support from the state Department of Education. Over the past year more than 70 teachers, community leaders, and industry representatives have joined together to explore a variety of different approaches. This effort is evolving into a statewide SaTL association with the mission of supporting the creation of programs that provide technical training to young people.

Hardware and software snags are inevitable. When they occur, even the most competent and best trained teachers need technical assistance. The importance of having that support on hand, on a "just-in-time" basis, so that teachers can devote their time to teaching, cannot be overemphasized. Schools are struggling to find innovative ways to maintain their equipment as "ready-to-use" learning tools. They need help building and running their networks, dealing with ISP issues, installing hardware and software, and upgrading equipment. Just as businesses provide their trained staff with expert technology support, schools need to ensure that teachers and students have help when they need it.

Youth Tech Entrepreneurs (YTE)

Youth Tech Entrepreneurs (YTE) is a rigorous training program that prepares high school students as technology leaders in their schools and communities. Through YTE, students gain valuable computer skills and real-world business experience. In return, they provide cost-effective computer services to their schools, businesses, and community organizations.

(Visit YTE's student-created website at <http://www.yte.org>.)

Students as Technical Support Experts

By the year 2001, the city of Boston expects to have one computer for every four students and one computer for every teacher. Each classroom will be networked, technology tools will be integrated into all areas of the curriculum, and all classrooms will have a variety of multimedia equipment. This ambitious goal is part of a city-wide education reform initiative which has been underway for more than three years. By June of 1999 the city had installed over 10,000 new computers, all loaded with software. In three years the student-to-computer ratio has fallen from 63-to-1 to 7-to-1.

This infusion of technology has brought with it a new challenge: how to provide adequate technical support. Through a program known as TechBoston, students with strong interests in technology have become a major source for that needed support. With funding from a Statewide Impact Grant, students received training in courses ranging from computer repair and networking to systems operation. Once they gain the necessary skills, they will be hired to provide technical support for their schools and other schools in the district.

School districts in Massachusetts have come a long way in developing and implementing their local technology plans. Schools are being wired for Internet access and computers are being upgraded. Teachers are gaining fluency through increasing hours of technology professional development. Such progress shows a deep commitment at every level to bringing the power of the information age to education.

References:

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- (4) National Center for Education Statistics. 1999. "Internet access in public and private schools." U.S. Department of Education, Office of Educational Research and Improvement. NCES 1999-005.
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- (12) Milken Exchange on Education Technology. 1999. Survey of Technology in the Schools. Milken Family Foundation, Santa Monica, California. Questions 25-26. <http://www.mff.org>.
- (13) Consortium for School Networking. 1999. "Taking TCO to the Classroom: A School Administrator's Guide to Planning for the Total Cost of New Technology." Source: <http://www.cosn.org/tco>

Technology Access in Massachusetts Schools Data from District Technology Profiles

School District	Students Per Computer Type*:		Percent of Classrooms with access to:		Last Updated:
	"A" or "B"	Any Type	LAN	Internet	
ABBY KELLEY FOSTER REG CH	14.0	14.0	100.0%	100.0%	June 1999
ABINGTON	10.8	10.1	50.4%	39.6%	October 1999
ACADEMY OF PACIFIC RIM CH	3.2	3.2	85.7%	85.7%	June 1999
ACTON	7.1	5.5	100.0%	100.0%	October 1999
ACTON-BOXBOROUGH	6.0	4.1	100.0%	100.0%	October 1999
ACUSHNET	2.8	2.6	100.0%	100.0%	October 1999
ADAMS-CESHIRE	11.8	7.4	84.8%	84.8%	June 1999
AGAWAM	9.2	6.6	9.0%	8.6%	October 1999
AMESBURY	5.5	5.5	42.3%	42.3%	October 1999
AMHERST	5.9	5.1	100.0%	100.0%	October 1999
AMHERST-PELHAM	5.8	5.3	100.0%	100.0%	October 1999
ANDOVER	5.3	4.8	100.0%	100.0%	October 1999
ARLINGTON	8.1	4.9	100.0%	100.0%	October 1999
ASHBURNHAM-WESTMINSTER	6.5	6.5	87.9%	87.9%	October 1999
ASHLAND	7.1	6.5	90.6%	90.6%	October 1999
ASSABET VALLEY	5.1	2.9	56.9%	56.9%	June 1999
ATHOL-ROYALSTON	6.2	5.7	40.0%	36.8%	October 1999
ATLANTIS CHARTER	9.3	9.3	0.0%	100.0%	Oct. 1998
ATTLEBORO	12.2	7.4	42.3%	24.6%	June 1999
AUBURN	7.7	6.2	38.3%	39.7%	October 1999
AVON	8.0	5.0	20.5%	13.6%	October 1999
AYER	6.7	3.5	100.0%	100.0%	October 1999
BARNSTABLE	8.4	5.0	100.0%	100.0%	October 1999
BEDFORD	4.6	4.3	100.0%	100.0%	October 1999
BELCHERTOWN	15.9	10.8	59.3%	31.4%	June 1999
BELLINGHAM	13.8	8.5	28.6%	66.0%	October 1999
BELMONT	11.0	9.2	68.6%	100.0%	October 1999
BENJAMIN BANNEKER CHARTER	3.7	3.7	100.0%	100.0%	October 1999
BENJAMIN FRANKLIN CHARTER	11.5	11.5	100.0%	100.0%	October 1999
BERKLEY	22.0	9.8	13.9%	5.6%	October 1999
BERKSHIRE HILLS	5.7	4.3	22.3%	22.3%	October 1999
BERLIN	4.8	4.8	100.0%	100.0%	October 1999
BERLIN-BOYLSTON	8.6	4.4	24.3%	24.3%	October 1999
BEVERLY	20.1	5.8	39.8%	37.0%	October 1999
BILLERICA	25.3	7.8	23.8%	23.8%	October 1999
BLACKSTONE VALLEY REG	3.3	2.8	94.3%	94.3%	October 1999
BLACKSTONE-MILLVILLE	5.8	5.5	100.0%	100.0%	October 1999
BLUE HILLS VOC	5.7	2.6	86.4%	100.0%	October 1999
BOSTON	7.1	4.8	40.7%	41.6%	June 1999
BOSTON RENAISSANCE CH SCH	0.0	8.9	100.0%	100.0%	June 1999

*Type "A" or "B" computers include those with Intel Pentium or Apple Power PC processors, their equivalent, or newer.

Technology Access in Massachusetts Schools Data from District Technology Profiles

School District	Students Per Computer Type*:		Percent of Classrooms with access to:		Last Updated:
	"A" or "B"	Any Type	LAN	Internet	
BOSTON UNIVERSITY CHARTER	1.8	1.8	14.3%	14.3%	October 1999
BOURNE	8.4	5.5	100.0%	100.0%	October 1999
BOXBOROUGH	6.5	5.7	100.0%	100.0%	June 1999
BOXFORD	5.2	4.0	100.0%	100.0%	October 1999
BOYLSTON	16.8	10.4	0.0%	0.0%	October 1999
BRAINTREE	6.1	3.9	45.0%	45.6%	October 1999
BREWSTER	6.9	5.1	47.9%	41.7%	October 1999
BRIDGEWATER-RAYNHAM	10.5	7.2	62.0%	62.4%	June 1999
BRIMFIELD	5.2	4.1	100.0%	100.0%	October 1999
BRISTOL COUNTY AGR	11.8	11.8	0.0%	100.0%	Oct. 1998
BRISTOL-PLYMOUTH VOC TECH	3.1	3.1	55.4%	55.4%	October 1999
BROCKTON	8.2	7.1	36.1%	7.1%	October 1999
BROOKFIELD	4.1	3.1	100.0%	100.0%	October 1999
BROOKLINE	7.7	4.4	70.3%	70.3%	June 1999
BURLINGTON	7.0	4.7	59.0%	57.0%	October 1999
CAMBRIDGE	6.2	4.1	96.7%	96.2%	October 1999
CANTON	3.8	2.8	88.4%	87.9%	October 1999
CAPE COD LIGHTHOUSE CHTR	7.5	4.4	92.9%	92.9%	June 1999
CAPE COD REGION VOC TECH	3.7	2.8	100.0%	100.0%	October 1999
CARLISLE	22.3	6.4	25%	100.0%	June 1999
CARVER	11.8	7.5	100.0%	100.0%	October 1999
CENTRAL BERKSHIRE	12.3	6.1	76.6%	64.7%	June 1999
CHATHAM	1.9	1.9	100.0%	100.0%	October 1999
CHELMSFORD	4.1	3.6	79.7%	79.7%	October 1999
CHELSEA	5.6	5.1	100.0%	100.0%	October 1999
CHESTERFIELD-GOSHEN	4.2	4.2	100.0%	100.0%	October 1999
CHICOPEE	8.9	6.8	98.2%	98.2%	October 1999
CITY ON A HILL CHTR	2.9	3.7	100.0%	100.0%	Oct. 1998
CLARKSBURG	17.8	5.8	100.0%	100.0%	October 1999
CLINTON	4.2	3.5	97.6%	98.4%	June 1999
COHASSET	7.0	4.5	86.9%	86.9%	October 1999
COMMUNITY DAY CHARTER SCH	6.8	3.3	100.0%	100.0%	June 1999
CONCORD	7.7	5.7	100.0%	100.0%	October 1999
CONCORD-CARLISLE	6.3	4.4	26.9%	100.0%	October 1999
CONWAY	32.3	5.9	100.0%	100.0%	October 1999
DANVERS	14.3	9.7	61.3%	61.3%	June 1999
DARTMOUTH	9.8	5.3	67.3%	85.5%	October 1999
DEDHAM	7.9	6.7	100.0%	100.0%	June 1999
DEERFIELD	8.4	5.4	100.0%	100.0%	October 1999
DENNIS-YARMOUTH	9.3	5.7	100.0%	100.0%	October 1999

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Technology Access in Massachusetts Schools Data from District Technology Profiles

School District	Students Per Computer Type*:		Percent of Classrooms with access to:		Last Updated:
	"A" or "B"	Any Type	LAN	Internet	
DIGHTON-REHOBOTH	5.7	3.9	79.9%	94.3%	October 1999
DOUGLAS	4.4	2.7	100.0%	100.0%	June 1999
DOVER	8.5	7.9	54.5%	54.5%	October 1999
DOVER-SHERBORN	7.8	3.9	100.0%	100.0%	October 1999
DRACUT	12.5	6.6	61.5%	100.0%	October 1999
DUDLEY-CHARLTON REG	14.5	8.4	40.9%	75.0%	October 1999
DUXBURY	7.4	4.4	100.0%	100.0%	October 1999
EAST BRIDGEWATER	5.6	4.1	100.0%	100.0%	October 1999
EAST LONGMEADOW	16.8	7.5	71.2%	71.2%	October 1999
EASTHAM	20.9	5.7	100.0%	100.0%	October 1999
EASTHAMPTON	5.8	4.8	41.5%	41.5%	October 1999
EASTON	9.5	7.3	76.0%	75.0%	October 1999
EDGARTOWN	3.7	3.1	100.0%	100.0%	October 1999
ERVING	2.7	2.1	100.0%	100.0%	October 1999
ESSEX	5.5	4.0	100.0%	100.0%	October 1999
ESSEX AGR TECH	9.7	4.4	58.8%	54.9%	October 1999
EVERETT	10.9	5.9	34.4%	31.1%	October 1999
FAIRHAVEN	6.9	5.5	100.0%	100.0%	June 1999
FALL RIVER	12.7	6.2	12.7%	9.3%	October 1999
FALMOUTH	16.3	8.0	49.5%	49.5%	October 1999
FARMINGTON RIVER REG	3.8	3.8	100.0%	100.0%	October 1999
FITCHBURG	29.1	12.1	80.6%	80.6%	June 1999
FLORIDA	6.8	1.9	30.0%	30.0%	October 1999
FOXBOROUGH	9.0	5.4	78.5%	78.5%	October 1999
FRAMINGHAM	11.5	6.2	65.3%	96.6%	October 1999
FRANCIS W. PARKER CHTR	5.6	5.8	100.0%	100.0%	Oct. 1998
FRANKLIN	6.8	5.1	98.4%	99.1%	October 1999
FRANKLIN COUNTY	4.4	1.9	100.0%	100.0%	October 1999
FREETOWN	15.7	10.6	36.7%	36.7%	October 1999
FREETOWN-LAKEVILLE	7.5	4.3	8.4%	3.2%	October 1999
FRONTIER	2.0	1.8	100.0%	100.0%	October 1999
GARDNER	8.9	5.6	61.7%	61.7%	October 1999
GATEWAY	7.4	5.9	7.1%	4.7%	October 1999
GEORGETOWN	4.0	3.7	100.0%	100.0%	October 1999
GILL-MONTAGUE	7.0	4.8	88.2%	88.2%	October 1999
GLOUCESTER	8.5	5.5	54.2%	53.4%	June 1999
GRAFTON	16.3	7.3	46.9%	45.6%	October 1999
GRANBY	11.5	8.2	100.0%	100.0%	October 1999
GRANVILLE	18.7	7.1	100.0%	100.0%	October 1999
GREATER FALL RIVER	3.1	2.8	57.0%	57.0%	October 1999

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Technology Access in Massachusetts Schools Data from District Technology Profiles

School District	Students Per Computer Type*:		Percent of Classrooms with access to:		Last Updated:
	"A" or "B"	Any Type	LAN	Internet	
GREATER LAWRENCE RVT	9.6	5.0	4.5%	4.5%	June 1999
GREATER LOWELL VOC TEC	3.9	3.3	100.0%	100.0%	October 1999
GREATER NEW BEDFORD	6.1	4.7	70.9%	72.7%	October 1999
GREENFIELD	11.1	6.3	79.9%	79.9%	June 1999
GROTON-DUNSTABLE	25.9	5.3	54.0%	67.9%	October 1999
HADLEY	19.5	10.5	100.0%	100.0%	June 1999
HALIFAX	15.7	11.0	100.0%	100.0%	June 1999
HAMILTON-WENHAM	6.1	3.9	80.6%	80.6%	October 1999
HAMPDEN-WILBRAHAM	8.1	6.1	92.0%	100.0%	October 1999
HAMPSHIRE	5.2	3.3	100.0%	100.0%	October 1999
HANCOCK	2.8	2.3	50.0%	50.0%	October 1999
HANOVER	4.9	3.8	100.0%	100.0%	October 1999
HARVARD	9.5	5.9	5.6%	29.2%	June 1999
HARWICH	7.6	4.9	79.0%	80.0%	October 1999
HATFIELD	4.5	4.3	100.0%	100.0%	October 1999
HAVERHILL	11.6	5.6	31.2%	31.4%	October 1999
HAWLEMONT	6.9	4.8	77.8%	77.8%	October 1999
HEALTH CAREERS ACAD HMCS	5.7	5.7	12%	12%	October 1999
HILLTOWN CHTR	0.0	23.1	0.0%	0.0%	June 1999
HINGHAM	11.0	8.1	62.6%	62.6%	October 1999
HOLBROOK	65.2	3.9	100.0%	100.0%	October 1999
HOLLAND	9.5	6.0	100.0%	100.0%	October 1999
HOLLISTON	4.7	4.4	68.3%	68.3%	October 1999
HOLYOKE	9.1	5.4	99.3%	99.2%	October 1999
HOPEDALE	12.5	7.5	85.1%	85.1%	October 1999
HOPKINTON	7.1	4.6	100.0%	81.0%	June 1999
HUDSON	15.1	6.2	76.6%	76.6%	June 1999
HULL	9.3	6.8	76.0%	77.3%	October 1999
IPSWICH	6.9	3.7	100.0%	78.3%	October 1999
KING PHILIP	6.3	3.7	100.0%	100.0%	October 1999
KINGSTON	7.8	7.3	96.8%	96.8%	June 1999
LAKEVILLE	19.4	10.9	36.1%	36.1%	October 1999
LANESBOROUGH	6.9	4.6	100.0%	100.0%	October 1999
LAWRENCE	5.3	3.2	4.6%	83.9%	October 1999
LAWRENCE FAMILY DEV CHTR	170.5	74.9	100.0%	100.0%	June 1999
LEE	8.2	6.3	100.0%	100.0%	October 1999
LEICESTER	8.3	7.6	100.0%	100.0%	June 1999
LENOX	5.0	4.6	100.0%	100.0%	October 1999
LEOMINSTER	10.2	8.3	4.1%	10.1%	October 1999
LEVERETT	6.3	4.1	85.7%	85.7%	October 1999

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Technology Access in Massachusetts Schools Data from District Technology Profiles

School District	Students Per Computer Type*:		Percent of Classrooms with access to:		Last Updated:
	"A" or "B"	Any Type	LAN	Internet	
LEXINGTON	6.5	3.9	100.0%	100.0%	October 1999
LINCOLN	3.9	6.8	100.0%	100.0%	Oct. 1998
LINCOLN-SUDBURY	7.1	3.7	7.2%	7.2%	October 1999
LITTLETON	5.2	4.1	48.1%	40.5%	October 1999
LONGMEADOW	13.2	7.1	95.4%	94.0%	June 1999
LOWELL	6.5	3.6	95.1%	94.9%	October 1999
LOWELL MIDDLESEX ACAD CH	3.1	3.1	16.7%	16.7%	October 1999
LUDLOW	18.5	8.5	15.9%	13.6%	October 1999
LUNENBURG	9.9	5.8	33.9%	72.3%	October 1999
LYNN	6.7	4.8	50.8%	50.9%	October 1999
LYNN COMMUNITY CHARTER	0.0	0.0	0.0%	0.0%	June 1999
LYNNFIELD	5.5	3.5	71.8%	71.8%	October 1999
MA ACADEMY MATH AND SCI	208.1	80.0	75.0%	75.0%	June 1999
MALDEN	15.4	11.0	5.6%	8.4%	June 1999
MANCHESTER	38.5	5.8	69.2%	53.8%	June 1999
MANSFIELD	12.6	6.5	85.7%	99.1%	October 1999
MARBLEHEAD	7.3	5.6	89.9%	89.9%	June 1999
MARBLEHEAD COMMUNITY CH	4.7	4.7	100.0%	100.0%	October 1999
MARION	13.4	5.4	7.1%	7.1%	October 1999
MARLBOROUGH	10.3	7.2	100.0%	100.0%	October 1999
MARSHFIELD	16.8	8.7	40.7%	40.7%	October 1999
MARTHAS VINEYARD	2.8	2.2	100.0%	100.0%	October 1999
MARTHAS VINEYARD CHARTER	5.2	3.4	100.0%	100.0%	October 1999
MASCONOMET	8.8	7.2	20.6%	20.6%	October 1999
MASHPEE	4.2	3.7	100.0%	85.9%	June 1999
MATTAPOISETT	7.8	4.2	100.0%	100.0%	October 1999
MAYNARD	9.2	4.4	100.0%	100.0%	October 1999
MEDFIELD	15.2	8.2	100.0%	100.0%	June 1999
MEDFORD	15.5	5.8	44.8%	44.8%	October 1999
MEDWAY	6.2	5.4	59.5%	74.1%	October 1999
MELROSE	14.8	7.5	51.7%	51.7%	October 1999
MENDON-UPTON	4.7	3.8	96.6%	96.6%	October 1999
METHUEN	4.2	3.7	82.3%	82.3%	October 1999
MIDDLEBOROUGH	4.8	4.1	86.0%	86.0%	June 1999
MIDDLETON	11.3	5.8	46.7%	100.0%	October 1999
MILFORD	8.6	7.1	71.5%	70.3%	October 1999
MILLBURY	8.4	6.8	43.0%	43.0%	October 1999
MILLIS	6.2	3.3	100.0%	100.0%	October 1999
MILTON	14.2	9.5	9.0%	71.7%	October 1999
MINUTEMAN VOC TECH	3.3	1.7	94.1%	71.8%	June 1999

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Technology Access in Massachusetts Schools Data from District Technology Profiles

School District	Students Per Computer Type*:		Percent of Classrooms with access to:		Last Updated:
	"A" or "B"	Any Type	LAN	Internet	
MOHAWK TRAIL	9.2	4.8	83.1%	83.1%	October 1999
MONSON	12.1	3.7	90.5%	90.5%	October 1999
MONTACHUSETT VOC TECH REG	2.0	2.0	100.0%	100.0%	October 1999
MOUNT GREYLOCK	5.5	4.8	100.0%	100.0%	October 1999
MYSTIC VALLEY ADV REG CH	7.0	7.0	100.0%	100.0%	October 1999
NAHANT	19.5	7.2	100.0%	100.0%	June 1999
NANTUCKET	7.7	3.9	100.0%	0.0%	October 1999
NARRAGANSETT	5.4	4.3	79.8%	76.1%	October 1999
NASHOBA	12.1	5.8	88.6%	64.9%	June 1999
NASHOBA VALLEY TECH	6.5	2.8	100.0%	100.0%	October 1999
NATICK	7.9	4.5	57.8%	61.2%	October 1999
NAUSET	6.3	3.8	85.7%	85.7%	October 1999
NEEDHAM	7.4	5.7	100.0%	100.0%	October 1999
NEIGHBORHOOD HOUSE CHART	6.5	5.5	90.9%	90.9%	June 1999
NEW BEDFORD	8.6	5.7	31.2%	31.2%	October 1999
NEW SALEM-WENDELL	33.7	10.1	100.0%	100.0%	October 1999
NEWBURYPORT	14.3	6.4	75.6%	75.6%	October 1999
NEWTON	11.9	6.9	46.3%	50.7%	October 1999
NORFOLK	8.6	3.8	100.0%	100.0%	October 1999
NORFOLK COUNTY AGR	11.2	8.0	5.4%	13.5%	June 1999
NORTH ADAMS	17.1	8.0	61.5%	61.5%	October 1999
NORTH ANDOVER	5.0	3.3	100.0%	100.0%	October 1999
NORTH ATTLEBOROUGH	5.2	4.3	18.4%	46.9%	October 1999
NORTH BROOKFIELD	3.4	3.4	100.0%	100.0%	October 1999
NORTH MIDDLESEX	10.3	7.0	86.7%	86.7%	October 1999
NORTH READING	13.4	7.1	42.1%	40.7%	October 1999
NORTH SHORE REG VOC	2.6	2.3	100%	100%	October 1999
NORTH STAR ACAD CHTR	5.4	5.4	100.0%	100.0%	Oct. 1998
NORTHAMPTON	11.6	5.6	39.3%	40.3%	October 1999
NORTHAMPTON-SMITH	5.2	2.4	3.8%	5.8%	October 1999
NORTHBORO-SOUTHBORO	13.7	5.0	100.0%	100.0%	June 1999
NORTHBOROUGH	7.1	6.2	100.0%	100.0%	June 1999
NORTHBRIDGE	8.1	4.6	52.4%	69.2%	October 1999
NORTHEAST METRO VOC	4.5	3.9	8.1%	5.4%	October 1999
NORTHERN BERKSHIRE VOC	1.8	1.8	100.0%	100.0%	October 1999
NORTON	6.1	4.1	100.0%	100.0%	October 1999
NORWELL	12.0	6.8	76.5%	76.5%	October 1999
NORWOOD	5.9	5.5	100.0%	100.0%	October 1999
OAK BLUFFS	3.9	3.1	100.0%	100.0%	October 1999
OLD COLONY REG VOC TECH	3.8	2.7	100.0%	84.1%	October 1999

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Technology Access in Massachusetts Schools Data from District Technology Profiles

School District	Students Per Computer Type*:		Percent of Classrooms with access to:		Last Updated:
	"A" or "B"	Any Type	LAN	Internet	
OLD ROCHESTER	8.5	4.9	8.1%	6.5%	October 1999
ORANGE	6.3	3.6	100.0%	100.0%	October 1999
ORLEANS	7.7	3.3	100.0%	100.0%	October 1999
OXFORD	20.4	10.9	100.0%	100.0%	October 1999
PALMER	5.9	5.6	100.0%	99.3%	October 1999
PATHFINDER VOC TECH	3.4	3.4	100.0%	100.0%	October 1999
PEABODY	9.7	7.4	45.9%	45.9%	October 1999
PELHAM	7.9	6.8	57.1%	57.1%	October 1999
PEMBROKE	9.1	6.9	98.0%	98.0%	June 1999
PENTUCKET	7.7	4.8	100.0%	100.0%	October 1999
PETERSHAM	5.7	4.1	100.0%	0.0%	October 1999
PIONEER VALLEY	10.1	6.1	51.4%	50.0%	October 1999
PIONEER VALLEY PERF ARTS	209.9	154.6	33.3%	60.0%	June 1999
PITTSFIELD	7.7	5.9	90.1%	90.1%	October 1999
PLAINVILLE	9.8	7.8	7.5%	2.5%	October 1999
PLYMOUTH	3.7	2.7	98.0%	97.9%	October 1999
PLYMPTON	7.1	6.3	100.0%	100.0%	June 1999
PROVINCETOWN	212.2	116.7	69.2%	69.2%	June 1999
QUABBIN	16.7	9.4	51.5%	48.5%	June 1999
QUABOAG REGIONAL	25.9	4.1	70.3%	70.3%	October 1999
QUINCY	17.3	7.6	100.0%	100.0%	October 1999
RALPH C MAHAR	7.6	4.3	73.5%	91.8%	October 1999
RANDOLPH	6.9	5.3	100.0%	100.0%	October 1999
READING	7.1	6.3	93.1%	93.1%	October 1999
REVERE	4.3	3.2	100.0%	100.0%	October 1999
RICHMOND	6.1	3.8	31.6%	31.6%	October 1999
ROCHESTER	5.8	3.8	100.0%	100.0%	October 1999
ROCKLAND	10.2	6.5	100.0%	100.0%	October 1999
ROCKPORT	7.0	4.8	97.6%	97.6%	October 1999
ROWE	2.4	1.4	100.0%	100.0%	October 1999
S.BOSTON HARBOR ACAD CH	15.0	15.0	100.0%	100.0%	October 1999
SABIS INTERNATIONAL CHARTER	7.8	7.7	6.3%	3.1%	October 1999
SALEM	6.9	3.7	28.3%	27.8%	October 1999
SANDWICH	21.9	10.9	55.2%	55.2%	October 1999
SAUGUS	14.1	5.4	47.7%	9.4%	June 1999
SAVOY	7.4	6.6	80.0%	80.0%	October 1999
SCITUATE	8.3	7.2	100.0%	100.0%	October 1999
SEEKONK	4.8	3.4	100.0%	100.0%	October 1999
SEVEN HILLS CHARTER SCH	1.4	1.2	100.0%	100.0%	October 1999
SHARON	8.8	5.5	100.0%	100.0%	October 1999

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SHAWSHEEN VALLEY VOC TECH	3.0	2.1	100.0%	100.0%	October 1999
SHERBORN	6.1	4.6	100.0%	100.0%	October 1999
SHIRLEY	11.0	7.3	74.4%	74.4%	June 1999
SHREWSBURY	6.1	4.5	99.2%	99.2%	October 1999
SHUTESBURY	9.6	6.3	100.0%	100.0%	October 1999
SILVER LAKE	6.2	4.9	100.0%	100.0%	June 1999
SO MIDDLESEX VOC TECH REG	2.4	2.4	51.0%	51.0%	October 1999
SOMERSET	4.0	3.7	100.0%	100.0%	October 1999
SOMERVILLE	6.5	6.0	36.9%	22.5%	October 1999
SOMERVILLE CHARTER SCH	15.6	15.6	4.0%	4.0%	October 1999
SOUTH HADLEY	16.5	7.5	75.2%	68.1%	June 1999
SOUTH SHORE CHARTER SCH	3.9	6.6	96%	96%	Oct. 1998
SOUTH SHORE REG VOC TECH	5.3	2.2	28.6%	71.4%	June 1999
SOUTHAMPTON	41.7	9.9	100.0%	100.0%	October 1999
SOUTHBOROUGH	6.0	4.0	71.2%	71.2%	June 1999
SOUTHBRIDGE	6.8	4.1	96.9%	100.0%	October 1999
SOUTHEASTERN REG VOC TECH	3.7	5.3	8.0%	8.0%	Oct. 1998
SOUTHERN BERKSHIRE	4.0	2.2	97.4%	100%	October 1999
SOUTHERN WORCESTER CTY VT	4.3	3.8	53.3%	53.3%	October 1999
SOUTHWICK-TOLLAND	16.7	7.5	100.0%	100.0%	October 1999
SPENCER-E BROOKFIELD	6.8	4.0	48.3%	55.2%	October 1999
SPRINGFIELD	6.2	4.9	38.6%	36.8%	October 1999
STONEHAM	12.4	7.4	60.6%	59.9%	October 1999
STOUGHTON	2.9	2.7	100.0%	100.0%	October 1999
STURBRIDGE	11.0	6.8	100.0%	100.0%	October 1999
SUDBURY	4.9	3.8	72.6%	72.0%	October 1999
SUNDERLAND	7.8	5.6	100.0%	100.0%	October 1999
SUTTON	3.5	3.1	100.0%	100.0%	October 1999
SWAMPSCOTT	7.3	5.7	18.7%	0.0%	October 1999
SWANSEA	12.3	6.4	40.1%	19.7%	October 1999
TANTASQUA	7.4	5.1	93.3%	93.3%	October 1999
TAUNTON	3.9	3.2	99.2%	98.2%	October 1999
TEWKSBURY	8.9	5.8	45.8%	45.8%	October 1999
TISBURY	4.8	3.5	100.0%	100.0%	October 1999
TOPSFIELD	4.3	4.3	5.0%	10.0%	October 1999
TRI COUNTY	2.7	2.5	100.0%	100.0%	October 1999
TRITON	14.6	7.4	57.6%	54.5%	October 1999
TRURO	6.4	3.0	100.0%	100.0%	October 1999
TYNGSBOROUGH	10.2	4.8	70.6%	69.7%	October 1999
UP-ISLAND REGIONAL	3.4	2.7	100.0%	100.0%	October 1999

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School District	Students Per Computer Type*:		Percent of Classrooms with access to:		Last Updated:
	"A" or "B"	Any Type	LAN	Internet	
UPPER CAPE COD VOC TECH	3.9	3.1	100.0%	100.0%	October 1999
UXBRIDGE	11.7	9.3	4.7%	53.9%	October 1999
WACHUSETT	4.1	3.4	100.0%	99.1%	October 1999
WAKEFIELD	14.5	5.8	42.6%	38.3%	October 1999
WALES	17.7	9.6	100.0%	100.0%	October 1999
WALPOLE	8.9	5.8	58.3%	59.6%	October 1999
WALTHAM	17.6	7.4	63.5%	63.5%	October 1999
WARE	4.4	3.9	68.1%	68.1%	October 1999
WAREHAM	6.1	3.4	100.0%	100.0%	October 1999
WATERTOWN	7.2	4.9	100.0%	100.0%	October 1999
WAYLAND	9.0	5.3	100.0%	100.0%	October 1999
WEBSTER	23.6	6.9	4.9%	5.6%	June 1999
WELLESLEY	5.3	4.0	100.0%	100.0%	October 1999
WELLFLEET	6.1	5.4	4.8%	14.3%	October 1999
WEST BOYLSTON	6.5	5.3	100.0%	100.0%	October 1999
WEST BRIDGEWATER	8.7	13.3	2.0%	0.0%	Oct. 1998
WEST SPRINGFIELD	10.0	5.5	24.2%	25.0%	June 1999
WESTBOROUGH	6.4	5.2	100.0%	100.0%	October 1999
WESTFIELD	5.4	4.8	92.8%	97.4%	October 1999
WESTFORD	14.1	6.4	100.0%	100.0%	June 1999
WESTHAMPTON	9.3	7.6	100.0%	100.0%	October 1999
WESTON	3.6	2.7	88.6%	88.6%	June 1999
WESTPORT	7.0	4.3	35.8%	35.8%	October 1999
WESTWOOD	10.3	6.2	75.8%	69.2%	October 1999
WEYMOUTH	15.2	7.7	55.0%	47.5%	October 1999
WHATELY	6.5	3.7	100.0%	100.0%	October 1999
WHITMAN-HANSON	4.7	3.9	91.7%	92.4%	October 1999
WHITTIER VOC	6.3	3.5	100.0%	100.0%	October 1999
WILLIAMSBURG	4.6	3.7	100.0%	100.0%	October 1999
WILLIAMSTOWN	7.6	4.7	100.0%	100.0%	October 1999
WILMINGTON	15.8	9.0	60.6%	60.6%	June 1999
WINCHENDON	9.8	5.9	45.0%	100.0%	October 1999
WINCHESTER	14.5	8.2	63.8%	63.8%	October 1999
WINTHROP	14.0	10.8	42.6%	42.6%	June 1999
WOBURN	21.7	11.0	9.7%	9.7%	October 1999
WORCESTER	5.2	4.2	83.2%	83.2%	October 1999
WRENTHAM	2.9	2.6	100.0%	100.0%	October 1999
STATE AVERAGES	7.4	5.1	68.5%	69.2%	

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