

Massachusetts



Department of
Education

Technology in Massachusetts Schools *2002-2003*

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Contents

Introduction.....	1
Planning and Goals.....	2
Clarifying Goals for Technology	2
Guidelines for Planning.....	2
Teaching and Learning	4
Use of Technology	4
Curriculum Integration Support	4
Technology Literacy	6
Distance Learning	6
Grant Funding for Technology.....	6
Technology Tools Provided by the State	7
Educator Preparation and Development.....	8
Professional Development.....	8
Content of Training	8
Assessing Professional Development Needs.....	9
Funding Professional Development	10
Infrastructure for Technology.....	11
Computers	11
Other Technologies	12
Assistive Technologies and Universal Design	12
Connectivity	13
Access Outside the School Day.....	14
Administration and Support Services.....	16
Technical Support	16
Budget Allocated for Technology	17
Conclusion	19
Appendix A – District Statistics	20
Appendix B – Local Technology Plan Guidelines	31
Appendix C – Technology Enhancement Grants Annual Report.....	35
Appendix D – Model Technology Integration Grants Final Report.....	38

Introduction

No Child Left Behind established the Enhancing Education Through Technology Act of 2001 “to improve student academic achievement through the use of technology in elementary and secondary schools.” The Massachusetts Department of Education has supported schools in their efforts to achieve this goal by focusing on the Board of Education’s priority of “creating conditions for effective schools.” Specifically, the Department has encouraged schools to implement a set of technology guidelines created in 2000. Referred to as the *Local Technology Plan Benchmark Standards for the Year 2003*,¹ this document described conditions that stakeholders believed would maximize the impact of technology on learning.

An analysis of the technology data submitted to the Department over the past three years reveals that Massachusetts schools have made substantial progress in some areas. As this report will show, approximately two-thirds of the school districts met the benchmarks for computer access and Internet connectivity, and nearly as many districts met the benchmark for professional development. On the other hand, many schools are struggling to provide staffing for technical support and curriculum integration, with half of the districts meeting the benchmarks in these areas.

This year, to help districts continue to gauge their progress in providing conditions that support the use of technology, the Department has collaborated with the state’s Educational Technology Advisory Council (ETAC) and technology specialists throughout the state to develop a new set of guidelines and goals for the year 2006². These guidelines are based on the *Massachusetts STaR (School Technology and Readiness) Chart*,³ which was developed last year by ETAC. The 2002-2003 data will serve as baseline data as we measure our progress as a state in achieving the conditions described in these guidelines.

It is important to keep in mind that the new guidelines are not ends in themselves but means to support the use of technology to improve teaching and learning. Without sufficient access to computers and support staff, teachers and students will be unable to meet the national technology goals of increasing student achievement through the use of technology, helping students become technologically literate, and ensuring that teachers are able to integrate technology into the curriculum.

¹ The *Local Technology Plan Benchmark Standards for the Year 2003* are available at <http://www.doe.mass.edu/edtech/standards/benchmrk.pdf> .

² See Appendix B.

³ The *Massachusetts STaR Chart* is available on the Massachusetts Educational Technology Advisory Council’s web page at <http://www.doe.mass.edu/boe/sac/edtech/star.html> .

Planning and Goals

No Child Left Behind and federal E-rate regulations require every school district to have a three- to five-year technology plan approved by the state in order to be eligible for technology grants and E-rate discounts. In addition, thoughtful planning helps ensure that the district makes the best use of its resources to improve teaching and learning.

In order to approve school districts' plans, the Massachusetts Department of Education asks districts to develop a long-range plan, which should be kept on file in the district, and to provide data annually to validate the implementation of the plan. This process, which is achieved using the Department's secure web portal, offers districts an opportunity to review their progress and adjust their goals and strategies, if necessary, so that they can best leverage technology to improve student achievement. Recently more than 95% of districts submitted data to validate their technology plans.

Clarifying Goals for Technology

Developing a technology plan can help a school district clarify its goals and focus its efforts so that its technology resources will meet the needs of students and teachers. The plan should focus on both long-term and short-term goals, all of which are aligned with the district's mission, its school improvement plan, the state's education goals, and the goals of No Child Left Behind. For each goal, there should be one or more implementation strategies to accomplish the goal. Evaluation should be an integral part of the planning process at every step along the way. As the plan is being developed, for example, the district should assess the needs of those who will use the technology. During the implementation of the plan, the district should evaluate how well it is working and how it can be improved for the future.

A comparison of some of the district technology goals submitted to the Department in 1999 and 2003 suggests that districts are making progress in identifying specific strategies that are likely to impact student learning. In past years, many districts had visions of what technology could do for them, while today more districts have clear strategies designed to make their vision a reality. For example, in 1999 one district stated that it would "use technology to maintain relevance to the larger world and to optimize the learning experience of all students." In 2003 that district planned to "provide training and support for continued writing across the curriculum at the middle and elementary levels, infusing technology through the use of graphic organizers." While it is important not to lose sight of the original vision, clear strategies that name specifics are more likely to lead to success.

Guidelines for Planning

For guidance in developing technology plans, districts can now begin to use the state's new *Local Technology Plan Guidelines for the School Year 2004-2005 through 2006-2007*⁴. These guidelines incorporate recommendations from the *Massachusetts STaR (School*

⁴ See Appendix B.

Technology and Readiness) Chart developed last year by the state's Educational Technology Advisory Council, along with input from technology leaders across the state.

The guidelines also incorporate the requirements set forth by the Federal-State Joint Board on Universal Service⁵, which is responsible for the E-rate discount program. According to this board, a technology plan must meet five requirements: (1) clear goals and a realistic strategy for using telecommunication and information technology to improve education; (2) a professional development strategy to ensure that staff know how to use these new technologies; (3) an assessment of the telecommunication services, hardware, software, and other services that will be needed; (4) a sufficient budget to acquire and support the non-discounted elements of the plan; (5) an evaluation process that enables the district to monitor progress toward the specified goals.

⁵ The Federal-State Joint Board on Universal Service (comprised of FCC Commissioners, State Utility Commissioners, and a consumer advocate representative) makes recommendations to implement certain provisions of the Telecommunication Act of 1996, including the Universal Service Program, or E-rate. This program provides discounts to assist most schools and libraries in the United States to obtain affordable telecommunications and Internet access. The program is administered by the Schools and Libraries Division (SLD) of the Universal Service Administrative Company (USAC). For more information, go to <http://www.sl.universalservice.org/>.

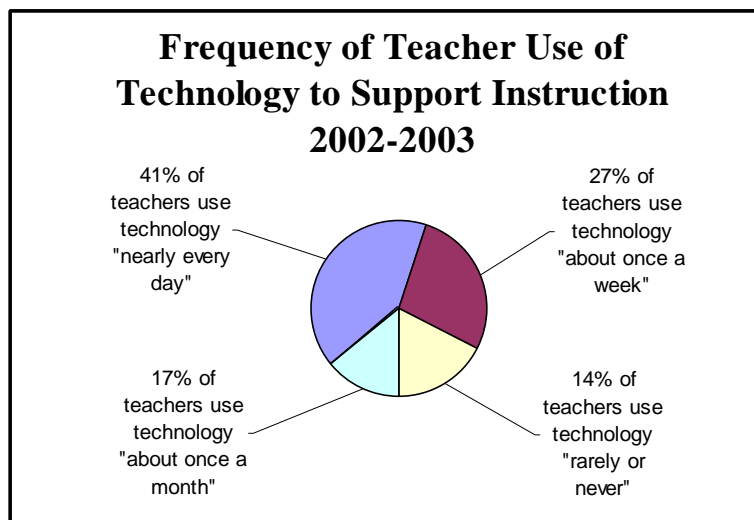
Teaching and Learning

Use of Technology

One of the focus areas in the Massachusetts STaR Chart is “patterns of teacher use,” which refers to the percentage of teachers using technology in their practice. According to the data submitted by districts, there has been an increase in teacher use of technology over the past year, with nearly three-quarters of teachers using technology in their instruction “about once a week” or more. The percentage of teachers using technology on a daily basis has increased from 41% to 43%, and the percentage of those using technology weekly has increased from 27% to 31%.

Although about half of the respondents said that their data came from informal observation alone, nearly half of them used two or three methods to assess teachers’ use of technology. These methods included surveying teachers, which more than one quarter of respondents did, as well as looking at equipment and computer lab sign-up sheets, monitoring server data, and gathering information from principals and curriculum specialists.

In the upcoming year, the Department will ask districts to collect additional data about teachers’ use of technology based on the new technology guidelines. The guidelines recommend that at least 85% of teachers use technology outside the classroom every day in areas such as lesson planning, administrative tasks, communications, and collaboration. The guidelines also recommend that at least 85% of teachers use technology each week with their students.



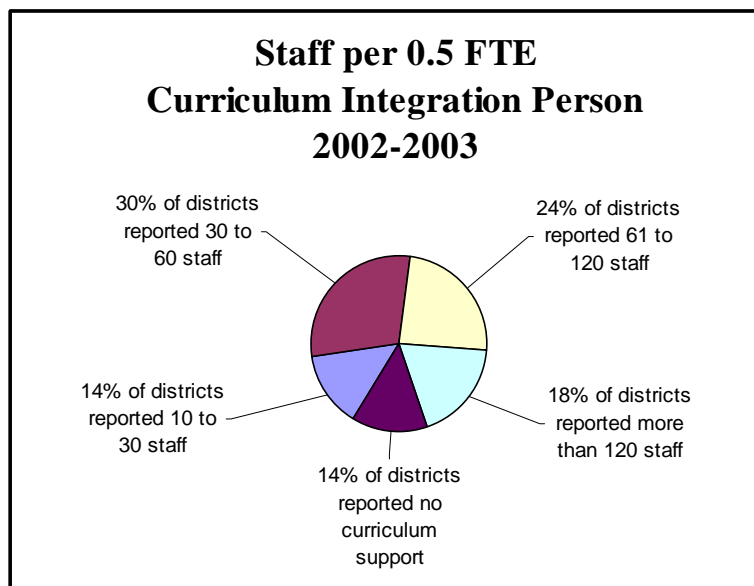
Curriculum Integration Support

To help teachers integrate technology into their teaching, the 2003 benchmark standards recommended that schools employ at least one half-time person to support up to 60 teachers. The person providing this support would probably be an instructional technology specialist, technology professional development specialist, media specialist,

or library teacher. This person's activities might include things like consulting with teachers, modeling effective teaching with technology, collaborating with teachers to develop technology-rich lessons, helping to locate appropriate technology resources, and providing workshops on technology integration.

Currently 46% of districts meet the recommended benchmark for curriculum integration support, a slight decrease from last year's 52%. However, curriculum integration staff often have multiple responsibilities, so it can be difficult for districts to accurately determine the portion of time that is devoted specifically to curriculum integration support.

It is important to note that the new technology guidelines recommend having a full-time staff person dedicated to data management and assessment. Without such a person, this responsibility may fall on the curriculum integration staff, reducing their ability to help teachers.



Technology Literacy

The state's new *Local Technology Plan Guidelines*⁶ recommend that teachers and students work towards technology literacy by the end of the 2006-2007 school year. As a result, the Department plans to collect data on technology literacy beginning in 2004. The *Massachusetts Recommended PreK-12 Instructional Technology Standards*⁷ define what students should know and be able to do in order to be considered technologically literate. The Department will ask districts to report the percentage of students in grades 5 to 8 who are proficient in these standards. Districts can devise their own methods for determining students' technology literacy.

The Technology Self-Assessment Tool (TSAT)⁸ lists the skills that teachers need to possess in order to be considered technologically literate. The Department plans to collect TSAT data from districts beginning in 2004. Districts may use the TSAT interactive application available on Virtual Education Space (VES) or locally developed tools that are aligned to the TSAT.

Distance Learning

The use of distance learning is on the increase, with 21% of districts reporting that their students took courses via distance learning in 2002-2003. Of these districts, 96% used online courses, while 7% used satellite-based or televised courses. In the districts offering online courses, the most common curriculum areas for courses were science, mathematics and English language arts. In those offering satellite-based or televised courses, science, English language arts and foreign languages were the most prevalent.

For the districts offering online courses for students, 45% reported that members of their staff taught online courses to students in their district. Additionally 45% of districts (not necessarily the same districts) reported that their staff taught online courses to students in other districts. The vast majority of the latter group were members of Virtual High School (VHS)⁹, which allows schools to share resources in order to offer courses that they could not otherwise provide for their students.

Grant Funding for Technology

In 2002-2003, the Department distributed nearly \$13 million in technology grants with funding from No Child Left Behind. Approximately half of these funds were distributed through entitlement grants received by nearly every school district. The other half of the funds were distributed through competitive grants.¹⁰ The goals of these grants are threefold: (1) to train teachers to integrate technology into their instruction, (2) to help all students become technologically literate, and (3) to improve student achievement through the use of technology.

⁶ See Appendix B.

⁷ The *Massachusetts Recommended PreK-12 Instructional Technology Standards* are available at <http://www.doe.mass.edu/edtech/standards/itstand.pdf>.

⁸ For more information about the TSAT, go to http://www.doe.mass.edu/edtech/standards/sa_tool.html.

⁹ For more information about Virtual High School, go to <http://www.govhs.org/>.

¹⁰ For more information on the 2002-2003 competitive technology grants, see Appendices C and D.

Technology Tools Provided by the State

Using technology to inform teaching - Technology can play a vital role in analyzing students' instructional needs. A powerful tool for analyzing student test data, including results from the MCAS and LAS (Language Assessment Scale) is TestWiz¹¹. TestWiz allows administrators and teachers to determine which specific learning standards students are mastering and which ones require better teaching strategies. Results can be viewed by district, school, classroom, student, or by specific group, such as all of the students who participated in an after-school tutoring program. In addition, TestWiz makes it possible to track this data over time, so that school personnel can better identify successful teaching strategies. Because the Department has purchased a statewide license for the software, it is available for districts to use at no charge. According to data from TestWiz, 186 school districts have downloaded the application.

Massachusetts' statewide web portal - Teachers throughout the state are finding it helpful to use the state's Virtual Education Space (VES)¹² for teaching, lesson planning, collaborating, and communicating with colleagues. A number of districts have set up teacher discussion forums, which they are using to broaden their professional development efforts. In addition, some teachers have integrated electronic discussion forums into their curricula, supporting classroom discussion and providing students with an engaging way to express their ideas. Another popular VES tool is the virtual hard drive, which allows teachers and students to share educational resources and store their files in a personal folder, which they can then access from any Internet-connected computer.

According to data supplied by the Department's Information Services and Technology unit, educators from 73% of districts had accounts on VES as of June 2003. The number of districts with VES users continues to increase, possibly as a result of the new tools offered, such as Teaching and Learning Resources (TLR) and the Technology Self-Assessment Tool (TSAT)¹³. As of April 2004, 88% of districts had educators with accounts on VES.

¹¹ For more information on TestWiz, go to http://www.doe.mass.edu/mcas/2002/news/tstwiz_qa.html.

¹² For more information on Virtual Education Space, go to <http://www.ves.mass.edu/>.

¹³ See "Assessing Professional Development Needs" on page 9 of this report.

Educator Preparation and Development

Professional Development

The 2003 benchmarks recommended that districts provide technology professional development for at least 85% of their teachers over a three-year period. This year 59% of districts reported that they met this benchmark for the period from 1999 to 2002. Many other districts were close to meeting the benchmark. On average, school districts reported that 80% of teachers had received technology professional development from 1999 to 2002.

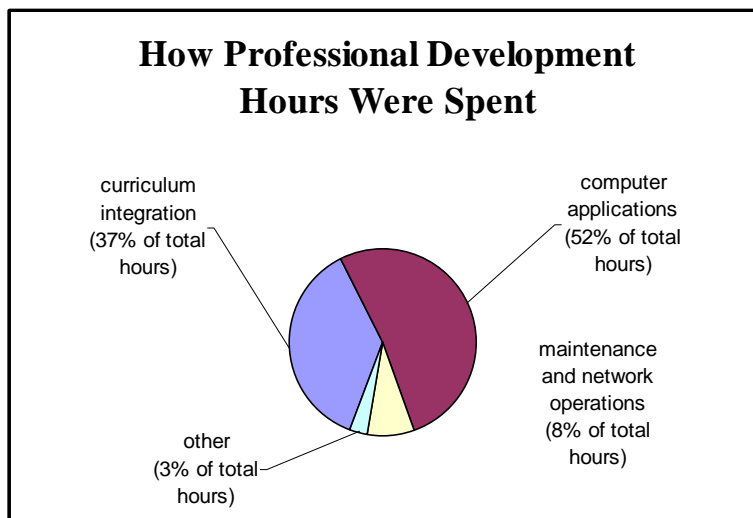
For the 2002-2003 school year districts reported, on average, that about half of their teachers received formal professional development such as workshops, summer institutes, credit courses, or study groups. Districts also indicated that half of their teachers received informal professional development such as coaching, mentoring, and co-teaching. On average, districts indicated that approximately 61% of their teachers received some type of professional development in 2002-2003, suggesting that many teachers received both formal and informal professional development. This is in keeping with the Massachusetts State Plan for Professional Development, which recommends that professional development offerings provide “on-the-job, informal support throughout the school year” and “follow-up activities in the educator’s own classroom.”

Online Professional Development - A growing trend is the use of distance learning for professional development. For the 2002-2003 school year, 37% of districts reported that teachers in their district had received professional development via distance learning. Of the districts that used distance learning, 95% used online workshops or courses, while 11% used satellite-based or televised courses. Districts reported, on average, that 6% of their teachers received professional development online.

Massachusetts educators are also involved in providing professional development via distance learning. In 2002-2003, 12% of districts reported that their staff taught online professional development workshops or courses for their colleagues within the district and 5% did so for teachers outside their district. In addition, 1% of districts reported that staff members taught satellite-based and/or televised workshops or courses for their colleagues.

Content of Training

On average, districts reported that slightly more than half of their professional development focused on computer applications in 2002-2003. Within this category, the most prevalent topics were productivity tools (offered by 94% of districts), presentation tools (89% of districts), and use of the Internet (88% of districts). Training on computer basics, offered by 79% of districts was down slightly from last year, when 83% of districts offered it. There were increases in the number of districts offering professional development on assistive technologies (59%) and handheld technologies (32%).



The second most common focus area, accounting for about 37% of districts' professional development, was integration of technology into the curriculum. Topping the list of topics in this area were mathematics, science, and English language arts, with approximately **85% of districts offering professional development in each of these areas**. This is an increase from last year, when about 75% of districts offered these topics, suggesting that districts are focusing their technology professional development efforts on areas that they have targeted for student improvement. There was also an increase in the number of districts that included the Massachusetts Recommended PreK-12 Instructional Technology Standards in their professional development, with 57% of districts offering this topic in 2002-2003.

Assessing Professional Development Needs

District administrators have a new way to gather data about their teachers' professional development needs: the Technology Self-Assessment Tool (TSAT).¹⁴ Designed to help teachers determine their professional needs, the TSAT is based on a similar tool developed by the Boston Public Schools in 1997. Over the past year, the Department worked with Boston educators and others across the state to update the content and align the tool with the *Massachusetts Recommended PreK-12 Instructional Technology Standards*¹⁵, the *National Educational Technology Standards (NETS)*, and the *Massachusetts STaR Chart*. Since this is the pilot year for the TSAT, Massachusetts educators are invited to submit comments to help make the tool more useful.

The TSAT is available as a printable file on the Department's web site and as an online application on Virtual Education Space (VES). The online TSAT allows administrators to access aggregated data for all of the teachers in the district or for those in a particular school. Administrators can also view TSAT data for specialized groups of teachers, such

¹⁴ For more information about the TSAT, go to http://www.doe.mass.edu/edtech/standards/sa_tool.html.

¹⁵ The *Massachusetts Recommended PreK-12 Instructional Technology Standards* are available at <http://www.doe.mass.edu/edtech/standards/itstand.pdf>.

as all of the district's middle school science teachers, using the tool to create a list of those teachers' VES user names.

Funding Professional Development

No Child Left Behind has provided a useful guideline for funding technology professional development, with its requirement that one quarter of all NCLB technology grant monies be spent on professional development. This requirement has been met by districts receiving entitlement grants and competitive grants. On average, districts receiving competitive grants used considerably more than 25% of their grant funds on professional development. Recipients of Model Technology Integration Grants spent nearly 40% of their grant funds on professional development, while those receiving Technology Enhancement Grants spent 53% of their grant funds on it.¹⁶

According to numerous studies, technology is likely to impact student learning only when teachers receive adequate and appropriate professional development¹⁷.

Because professional development is so important, the Department of Education encourages districts to apply the NCLB guideline to all of their technology spending, allocating a minimum of 25% of their technology budget (including funds from all sources) for professional development.

On average, Massachusetts districts report spending approximately 6% of their technology budgets on professional development. However, this figure may be misleading, because the expenses associated with informal professional development, such as mentoring and co-teaching, often overlap with expenses for instructional technology. Districts spend an average of 52% of their budgets on salaries for instructional technology staff. If the instructional technology staff spend half of their time providing informal professional development, the district will surpass the recommended 25% budgetary allocation for professional development. On the other hand, if the instructional technology staff spend most of their time dealing with technical support issues, the district will fall below 25%. As a result, teachers may not receive the instructional support they need and they will be less likely to use technology to enhance their teaching.

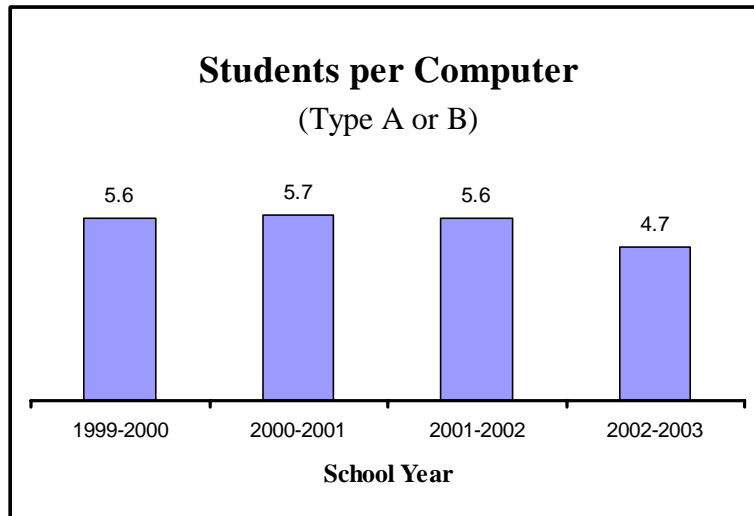
¹⁶ For more information on the Model Technology Integration Grants and Technology Enhancement Grants, see Appendices C and D.

¹⁷ From "The Learning Return on Our Educational Technology Investment: A Review of Findings from Research", WestEd, 2002; available at http://www.wested.org/online_pubs/learning_return.pdf.

Infrastructure for Technology

Computers

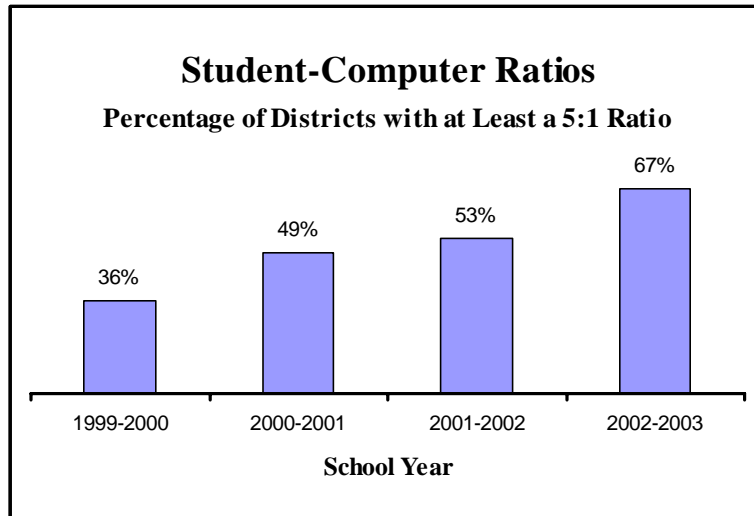
Massachusetts school districts have made substantial progress in providing students and teachers with access to modern computers¹⁸, with 68% of districts meeting the recommended benchmark of 5 or fewer students per instructional computer. In addition, the statewide average number of students sharing a modern computer dropped from 5.6 in 2002 to 4.7 in 2003.



It is important to note that a district's student-to-computer ratio may not accurately characterize conditions in all of the schools in that district. While many districts have met the recommended standard of no more than 5 students per computer, the ratios for individual schools within those districts may vary widely. An analysis of schools with eighth grade students revealed a number of schools with ratios considerably higher than the overall district student-to-computer ratio. It is important that districts address these inequities so that all students can take advantage of the learning opportunities that technology provides.

Districts continue to purchase laptop computers, with 96% of districts owning one or more. Still, desktop computers are the norm. In 80% of districts, less than one in five computers are laptops.

¹⁸ The specifications for "modern" (Type A and B) computers were updated in 2002 and remained the same in 2003. Type A computers were defined as those with a minimum of 128 MB of RAM and at least a 500 MHz processor (350 MHz for Macintosh computers). Type B computers were defined as those with a minimum of 32 MB of RAM and at least a 225 MHz processor (133 MHz for Macintosh computers).



Other Technologies

Many schools are using portable word-processing devices, such as AlphaSmarts, to increase student access to technology. While the majority of schools have at least one portable word-processing device, 31% of school buildings have 20 or more of these devices, and nearly 10% of schools have 50 or more. For the schools that have them, portable word processing devices increase technology access by 24% on average.

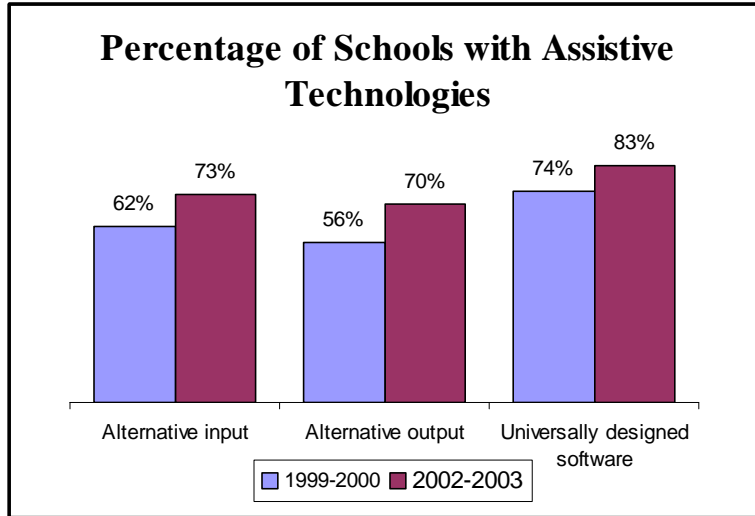
Digital projectors increase access in a different way, allowing all the students in a class to view the image from a computer at the same time. In 2003, approximately 55% of school buildings had projectors. About one-fifth of those schools had five or more projectors.

Approximately 23% of school buildings have at least one electronic whiteboard, which digitally captures whatever is written or drawn on the board. These devices can be useful for students with disabilities, as well as other students who have difficulty taking notes. Most of the schools that have electronic whiteboards also have digital projectors. When used together, the projector and whiteboard create a large touch screen that teachers and students can also write on.

Handheld computers are becoming more common in schools, with 24% of schools reporting at least one in their building. Often used by administrators to manage data, these devices are also used by students in some schools. Still, access to these handhelds is limited, with only 6% of schools having 20 or more.

Assistive Technologies and Universal Design

A growing number of technology tools are available to assist students with disabilities, including learning disabilities, as well as other students such as those learning English. For example, text-to-speech software makes it possible for students to listen to any text that is in a digital format, while word prediction software allows students to express themselves without having to type every letter of every word.

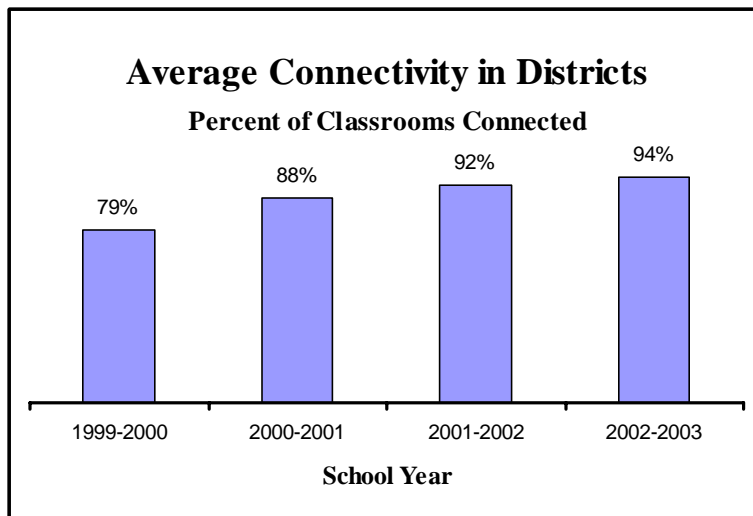
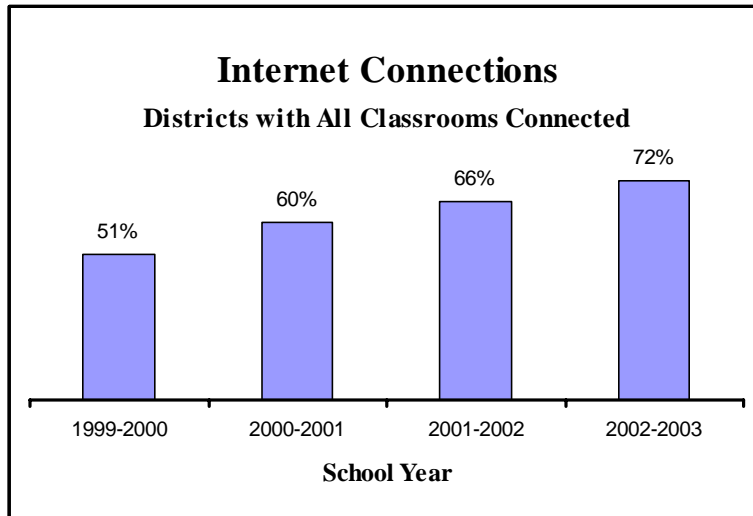


Almost three-quarters of schools indicated that they have alternative input devices in their buildings, and about the same number of schools also have alternate output devices. The most common alternative input devices are microphones (reported by 49% of schools), alternative keyboards (40% of schools), and voice recognition software (33% of schools). The most common alternative output devices are text-to-speech software (reported by 53% of schools), large computer monitors (35% of schools), and communication aids such as speech output devices (25%).

The availability of universally designed software continues to increase. Defined as software that has built-in features that make it accessible to all students, universally designed software is available in 83% of school buildings, according to schools' 2003 reports. In addition, 92% of schools reported that they consider accessibility for all students when purchasing technologies.

Connectivity

Districts have made steady progress in connecting their classrooms to the Internet. In 2003, 72% of districts reported that they met the benchmark, with 100% of their classrooms connected. On average, districts have 95% of their classrooms connected, a slight increase from 2002. In addition, districts reported that 91% of instructional computers were connected to the Internet.



The use of wireless connections continues to grow, with 59% of districts reporting at least one wireless device. Still, for the vast majority of districts (88%), the use of wireless technology is still in its early stages, with fewer than one in five computers using wireless connections.

Access Outside the School Day

Students often find it helpful to use the Internet to complete their homework. Although most households now have computers, research has shown that students from low-income households are less likely to have access to the Internet at home than their classmates from higher-income households.

Increasing access - In 2003, about half of Massachusetts schools reported that they informed students about places in the community where they could access the Internet. This is a concern, since the benchmark standards recommend that schools work with

community groups to ensure that students have access to the Internet outside the school day. However, many schools allow students to use computers before and after school. At the high school level, 71% of schools provide this access, and most of those schools provide access at least five hours per week. However, the Department did not collect data on the number of computers available for use outside of school hours, so it is impossible to determine whether this access is adequate to meet students' needs.

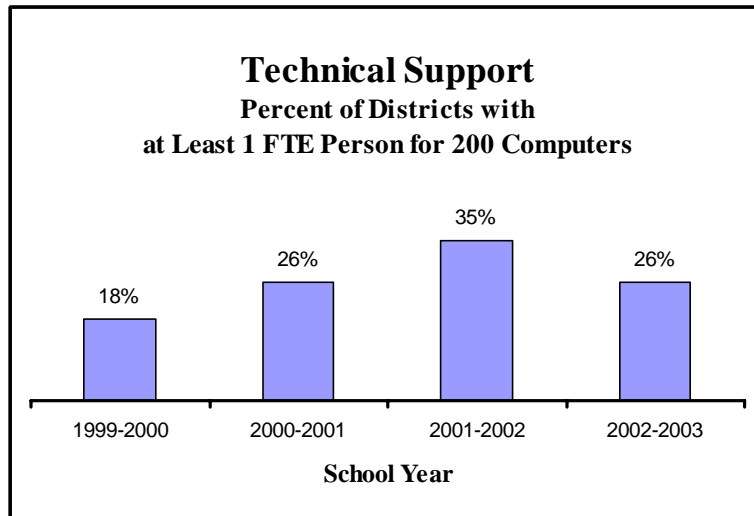
Accessing files - Virtual Education Space (VES) is a convenient tool for both students and teachers who work at computers in more than one location. VES allows each user to set up a personal "virtual hard drive" where they can store files and then access them from any computer. Using VES, students and teachers can begin work on a project at school and then complete it on a computer in a library, home, or community center without having to copy files onto a disk.

Using the Web to communicate - The benchmark standards recommend that every school maintain an up-to-date Web site so that students, parents, and community members can access information about the school. No Child Left Behind also urges schools to maintain Web sites to increase communication with parents. In 2003, less than two-thirds of districts reported that they had web sites for all their schools.

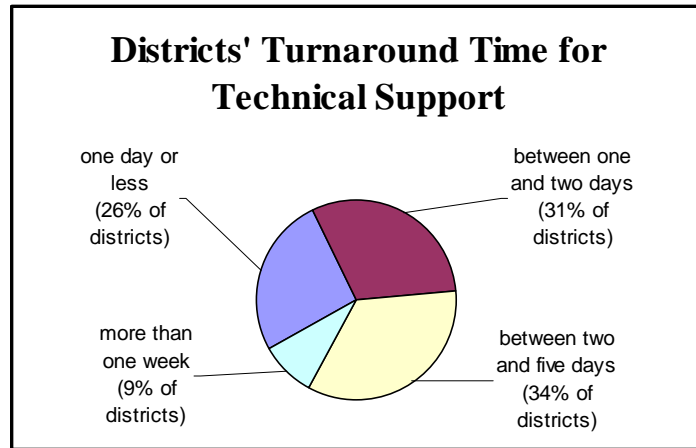
Administration and Support Services

Technical Support

Both the benchmark standards and the STaR Chart recommend that districts have at least one full-time person to support every 200 computers. The percentage of districts offering this level of support dropped from 35% in 2002 to 26% in 2003. This suggests that districts may have purchased additional computers without taking on additional staff to maintain them.



Adequacy of technical support - According to statewide data submitted by districts, the average technical support person maintains approximately 405 computers. One way to determine whether or not this level of technical support is adequate is to look at how long it takes to resolve a technical problem. The STaR Chart suggests that same-day technical support be available to minimize problems that cause major disruptions to instructional activities involving technology. However, only 25% of districts reported that they provide same-day technical support, a slight decline from last year's 28%. The average turnaround time for resolving technical problems is 3 days, a delay that may discourage teachers from using technology. On the other hand, if teachers take on the challenge of solving complicated technical problems on their own, they will have less time to focus on teaching and learning.



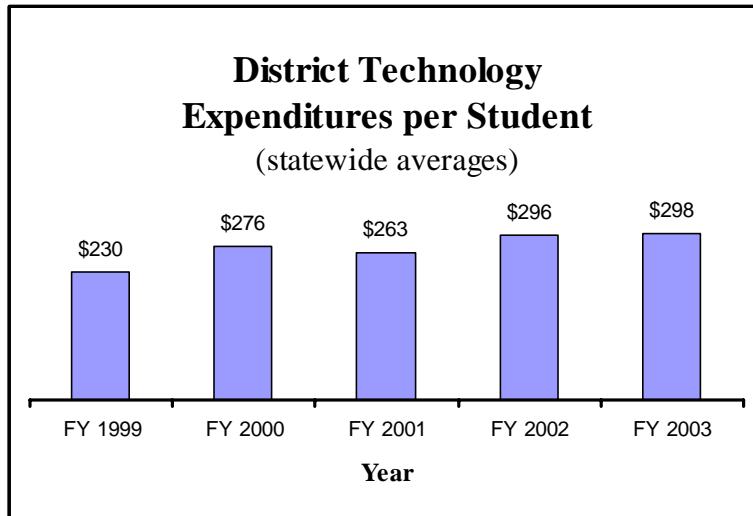
Staffing models - Having building level technical support staff increases the likelihood that teachers will receive just-in-time support when problems arise. However, while 84% of districts employ technical staff at the district level, only 70% of districts do so at the building level.

In an effort to deal with the challenge of providing adequate technical support, nearly one-third of all districts use either outside contractors or teachers who are paid stipends for the extra work. One-quarter of districts use students or volunteers for a portion of their technical support. In 18% of districts, at least half of the district's technical support comes from these sources.

Technical support strategies - To streamline the process of reporting and responding to technical support requests, 47% of districts use a telephone help desk. Nearly two-thirds of those districts use both a telephone help desk and an online technical support system. About 10% of districts use an online system alone. Reporting systems can help the technical staff prioritize service requests, which is especially important when a single person is responsible for hundreds of computers. In addition, both systems can be used to help users solve their own problems, reducing the demands placed on the technical staff.

Budget Allocated for Technology

An important part of a district's technology plan is a realistic budget, which takes into account all of the cost associated with the technology plan. In addition to hardware and software costs, the budget needs to include money for things like hardware and software upgrades, maintenance, technical support, and professional development. In 2002-2003, the average per student spending on technology was \$298, an increase of less than 1% over the previous year. These expenditures included monies from districts' operational budgets, municipal bonds, and grants from federal, state, local, and private sources. This year's small annual increase suggests that technology spending might have decreased if federal technology grants had not been available to districts.



Enhancing Education Through Technology grants - During the 2002-2003 school year, the Department distributed \$5,845,737 through No Child Left Behind Title IID entitlement grants, with an average grant award of \$21,257. Grant size varied according to district size and need, with each district's allocation based on the proportional share of funds under Part A of Title I. The smallest grant award was \$68 and the largest grant award was \$1,035,370. These grants were used for professional development, hardware, software, Internet connections, and staffing for special projects.

E-rate discounts - Increasingly, districts are recognizing the value of the E-rate discount program, with 77% of Massachusetts districts using it in 2002-2003, compared to 49% in 2001-2002. This year Massachusetts school districts received approximately \$30 million in E-rate discounts for technology expenditures such as Internet services, telecommunications and wiring. With discounts based on economic disadvantage and location (urban or rural), some Massachusetts districts are eligible for discounts as high as 90%. The average discount for Massachusetts districts was 53%.

In order to be eligible for E-rate discounts and federal grants, schools must comply with the Children's Internet Protection Act (CIPA). The law requires schools to certify that they have an Internet safety policy and that they are using filtering. To be in compliance with CIPA, the Internet filter must block all visual descriptions that are obscene, child pornographic, or harmful to minors. In 2003, 88% of districts reported that their elementary schools had such filters, while 92% of districts said that their high schools had them. To further protect students, 91% of districts taught students at the elementary level about the responsible use of technology, including safety and ethics issues, and 94% of high schools did so at the high school level.

Conclusion

In general, Massachusetts school districts have made steady progress in working toward the goals set forth in the year 2000. Nearly every school district has an updated technology plan, and over two-thirds of districts met the recommended benchmarks for student-to-computer ratios and Internet connectivity. Moreover, according to district reports, an average of 80% of teachers have received technology professional development over the past three years, which is close to the recommended benchmark of 85%.

Still, many districts are having difficulty establishing some of the conditions that are involved in using technology effectively. Less than half of the districts met the recommended benchmark for curriculum integration support, and even fewer districts met the benchmark for technical support. Although the majority of teachers have received some technology training, sustained professional development is an ongoing need that should also be addressed.

In order to help districts move forward with their technology planning, the Department of Education has published new planning guidelines¹⁹, which incorporate recommendations from the state's Educational Technology Advisory Council and other technology leaders across the state. These guidelines can also be used by districts to gauge their progress in creating and maintaining the conditions that allow technology to significantly impact teaching and learning. Technology holds great promise for improving student learning; thoughtful planning can help ensure that this promised is realized.

¹⁹ See Appendix B.

Appendix A

District Statistics

Districts Reporting

School districts that reported on the implementation of their technology plans in 2003 are included in the following tables. Districts that did not do so are not included.

Student Computer Ratios

The ratio of students per Type A/B computer is based on the number of instructional computers of these types reported on the 2003 individual school profile forms. The ratio of students per computers of any type is based on the total number of instructional computers reported in all categories: Types A, B, and C. The enrollment figures used were those reported by the districts for the 2002-2003 school year. The ratios reported here are based on data aggregated from the school profile forms and validated by school districts. School districts should calculate a student computer ratio for each school to ensure equitable access across the entire district.

During the period that this data was collected, Type A computers were defined as “multimedia computers with CD-ROM and Internet capability using a browser, capable of running high-end applications and streamed video” and having at least 128 RAM and a processor speed of 500 MHz or greater (350 MHz for Macintosh). Type B computers were defined as “multimedia computers with CD-ROM access and Internet capability using a browser” and having at least 32 MB RAM and a processor speed of 225 MHz or greater (133 MHz for Macintosh). Type C computers were defined as machines with less than 32 MB RAM and a processor speed of less than 225 MHz (133MHz for Macintosh), with or without Internet capability.

Connections to the Internet

The percentage of classrooms connected to the Internet is based on reporting by individual schools on the school profile forms. Since some districts prefer to provide more connections in computer labs, the percentage of instructional computers connected to the Internet is also reported, using data from the school profile forms. This data was validated by school districts.

E-rate

The information on which schools received E-rate discounts is based on data provided by the School and Libraries Division of the Universal Service Administrative Company, which administers the E-rate program. This data was validated by school districts.

District Statistics

School district	Ratio of students to "modern" (Type A/B) computers	Ratio of students to computers of any type	Percentage of classrooms connected to the Internet	Percentage of instructional computers on Internet	Did the district receive E-Rate discounts?
Abby Kelley Foster Regional Charter	6.5	6.5	67	100	No
Abington	8.3	7.4	34	16	Yes
Academy of Strategic Learning HMCS	1.7	1.7	100	100	NA
Academy of the Pacific Rim Charter	11.1	11.1	11	100	No
Acton	5.9	5.0	100	99	Yes
Acton-Boxborough	4.9	4.2	100	97	Yes
Acushnet	1.9	1.8	100	100	No
Adams-Cheshire	7.2	5.7	100	89	No
Agawam	6.7	5.2	62	73	No
Amesbury	5.0	4.4	100	88	Yes
Amherst	4.0	3.3	100	100	Yes
Amherst-Pelham	3.6	3.3	100	100	Yes
Andover	2.9	2.8	100	100	Yes
Arlington	4.3	4.1	100	99	Yes
Ashburnham-Westminster	3.5	3.5	100	100	Yes
Ashland	5.9	5.9	100	100	Yes
Assabet Valley	2.8	2.1	22	90	Yes
Athol-Royalston	3.3	2.8	68	71	Yes
Attleboro	5.9	5.6	100	97	Yes
Auburn	4.6	4.6	100	100	No
Avon	4.6	4.6	100	100	No
Ayer	4.7	3.5	100	100	No
Barnstable	4.8	4.2	100	91	Yes
Barnstable HMCS	2.8	2.6	100	92	Yes
Bedford	2.4	2.3	100	100	Yes
Belchertown	4.2	4.1	85	90	Yes
Bellingham	5.2	5.2	99	97	Yes
Belmont	5.4	4.7	100	100	Yes
Benjamin Banneker Charter	3.1	3.1	100	100	Yes
Benjamin Franklin Classical Charter	8.4	6.7	100	100	No
Berkley	4.8	4.7	100	80	No
Berkshire Hills	4.4	4.4	100	91	No
Berlin	6.1	4.6	100	88	Yes
Berlin-Boylston	6.6	4.5	97	94	Yes
Beverly	4.7	4.7	93	100	Yes
Billerica	7.7	5.4	100	100	Yes
Blackstone Valley Reg.	2.0	2.0	100	100	Yes
Blackstone-Millville	3.9	3.4	100	99	Yes
Blue Hills Voc.	2.0	1.6	100	100	Yes

District Statistics

School district	Ratio of students to "modern" (Type A/B) computers	Ratio of students to computers of any type	Percentage of classrooms connected to the Internet	Percentage of instructional computers on Internet	Did the district receive E-Rate discounts?
Boston	5.0	5.0	99	96	Yes
Boston Renaissance Charter	3.7	3.7	100	95	Yes
Bourne	2.8	2.7	100	100	Yes
Boxborough	4.3	3.5	100	100	Yes
Boxford	4.2	3.8	97	100	No
Boylston	2.6	2.6	100	89	Yes
Braintree	6.8	5.9	38	75	Yes
Brewster	6.0	3.2	100	100	Yes
Bridgewater-Raynham	5.3	5.3	96	89	No
Brimfield	5.7	5.2	100	87	Yes
Bristol County Agr.	4.9	4.4	100	100	No
Bristol-Plymouth Voc. Tech.	1.6	1.6	100	100	No
Brockton	6.3	6.1	72	57	Yes
Brookfield	3.4	3.0	100	63	Yes
Brookline	3.6	3.0	97	94	Yes
Burlington	3.1	3.0	100	86	Yes
Cambridge	3.8	2.8	100	100	No
Canton	2.7	2.7	100	100	No
Cape Cod Lighthouse Charter	5.0	3.9	93	100	No
Cape Cod Region Voc. Tech.	2.8	2.8	100	100	Yes
Carlisle	7.5	4.5	100	56	Yes
Carver	5.5	5.1	100	100	Yes
Central Berkshire	4.8	4.6	100	95	Yes
Champion HMCS	5.0	5.0	100	100	No
Chatham	1.8	1.8	100	100	No
Chelmsford	4.5	4.2	100	100	Yes
Chelsea	3.7	3.7	100	100	Yes
Chesterfield-Goshen	5.9	5.9	100	100	Yes
Chicopee	6.0	5.1	98	99	Yes
City on a Hill Charter	2.4	2.4	100	100	Yes
Clarksburg	8.8	8.8	100	100	Yes
Clinton	3.6	2.9	98	92	Yes
Codman Academy Charter	2.2	2.2	100	100	No
Cohasset	2.2	2.2	100	100	Yes
Community Day Charter	8.5	5.3	100	100	No
Concord	4.0	4.0	100	100	Yes
Concord-Carlisle	4.4	4.2	100	100	Yes
Conway	3.3	2.1	100	53	Yes
Danvers	6.5	6.0	100	100	Yes

District Statistics

School district	Ratio of students to "modern" (Type A/B) computers	Ratio of students to computers of any type	Percentage of classrooms connected to the Internet	Percentage of instructional computers on Internet	Did the district receive E-Rate discounts?
Dartmouth	3.7	2.7	100	100	Yes
Dedham	3.2	3.2	100	99	Yes
Deerfield	7.1	4.5	100	98	Yes
Dennis-Yarmouth	4.5	3.8	100	100	Yes
Douglas	7.1	5.7	100	100	Yes
Dover	2.3	2.3	100	100	Yes
Dover-Sherborn	2.4	2.4	100	100	Yes
Dracut	4.9	4.4	98	100	Yes
Dudley-Charlton Reg.	3.3	3.2	100	100	Yes
Duxbury	4.3	4.1	100	100	Yes
East Bridgewater	4.9	4.9	100	100	No
East Longmeadow	2.6	2.6	100	100	Yes
Eastham	3.8	3.2	100	94	Yes
Easthampton	12.2	4.7	64	82	Yes
Easton	6.1	5.2	99	83	Yes
Edgartown	3.2	2.4	100	72	Yes
Edward Brooke Charter	3.5	3.5	100	100	No
Erving	2.5	2.5	100	100	Yes
Essex Agr. Tech.	3.0	3.0	92	94	Yes
Everett	6.3	5.2	43	84	Yes
Fairhaven	8.9	5.5	99	88	No
Fall River	6.6	4.7	62	59	Yes
Falmouth	6.5	5.8	94	92	Yes
Fitchburg	7.7	6.5	98	87	Yes
Florida	NA	NA	NA	NA	NA
Foxboro Regional Charter	18.3	17.9	4	67	Yes
Foxborough	2.5	2.5	100	100	Yes
Framingham	4.6	4.2	100	98	Yes
Francis W. Parker Charter	7.1	5.0	100	100	Yes
Franklin	4.2	3.5	100	100	Yes
Franklin County	1.5	1.5	100	100	Yes
Freetown	2.5	2.5	100	85	No
Freetown-Lakeville	2.0	2.0	100	100	No
Frontier	1.8	1.8	100	100	Yes
Gardner	5.2	4.6	100	99	No
Gateway	3.5	3.0	100	100	Yes
Georgetown	4.1	4.1	100	100	No
Gill-Montague	5.2	5.2	100	98	Yes
Gloucester	4.7	3.7	100	77	Yes

District Statistics

School district	Ratio of students to "modern" (Type A/B) computers	Ratio of students to computers of any type	Percentage of classrooms connected to the Internet	Percentage of instructional computers on Internet	Did the district receive E-Rate discounts?
Grafton	2.7	2.6	100	82	Yes
Granby	8.4	6.2	100	98	No
Granville	4.4	4.4	100	100	Yes
Greater Fall River	1.7	1.7	100	100	Yes
Greater Lawrence RVT	2.8	2.8	100	97	Yes
Greater Lowell Voc. Tec.	5.4	3.0	100	100	Yes
Greater New Bedford	2.3	2.3	100	100	No
Greenfield	6.0	4.6	97	89	No
Groton-Dunstable	6.4	5.0	86	90	Yes
Hadley	3.2	3.2	100	100	No
Halifax	6.5	5.4	100	53	No
Hamilton-Wenham	4.3	3.7	100	85	No
Hampden-Wilbraham	5.2	3.4	100	98	Yes
Hampshire	2.2	2.2	100	99	Yes
Hancock	3.1	3.1	100	60	No
Hanover	3.7	3.3	100	91	Yes
Harvard	6.5	4.4	90	64	Yes
Harwich	5.9	4.5	100	96	Yes
Hatfield	4.1	4.1	97	99	Yes
Haverhill	7.1	5.0	79	66	Yes
Hawlemont	2.1	1.9	100	100	Yes
Health Careers Academy HMCS	5.3	5.3	100	100	No
Hilltown Cooperative Charter District	4.9	4.4	82	0	No
Hingham	5.4	4.4	100	89	Yes
Holbrook	6.4	6.4	100	100	Yes
Holland	4.7	3.4	100	100	Yes
Holliston	2.4	2.4	100	100	Yes
Holyoke	3.3	3.2	100	92	Yes
Hopedale	3.1	3.1	100	100	Yes
Hopkinton	3.4	3.4	100	100	Yes
Hudson	3.8	2.8	100	79	Yes
Hull	3.8	3.5	100	100	Yes
Ipswich	3.1	2.8	100	99	Yes
King Philip	5.0	4.5	100	94	Yes
Kingston	4.2	3.6	100	35	Yes
Lakeville	7.2	6.2	100	0	No
Lanesborough	3.6	3.6	100	96	No
Lawrence	4.5	4.5	76	100	Yes
Lawrence Family Development Chart.	8.5	6.0	100	95	No

District Statistics

School district	Ratio of students to "modern" (Type A/B) computers	Ratio of students to computers of any type	Percentage of classrooms connected to the Internet	Percentage of instructional computers on Internet	Did the district receive E-Rate discounts?
Lee	2.2	2.2	100	100	No
Leicester	4.1	4.1	100	100	Yes
Lenox	5.3	3.4	100	82	Yes
Leominster	7.9	5.3	99	100	Yes
Leverett	2.1	2.1	100	88	Yes
Lexington	4.0	3.8	98	100	No
Lincoln	4.6	3.1	100	58	No
Lincoln-Sudbury	4.7	3.9	10	100	Yes
Littleton	4.7	2.9	98	63	Yes
Longmeadow	4.6	4.3	100	98	Yes
Lowell	5.0	3.6	90	91	Yes
Lowell Community Charter	4.7	4.4	100	100	Yes
Lowell Middlesex Academy Charter	2.7	2.7	29	100	No
Ludlow	9.2	6.0	99	85	Yes
Lunenburg	6.2	5.8	100	100	No
Lynn	9.1	4.4	82	81	Yes
Lynnfield	2.6	2.6	100	99	No
Malden	3.4	2.9	88	100	Yes
Manchester Essex Regional	3.3	3.3	100	100	Yes
Mansfield	28.1	8.0	99	99	Yes
Marblehead	5.3	3.7	100	100	Yes
Marblehead Community Charter	3.3	3.3	100	100	No
Marion	3.0	3.0	100	99	Yes
Marlborough	5.3	4.8	100	100	Yes
Marshfield	5.7	5.6	100	94	Yes
Martha's Vineyard	2.3	2.1	100	96	Yes
Martha's Vineyard Charter	3.5	3.1	100	100	No
Masconomet	2.1	2.1	100	100	Yes
Mashpee	9.4	4.0	100	100	Yes
Mattapoisett	3.1	3.1	100	90	Yes
Maynard	3.6	3.5	100	100	Yes
Medfield	13.8	5.1	100	83	Yes
Medford	3.3	3.2	55	100	Yes
Media and Technology Charter	2.7	2.7	100	100	No
Medway	8.1	4.5	100	96	Yes
Melrose	5.6	5.0	77	87	Yes
Mendon-Upton	9.8	5.3	100	99	Yes
Methuen	3.3	3.3	100	100	Yes
Middleborough	3.0	3.0	100	99	Yes

District Statistics

School district	Ratio of students to "modern" (Type A/B) computers	Ratio of students to computers of any type	Percentage of classrooms connected to the Internet	Percentage of instructional computers on Internet	Did the district receive E-Rate discounts?
Middleton	7.8	7.0	98	99	No
Milford	6.7	6.7	82	71	No
Millbury	6.7	4.9	100	100	Yes
Millis	4.6	3.7	100	97	Yes
Milton	5.1	5.0	99	99	Yes
Minuteman Voc. Tech.	1.3	1.3	100	100	Yes
Mohawk Trail	3.1	2.8	95	98	Yes
Monson	2.9	2.7	100	96	Yes
Montachusett Voc. Tech. Reg.	2.0	2.0	100	100	Yes
Murdoch Middle Public Charter	3.0	3.0	100	100	No
Nahant	4.4	2.5	100	58	No
Nantucket	2.0	1.7	100	99	No
Narragansett	5.9	4.9	79	79	Yes
Nashoba	3.4	2.8	100	70	Yes
Nashoba Valley Tech.	3.9	2.2	100	100	Yes
Natick	4.5	4.5	100	99	Yes
Nauset	6.6	3.5	97	98	Yes
Needham	4.7	4.3	100	100	Yes
Neighborhood House Charter	3.3	3.3	100	100	Yes
New Bedford	4.1	3.8	83	90	No
New Bedford Global HMCS	0.9	0.9	100	99	No
New Salem-Wendell	5.3	4.9	100	100	Yes
Newburyport	4.6	3.6	99	96	Yes
Newton	5.3	4.3	71	74	Yes
Norfolk	4.3	4.3	100	88	Yes
Norfolk County Agr.	3.0	3.0	100	100	Yes
North Adams	3.3	3.3	100	100	Yes
North Andover	5.5	3.1	100	100	Yes
North Attleborough	3.7	3.5	100	99	Yes
North Brookfield	5.0	3.4	100	100	Yes
North Middlesex	4.8	4.4	100	86	Yes
North Reading	6.6	5.0	79	91	Yes
North Shore Reg. Voc.	2.2	2.2	100	94	Yes
Northampton	5.9	5.2	97	90	Yes
Northampton-Smith	3.4	2.9	91	76	Yes
Northboro-Southboro	4.1	3.4	100	93	Yes
Northborough	4.1	3.2	100	95	Yes
Northbridge	3.4	2.9	98	99	Yes
Northeast Metro Voc.	4.3	4.3	100	100	No

District Statistics

School district	Ratio of students to "modern" (Type A/B) computers	Ratio of students to computers of any type	Percentage of classrooms connected to the Internet	Percentage of instructional computers on Internet	Did the district receive E-Rate discounts?
Northern Berkshire Voc.	1.5	1.5	100	96	Yes
Norton	4.8	4.0	100	93	Yes
Norwell	2.4	2.3	100	97	Yes
Norwood	5.8	5.3	100	99	Yes
Oak Bluffs	2.9	2.5	100	99	Yes
Old Colony Reg. Voc. Tech.	2.3	2.3	100	100	No
Old Rochester	2.2	2.2	100	100	Yes
Orange	2.0	1.9	100	84	Yes
Orleans	3.3	3.3	100	100	Yes
Oxford	5.5	5.5	100	98	Yes
Palmer	4.7	4.7	100	100	Yes
Pathfinder Voc. Tech.	2.4	2.0	100	77	No
Peabody	7.7	6.1	93	94	Yes
Pelham	1.9	1.7	100	100	Yes
Pembroke	5.0	5.0	100	100	Yes
Pentucket	6.4	4.9	100	98	Yes
Petersham	6.3	6.3	100	89	No
Pioneer Valley	2.7	2.7	94	100	Yes
Pioneer Valley Performing Arts Chart.	9.6	9.3	77	97	No
Pittsfield	4.1	3.7	99	78	Yes
Plainville	3.6	3.6	100	96	Yes
Plymouth	3.2	2.8	100	100	Yes
Plympton	3.0	3.0	100	100	Yes
Prospect Hill Academy Charter	7.9	7.9	0	100	No
Provincetown	1.8	1.5	100	93	Yes
Quabbin	9.4	6.8	100	100	Yes
Quaboag Regional	2.5	2.5	100	100	Yes
Quincy	5.6	3.7	100	100	Yes
Ralph C. Mahar	5.1	3.6	95	61	Yes
Randolph	4.2	3.7	100	83	Yes
Reading	5.3	4.4	91	57	Yes
Revere	4.8	4.8	100	100	Yes
Richmond	3.6	3.0	88	84	No
Rising Tide Charter	3.4	3.4	100	100	Yes
River Valley Charter	5.3	5.3	100	83	No
Rochester	3.9	3.7	98	100	Yes
Rockland	4.9	3.8	100	100	Yes
Rockport	4.3	3.4	100	100	Yes
Rowe	1.9	1.9	100	100	Yes

District Statistics

School district	Ratio of students to "modern" (Type A/B) computers	Ratio of students to computers of any type	Percentage of classrooms connected to the Internet	Percentage of instructional computers on Internet	Did the district receive E-Rate discounts?
Roxbury Preparatory Charter	4.3	4.3	100	100	Yes
Sabis International Charter	17.8	16.7	5	95	No
Salem	4.0	3.0	80	67	Yes
Sandwich	5.3	4.6	88	100	Yes
Saugus	5.4	4.8	80	52	Yes
Savoy	4.9	4.9	100	82	Yes
Scituate	6.4	4.8	100	100	Yes
Seekonk	2.5	2.5	100	100	Yes
Sharon	8.4	5.9	100	100	Yes
Shawsheen Valley Voc. Tech.	2.5	2.1	100	100	No
Sherborn	4.2	3.4	100	100	Yes
Shirley	7.7	3.4	98	98	Yes
Shrewsbury	3.9	3.4	100	100	No
Shutesbury	4.9	4.9	100	100	Yes
Silver Lake	30.3	6.4	100	100	Yes
S. Middlesex Voc. Tech. Reg.	1.9	1.9	84	90	Yes
S. Boston Harbor Academy Charter	11.5	11.5	7	100	Yes
Somerset	4.7	4.4	100	100	Yes
Somerville	3.4	3.0	90	87	Yes
South Hadley	4.9	4.6	86	92	No
South Shore Charter	3.3	3.2	100	0	No
South Shore Reg. Voc. Tech.	3.2	3.2	100	49	No
Southampton	11.0	9.2	100	90	Yes
Southborough	4.7	3.9	100	99	Yes
Southbridge	6.3	3.8	98	60	Yes
Southeastern Reg. Voc. Tech.	1.4	1.4	100	100	Yes
Southern Berkshire	2.1	2.1	100	100	Yes
Southern Worcester City Voc. Tech.	2.9	2.8	100	100	Yes
Southwick-Tolland	7.3	5.0	89	88	Yes
Spencer-E Brookfield	4.0	3.4	97	100	Yes
Springfield	3.3	3.0	61	83	Yes
Stoneham	5.2	5.2	100	100	Yes
Stoughton	2.7	2.7	100	100	No
Sturbridge	7.9	5.6	100	100	Yes
Sudbury	3.2	3.2	100	100	Yes
Sunderland	6.0	3.9	100	97	Yes
Sutton	3.7	2.9	100	69	Yes
Swampscott	4.1	4.1	100	20	Yes
Swansea	4.9	4.9	100	100	Yes

District Statistics

School district	Ratio of students to "modern" (Type A/B) computers	Ratio of students to computers of any type	Percentage of classrooms connected to the Internet	Percentage of instructional computers on Internet	Did the district receive E-Rate discounts?
Tantasqua	3.2	3.2	92	99	Yes
Taunton	2.7	2.6	100	100	Yes
Tewksbury	5.0	3.2	99	94	Yes
Tisbury	2.5	2.5	100	100	Yes
Topsfield	5.3	4.0	100	100	No
Tri County	1.6	1.6	100	100	Yes
Triton	3.0	2.7	100	81	Yes
Truro	2.4	2.4	100	100	No
Tyngsborough	3.0	3.0	89	84	Yes
Up-Island Regional	2.0	2.0	100	100	Yes
Upper Cape Cod Voc. Tech.	2.0	1.7	100	100	Yes
Uxbridge	6.6	5.8	100	100	Yes
Wachusett	3.2	2.9	100	92	Yes
Wakefield	4.4	4.0	100	100	Yes
Wales	3.2	2.9	100	91	Yes
Walpole	4.3	3.3	65	77	No
Waltham	9.0	5.3	72	93	Yes
Ware	3.6	3.4	72	85	Yes
Wareham	5.8	3.6	100	100	Yes
Watertown	7.4	3.2	100	100	Yes
Wayland	4.1	3.4	96	100	No
Webster	8.8	7.6	81	81	Yes
Wellesley	3.8	3.2	100	100	No
Wellfleet	2.1	2.0	100	100	Yes
West Boylston	2.6	2.6	100	99	Yes
West Bridgewater	3.9	3.9	96	100	No
West Springfield	3.3	3.2	61	55	No
Westborough	3.6	3.1	100	100	Yes
Westfield	3.9	3.2	95	95	Yes
Westford	4.5	3.9	100	92	No
Westhampton	4.5	4.2	100	71	Yes
Weston	3.5	2.7	100	100	Yes
Westport	5.3	4.4	100	100	Yes
Westwood	4.5	4.4	100	100	Yes
Weymouth	7.7	6.8	98	94	No
Whately	2.7	2.2	100	92	Yes
Whitman-Hanson	3.9	3.8	100	100	Yes
Whittier Voc.	2.1	2.0	100	100	Yes
Williamsburg	3.7	3.2	100	31	No

District Statistics

School district	Ratio of students to "modern" (Type A/B) computers	Ratio of students to computers of any type	Percentage of classrooms connected to the Internet	Percentage of instructional computers on Internet	Did the district receive E-Rate discounts?
Williamstown	2.7	2.7	100	100	No
Wilmington	4.9	4.6	100	100	Yes
Winchendon	6.4	4.8	100	0	Yes
Winchester	6.8	5.7	69	84	Yes
Winthrop	5.7	5.7	100	100	No
Woburn	3.7	3.7	90	98	Yes
Worcester	3.5	3.4	100	99	Yes
Wrentham	2.5	2.5	100	100	Yes

Appendix B

Local Technology Plan Guidelines

(School Year 2004-2005 through 2006-2007)

In order to be eligible for E-Rate discounts, as well as federal and state technology funding, every school district is required to have a long-range strategic technology plan approved by the Department of Education. School districts must have their plans on file locally, including a full description of their implementation strategies. Each year, to approve school districts' technology plans, the Department asks districts to report on the progress they have made in implementing their plans through the Department's secure web portal.

In 2000, to help districts develop purposeful plans, the Department worked with technology stakeholders across the state to develop a set of recommended guidelines called "Local Technology Benchmark Standards for 2003." (<http://www.doe.mass.edu/edtech/standards/benchmrk.pdf>) These guidelines represent recommended conditions for the effective integration of technology into instruction.

In 2001, the Board of Education established the Educational Technology Advisory Council (ETAC) to advise the Department on issues relating to the use of technology in schools. ETAC developed the School Technology and Readiness (STaR) Chart (<http://www.doe.mass.edu/boe/sac/edtech/star.html>) to illustrate the "complex set of interactions of people, materials and dimensions" that are involved in using technology effectively in schools. ETAC believes that the STaR Chart represents "the beginning of a new strategic plan for Massachusetts to improve student learning with the use of technology." Based on the recommendations of the STaR Chart and advice from stakeholders across the Commonwealth, the Department has developed this new set of guidelines for schools to use in technology planning. These guidelines are not mandated, but rather recommended benchmarks¹ for districts to meet by the end of the school year 2006 to 2007. The Department will use these guidelines to gauge the progress of districts' implementation in order to approve their technology plans annually.

Benchmark 1

Commitment to a Clear Vision and Mission Statement

- A. The district's technology plan contains a realistic and clearly stated set of goals and strategies that align with the district-wide school improvement plan. It is committed to achieving its vision by the end of the school year 2006-2007.
- B. The district has a technology team with representatives from a variety of stakeholder groups. The technology team has the support of the district leadership team.
- C. Budget
 1. The district has a budget for its local technology plan with line items for technology in its operational budget.
 2. The budget includes staffing, hardware, software, professional development, support, and contracted services.
 3. The district leverages the use of federal, state, and private resources.

¹ The word *benchmark* in this document is defined as a reference point in the implementation of the local technology plan.

D. Evaluation

1. The district evaluates the effectiveness of technology resources toward attainment of educational goals on a regular basis. Prior to purchasing the district assesses the products and services that are needed to improve teaching and learning.
2. The district's technology plan includes an evaluation process that enables the district to monitor its progress in achieving its technology goals and to make mid-course corrections in response to new developments and opportunities as they arise.

Benchmark 2

Technology Integration

A. Teacher and Student Use of Technology

1. (a) Outside the Classroom

At least 85% of teachers use technology everyday, including some of the following areas: lesson planning, administrative tasks, communications, and collaboration. Teachers share information about technology uses with their colleagues.

(b) Within the Classroom

At least 85% of teachers use technology appropriately with students each week, including some of the following areas: research, multimedia, simulations, data interpretation, communications, and collaboration.

2. At least 85% of students from grades 5 to 8 show proficiency in all the Massachusetts Recommended PreK-12 Instructional Technology Standards for Grades 5 to 8.
3. At least 90% of teachers are working to meet the proficiency level in technology, and by the school year 2006-2007, 60% of teachers will have reached the proficiency level as defined by the Massachusetts Technology Self-Assessment Tool (TSAT)².
4. The district has a Children's Internet Protection Act (CIPA) compliant Acceptable Use Policy (AUP) regarding Internet use.

B. Staffing

1. The district has a full-time equivalent (FTE) district-level technology director/coordinator.
2. The district provides one FTE instructional technology teacher per 40-80 instructional staff.
3. The district has one FTE person dedicated to data management and assessment.

Benchmark 3

Technology Professional Development

- A. By the end of the school year 2006-2007, at least 85% of district staff will have participated in 45 hours of high-quality technology professional development covering technology skills and the integration of technology into instruction.
- B. Technology professional development is sustained and ongoing and includes coaching, modeling best practices, district-based mentoring, and study groups. The professional

² TSAT is based on "Educational Technology Standards and Performance Indicators for All Teachers" (http://cnets.iste.org/teachers/t_stands.html) developed by National Educational Technology Standards (NETS) and the STaR (School Technology and Readiness) Chart (<http://www.doe.mass.edu/boe/sac/edtech/star.html>) developed by the Educational Technology Advisory Council (ETAC).

development includes concepts of universal design and scientifically based, researched models.

- C. Professional development planning includes an assessment of district and teachers' needs. The assessment is based on the competencies listed in the Massachusetts Technology Self-Assessment Tool³. The Department, the Educational Technology Advisory Council and stakeholders will review the levels of competencies in the Massachusetts Technology Self-Assessment Tool on an annual basis.

Benchmark 4

Accessibility of Technology

- A. Students per Instructional Computer
 - 1. The district has an average ratio of fewer than five students per high-capacity, Internet-connected computer. The Department will work with stakeholders to review the capacity of the computer on an annual basis. (The ultimate goal is to have a one-to-one, high-capacity, Internet-connected computer ratio.)
 - 2. The district considers students' access to portable and/or handheld electronic devices appropriate to their grade level.
 - 3. The district has established a computer replacement cycle of six years or less.
- B. Technical Support
 - 1. The district makes a commitment to provide timely in-classroom technical support with clear information on how to access the support, so that technical problems will not cause major disruptions to curriculum delivery.
 - 2. The district provides a FTE network administrator.
 - 3. The district provides at least one FTE person to support 100-200 computers. Technical support can be provided by dedicated staff or contracted services.

Benchmark 5

Infrastructure for Connectivity

- A. Internet Access
 - 1. The district provides connectivity to the Internet in all classrooms in all schools including wireless connectivity, if appropriate.
 - 2. The district provides bandwidth of at least 10/100 MB to each classroom.
- B. Networking (LAN/WAN)
 - 1. The district provides a minimum 10/100 MB Cat 5 switched network and/or 802.11b/g wireless network.
 - 2. The district provides services for secure file sharing, backups, scheduling, email, and web publishing, either internally or through contracted services.
- C. E-Learning Environments
 - 1. The district encourages the development and use of innovative strategies for delivering specialized courses through the use of technology.

³ Districts and teachers may use the TSAT online interactive application available on VES (Virtual Education Space) or a locally developed application.

2. The district deploys IP-based and or ISDN-based connections for access to web-based and/or interactive video learning on the local, state, regional, national, and international level.
3. Classroom applications of e-learning include courses, cultural projects, virtual field trips, etc.

Benchmark 6

Access to the Internet Outside the School Day

- A. The district maintains an up-to-date web site that includes information for parents.
- B. The district works with community groups to ensure that students and staff have access to the Internet outside of the school day.
- C. The district web site includes an up-to-date list of places where students and staff can access the Internet after school hours.

In developing these benchmarks, we used the Massachusetts STaR Chart (School Technology and Readiness Chart) developed by the state's Educational Technology Advisory Council (ETAC). Derived from the chart created by the CEO Forum and adapted by Texas, the STaR Chart was adapted locally in collaboration with district technology directors. The Massachusetts Department of Education has incorporated indicators from the STaR Chart into these benchmarks, as shown in the table below.

Benchmark Standards	STaR Chart Indicators
Benchmark 1-A	Column L
Benchmark 1-B	
Benchmark 1-C	Column O
Benchmark 1-D	
Benchmark 2-A	Columns B, D, E, and G
Benchmark 2-B	Column N
Benchmark 3-A	
Benchmark 3-B	Column I
Benchmark 3-C	
Benchmark 3-D	
Benchmark 4-A	Columns R and V
Benchmark 4-B	Column M
Benchmark 5-A	Column S
Benchmark 5-B	Column U
Benchmark 5-C	Column T
Benchmark 6-A	
Benchmark 6-B	Column R
Benchmark 6-C	Column R

Appendix C

No Child Left Behind Title II D Technology Enhancement Grants (Fund Code 170)

Annual Report 2002-2003 School Year Summary for the First Year of Two-Year Grants

The No Child Left Behind Title II D Technology Enhancement grant program supports school districts in the development of two-year sustainable projects that use technology to improve student academic achievement. To meet this end, these grants assist every student in becoming technologically literate, provide high quality professional development that uses research-based instructional strategies to integrate technology effectively into instruction, and provide specialized or rigorous courses through online distance learning.

During the 2002-03 school year, a total of **\$2,467,690** was awarded for this competitive grant program. Through this program, **23 projects** were funded, and **52 districts (including 26 high need districts that partnered with other districts)** benefited from the program. This document provides a summary of how the funds were used. More detailed descriptions of the projects as well as contact information can be found at: <http://www.doe.mass.edu/edtech/grants/fy03/te.pdf>

The following table shows statistics for teachers who received professional development through Technology Enhancement Grants.

Professional Development Participation
Total number of professional development participants: 2,732
Average number of professional development participants per project: 119
Total hours of professional development: 58,064 hours
Average hours of professional development per project: 2,525 hours

The following table shows spending on professional development.

Professional Development
Average percentage of funds spent in this area: 53%
Approximately \$1,307,895 spent on professional development

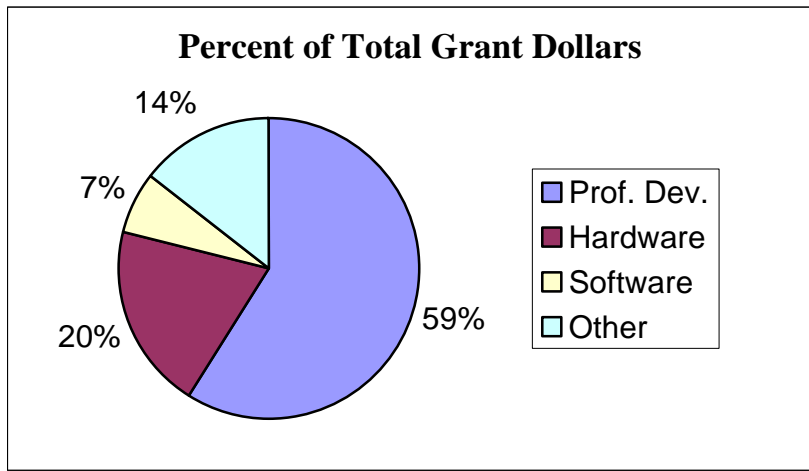
The following two tables show spending on hardware, software, and online purchases.

Funds Used for Hardware Purchases
16 of 23 districts used funding for these purchases
Average percentage of funds spent in this area: 18%
Approximately \$448,853 spent on hardware purchases

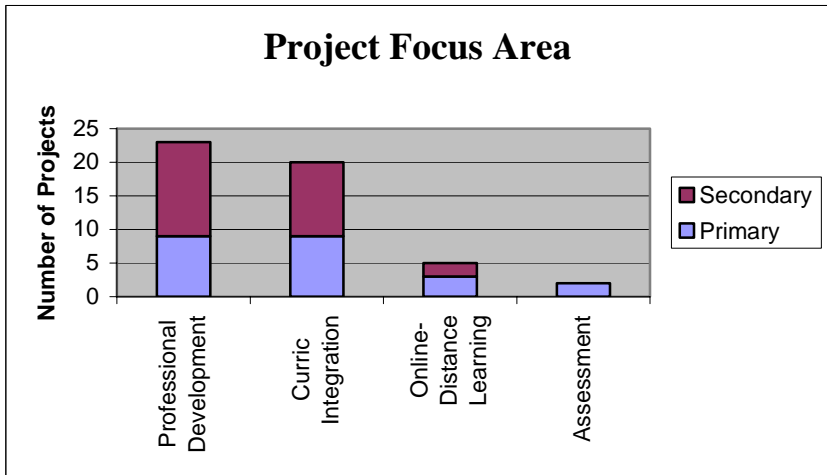
Funds Used for Software/Online Service Purchases:
16 of 23 districts used funding for these purchases
Average percentage of funds spent in this area: 6%
Approximately \$147,795 spent on software/online service purchases

The usage of funds significantly exceeded the NCLB requirement of 25% for professional development, as shown below.

Use of Grant Dollars			
Professional Dev.	Hardware	Software	Other
53%	18%	6%	13%

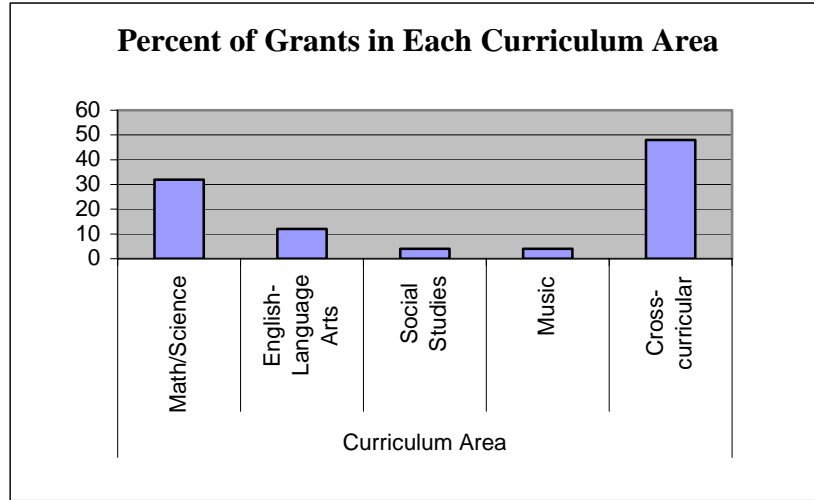


While all 23 grants contain a significant professional development component, nine have this as a primary focus. Similarly, nine deal primarily with technology integration into the curriculum, two address the use of technology for assessment, and five use online distance learning to deliver a significant part (greater than 30%) of their professional development. The total number of projects for each area is shown on the bar, which is split into the primary and secondary focus.



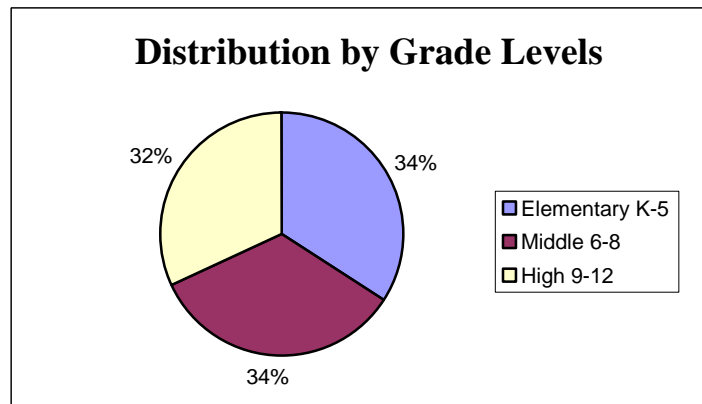
The technology integration projects cover all areas of the curriculum. Eight have a specific focus on math and/or science, three are specific for English-language arts, one is social studies, one is music and 11 are cross-curricular projects.

Percent of Grant Projects in Each Curriculum Area				
Math/Science	English-Language Arts	Social Studies	Music	Cross-curricular
32%	12%	4%	4%	48%



The distribution of projects across grade levels was approximately equal for elementary, middle and high school. Some projects overlap (include both middle and high school or impact K through 12); these are counted at both (or all three) levels.

Level of Impact of Project		
Elementary	Middle	High School
16	16	15



Appendix D

No Child Left Behind Title II D

Model Technology Integration Grants (Fund Code 165) Final Report 2002-2003 School Year

The Fund Code 165 grant program enables teachers to disseminate exemplary curriculum projects that use advanced technology to support student learning of content aligned with the Massachusetts Curriculum Frameworks. Teachers also learn how to integrate classroom instruction with the Massachusetts Recommended PreK-12 Instructional Technology Standards to increase technology literacy in students.

During the 2002-03 school year, a total of **\$915,125** was awarded for this competitive technology grant. This funding came from the USDOE through Title IID: Enhancing Education through Technology. Through this grant, **31 projects** were funded, and **41 districts (including 31 high need districts that partnered with other districts)** benefited from the grant. This document is a summary report of how the funds were used, as well as a basic description of projects along with relevant links. More detailed descriptions of the projects as well as contact information can be found at: <http://www.doe.mass.edu/edtech/grants/fy03/mti.pdf>.

The following table shows statistics for teachers who received professional development through Model Technology Integration Grants.

Professional Development Participation
Total number of professional development participants: 595
Average number of professional development participants per project: 19
Total hours of professional development: 1320 hours
Average hours of professional development per project: 43 hours

The following table shows spending on professional development.

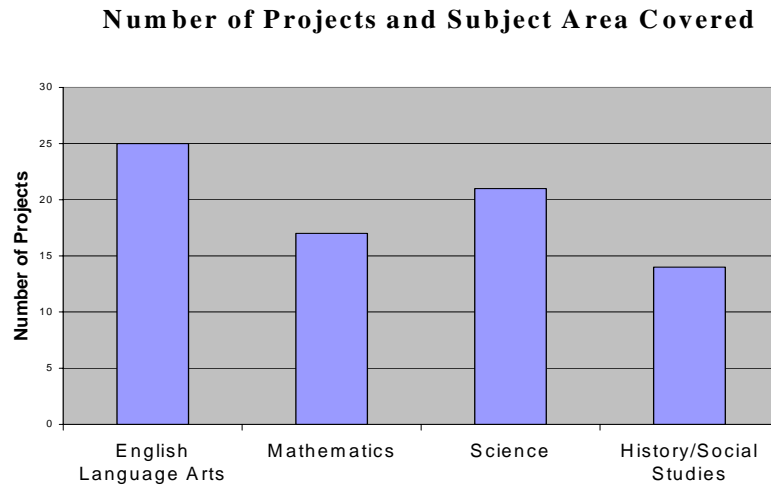
Professional Development
31 of 31 districts used funding in this area
Average percentage of funds spent in this area: 39.92%
Approximately \$365,318 spent on professional development

The following two tables show spending on hardware, software, and online purchases.

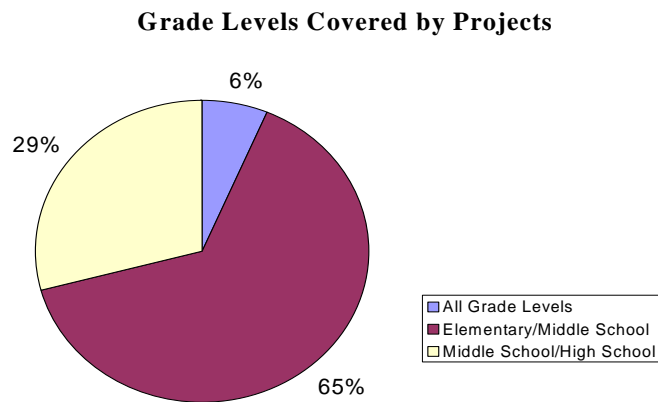
Funds Used for Hardware Purchases
31 of 31 districts used funding for these purchases
Average percentage of funds spent in this area: 38.79%
Approximately \$354,977 spent on hardware purchases

Funds used for Software/Online Service Purchases:
24 of 31 districts used funding for these purchases
Average percentage of funds spent in this area: 13.77%
Approximately \$126,013 spent on software/online service purchases

This grant program focused on exemplary curriculum projects that use advanced technology. The following graph shows the number of projects in each curriculum area.



The following graph shows the number of projects at each grade level.



Estimated Total Students Impacted: 23,351
 Average Number of Students Impacted in Each Project: 778



Massachusetts Department of Education

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