



Massachusetts Department of
ELEMENTARY & SECONDARY
EDUCATION

Technology in Massachusetts Schools

An annual report based on data submitted by districts in 2009

April 2010

Massachusetts Department of Elementary and Secondary Education
75 Pleasant Street, Malden, MA 02148-4906
Phone 781-338-3000 TTY: N.E.T. Relay 800-439-2370
www.doe.mass.edu



This document was prepared by the
Massachusetts Department of Elementary and Secondary Education
Mitchell D. Chester, Ed.D
Commissioner

The Massachusetts Department of Elementary and Secondary Education, an affirmative action employer, is committed to ensuring that all of its programs and facilities are accessible to all members of the public.
We do not discriminate on the basis of age, color, disability, national origin, race, religion, sex or sexual orientation.
Inquiries regarding the Department's compliance with Title IX and other civil rights laws may be directed to the Human Resources Director, 75 Pleasant St., Malden, MA 02148 781-338-6105.

© 2010 Massachusetts Department of Elementary and Secondary Education
Permission is hereby granted to copy any or all parts of this document for non-commercial educational purposes. Please credit the "Massachusetts Department of Elementary and Secondary Education."

This document printed on recycled paper

Massachusetts Department of Elementary and Secondary Education
75 Pleasant Street, Malden, MA 02148-4906
Phone 781-338-3000 TTY: N.E.T. Relay 800-439-2370
www.doe.mass.edu



Contents

Introduction	1
Organization of This Report.....	1
1. Clear Vision and Implementation Strategies	2
Technology Planning.....	2
Technology Budget	2
2. Technology Integration and Literacy.....	3
Use of Technology	3
Staffing for Technology Integration.....	4
Technology Proficiency.....	5
3. Technology Professional Development	8
4. Accessibility of Technology	9
Computers.....	9
Computer Replacement Policy	12
Other Technologies	12
Maximizing Access to the Curriculum.....	13
Accessible Instructional Materials	13
Digital Curriculum Materials	14
Connectivity	15
Access to the Internet Outside the School Day	15
Technical Support.....	16
5. E-Learning and Communications	17
Distance Education.....	17
Conclusion.....	18
Appendix	19
Local Technology Plan Guidelines	19

Introduction

As the Massachusetts Educational Technology Advisory Council pointed out in its vision statement, “In all sectors of society, the instruments of technology have become essential to research, analyze, evaluate, synthesize, create, and communicate. Massachusetts’ students must be prepared to use these instruments in learning science, mathematics and the humanities and how to succeed in a global society facilitated by technology.”¹

The Department is pleased to have recommended guidelines describing the conditions needed for effectively integrating technology into teaching and learning. The *Local Technology Plan Guidelines*² can help districts as they grapple with how to most effectively use their technology funds.

The *Local Technology Plan Guidelines* serve as the basis for the Department’s annual technology data collection. This report takes a look at the data submitted by Massachusetts school districts, examining the progress Massachusetts school districts are making in meeting the recommended guidelines. In doing so, it will gauge the degree to which local schools are ready to use technology to enhance teaching and learning. District leaders can use this information, along with their local technology data, to help identify areas where they are falling behind and where the infusion of technology stimulus funds is likely to have the greatest impact. For example, some schools have only a few computers, making them virtually inaccessible for regular use in instruction. In other schools, the Internet bandwidth may not be sufficient to access the rich online resources that engage students and help them learn. Even in schools that have an adequate technology infrastructure, there are teachers who have not had enough training to be able to use the technology effectively for instruction.

Organization of This Report

Because this report focuses on districts’ technology readiness as defined by the *Local Technology Plan Guidelines*, its organization follows the five areas covered by the guidelines:

1. Clear Vision and Implementation Strategies
2. Technology Integration and Literacy
3. Technology Professional Development
4. Accessibility of Technology
5. E-Learning and Communications

¹ Massachusetts Educational Technology Advisory Council (ETAC), FY 2009 Council Statement, available at <http://www.doe.mass.edu/boe/sac/edtech/>

² The *Local Technology Plan Guidelines (School Year 2007-2008 through 2010-2011)* are included in the Appendix of this report. They are also available online at <http://www.doe.mass.edu/edtech/planning.html>.

1. Clear Vision and Implementation Strategies

Technology Planning

Developing a technology plan can help a school district clarify its goals and focus its efforts so that it can best leverage technology to improve student achievement. 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. The Department's technology guidelines provide recommendations that can help districts in developing their technology plans.

A state-approved technology plan is a requirement for eligibility for the federal Title IID competitive technology grants and E-rate discounts. To receive approval from the Department, a district must first develop a three- to five-year plan. Each year, as part of the approval process, the Department asks every district to submit a Tech Plan Implementation Report through the Department's secure web portal. The Department reviews this information, along with the district's long-range plan, to issue an approval letter. To facilitate this process, the Department asks the district to post its long-range plan on its website.

Technology Budget

In planning, it is important to take into account all of the costs associated with the use of technology. For example, it would be unwise to purchase technology without allocating funds for things like professional development, maintenance, and technical support.

According to data reported by districts to the Department's School Finance Office, the average Massachusetts school district spent \$229 per student on technology-related expenditures in 2008-2009³, a slight increase from last year's \$212. This figure includes spending from all sources, including school committee appropriations, municipal appropriations, grants, and special funds. Included in the per-student average are expenditures for building technology, networking and telecommunications, district-wide information management and technology, technology maintenance, capital technology, other instructional hardware, classroom instructional technology, and instructional software. Note that, while the expenditure categories include salaries and contracted services, they do not include technology professional development.

³ Further details about district expenditures are available at http://finance1.doe.mass.edu/statistics/function09_note.html.

2. Technology Integration and Literacy

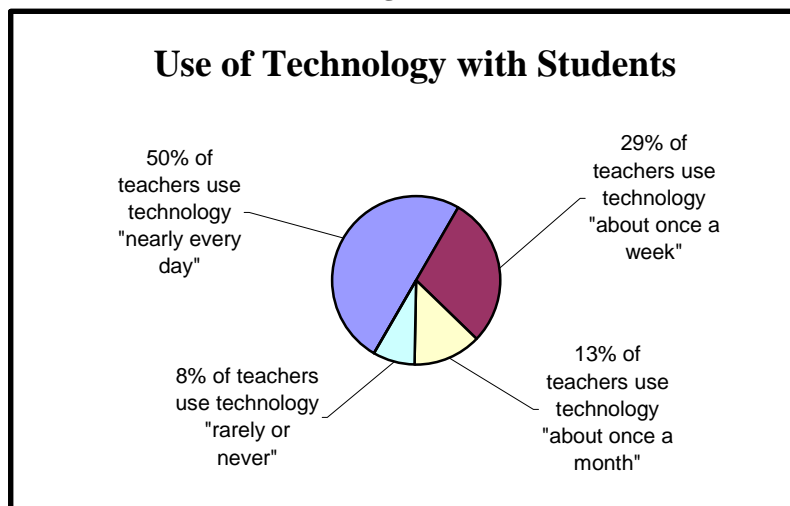
Use of Technology

The *Massachusetts Technology Literacy Standards and Expectations*⁴ explain how using technology can add value to instruction: “As technology tools become an integral part of the learning environment, and as students gain the knowledge and skills to use them appropriately, new opportunities for learning open up. Dynamic geometric applets, for example, can help students visualize and understand complex mathematics concepts. Simulation software enables students to investigate models of real-world problems such as climate change and population growth. Basic tools such as spreadsheet and database applications can be applied across the curriculum to analyze and solve problems. Even basic word processing software can encourage students to organize their thoughts and revise their work.”

Teacher Use of Computers with Students

The Department’s technology guidelines recommend that at least 85 percent of teachers use technology each week with their students. According to the data submitted by districts, the percentage of teachers using technology with their students "about once a week" or more was about 78 percent, a modest increase since 2008. The percentage of teachers using technology on a daily basis with students has also increased from 47 percent to 50 percent, as Figure 1 illustrates.

Figure 1



To gauge technology use, 28 percent of districts used the Department’s Teacher Technology Use Survey⁵, while 39 percent of them used a locally developed survey.

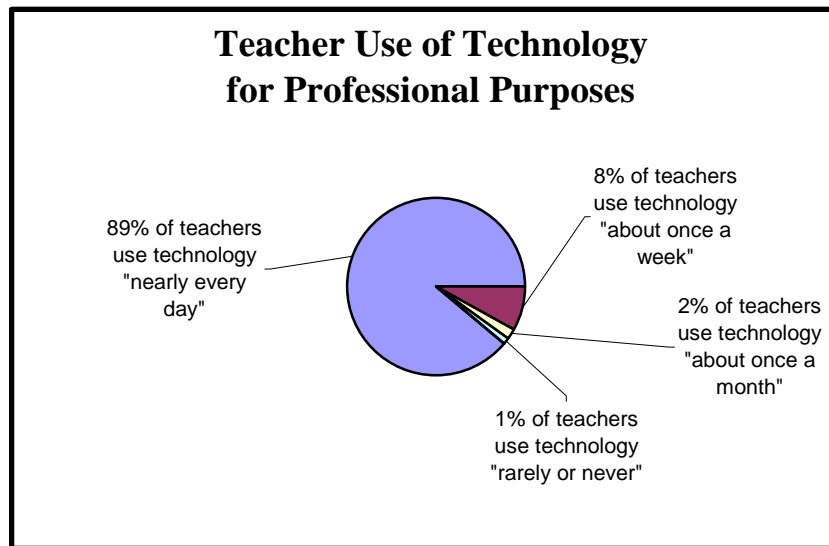
⁴ The *Massachusetts Technology Literacy Standards and Expectations* are available at <http://www.doe.mass.edu/edtech/standards.html>

⁵ The Teacher Technology Use Survey is available at <http://www.doe.mass.edu/edtech/techplan/>.

Nearly half of the districts used more than one method. These methods included things like formal assessments, classroom observations by the principal, and feedback from the technical support staff.

The Department's guidelines also recommend that at least 85 percent of teachers use technology outside the classroom every day for professional purposes such as lesson planning, administrative tasks, communications, and collaboration. District data for 2009 show that 89 percent of teachers used technology professionally every day, up from 86 percent in the previous year.

Figure 2



Staffing for Technology Integration

Since technology changes quickly and the number of available resources is immense, teachers need ongoing support in order to make the best use of technology. The people usually responsible for curriculum integration support are instructional technology specialists, media specialists, and library teachers. The support they provide typically includes researching, locating and evaluating curriculum resources, identifying effective practices that incorporate technology, and providing professional development. In addition, these people may take the responsibility for ensuring that teachers and students meet the instructional technology standards. To carry out all of these functions, the curriculum integration person's activities may include mentoring, consulting with teachers, modeling effective teaching with technology, collaborating with teachers to develop appropriate, technology-rich lessons, and providing workshops on technology integration.

To help teachers integrate technology into their teaching, the Department's technology guidelines recommend that schools have at least one full-time-equivalent person to support up to 80 teachers. Currently only a handful of districts meet this recommendation

for curriculum integration support. Based on data reported by districts, the average curriculum integration staff person is currently supporting more than 400 teachers.

Technology Proficiency

Student Technology Literacy

The *Massachusetts Technology Literacy Standards and Expectations*⁶, approved by the Board of Elementary and Secondary Education in 2008, define what students should know and be able to do in order to be considered technologically literate.

The technology standards comprise three broad categories. Standard 1 includes proficiency in basic productivity tools as well as a conceptual understanding of technology systems. Standard 2 relates to understanding of ethics and safety issues in using electronic media. Standard 3 asks students to apply a wide range of technology tools to their learning of the curriculum. The standards recommend that students learn technology skills within the context of the curriculum, to enhance their learning of both the technology skills and the subject matter.

Districts were asked to report the percentage of students in grade 8 who fell into each of three categories: those who had mastered all or most of the skills for their grade span, those who had mastered about half of them, and those who had mastered less than half of them. The data show nearly the same levels of mastery as last year.

Table 1

Student Technology Literacy	
<i>Statewide Averages Based on District Reports</i>	
Students have mastered . . .	Percent of grade 8 students
all or nearly all of the skills for their grade span	58%
half or more than half of the skills for their grade span	30%
less than half of the skills for their grade span	13%

The most common method used to determine students' levels of technology literacy, used by 48 percent of the reporting districts, was the use of a teacher survey. In addition, more than one-third of the districts used multiple methods, including informal interviews with staff or observations in their computer labs. To obtain more specific data, 36 percent of districts assessed technology literacy at the individual student level, with approximately

⁶ The *Massachusetts Technology Literacy Standards and Expectations* are available at <http://www.doe.mass.edu/edtech/standards.html>

half of these districts using a student survey and two-thirds of them using some kind of student assessment.

Districts have a special responsibility to help students understand Standard 2, which deals with ethics and safety issues when using technology. The Department's *Local Technology Plan Guidelines* state that districts should have an Acceptable Use Policy regarding Internet and network use. According to district reports for 2008-2009, 99 percent of schools had such a policy, and 93 percent of districts were providing formal instruction about the responsible use of technology, including ethics and safety issues. In addition, 92 percent of districts included this policy in their student handbook, while 95 percent included it on their school or district website.

Learning about Internet Safety

With students increasingly using the Internet both at school and in the community, students need to learn about the potential risks associated with being online. The 2008 Broadband Data Improvement Act includes a section designed to protect children. The law adds a requirement to the Internet Safety Policy that each district must have in order to receive funding from E-Rate and technology grants. Districts must educate minors about "appropriate online behavior, including interacting with other individuals on social networking websites and in chat rooms and cyberbullying awareness and response." This requirement is included in the Children's Internet Protection Act (CIPA) assurance that districts sign when applying for technology funding.

In order to teach students about the responsible use of technology, educators themselves need to be informed. According to district reports for 2008-2009, 86 percent of schools provided formal instruction to staff on this topic.

Teacher Technology Literacy

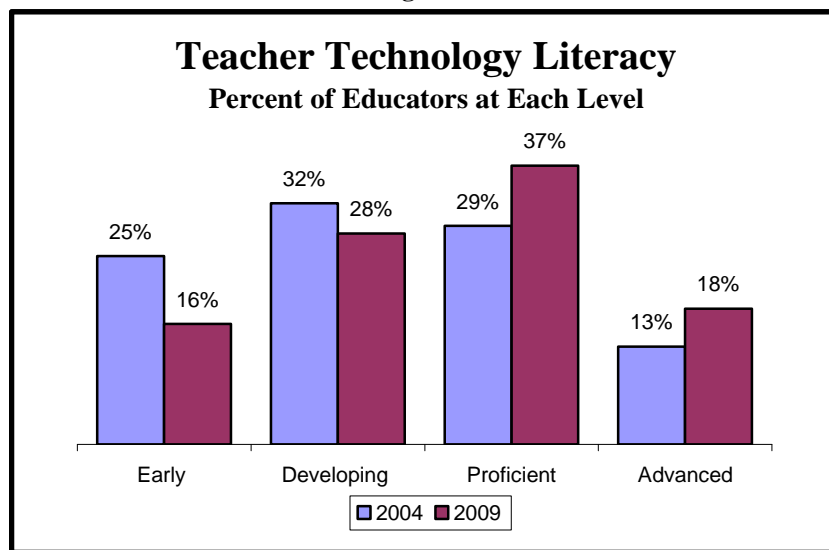
In order to help students become technologically literate, teachers must also be fluent with technology. To help teachers determine their own levels of technology proficiency and determine their need for professional development, the Department provides the online Technology Self-Assessment Tool (TSAT)⁷. This interactive tool, which aggregates teacher data, is available through the Department's MassONE portal. (In order to preserve the privacy of individual users, the MassONE TSAT reports only aggregated data, as opposed to data from individual teachers.) For those who prefer to print out a paper checklist, a PDF file is available on the Department's website.

Districts were asked to use either the TSAT application or their own methods. In 2009 59 percent of districts used either the TSAT or a locally developed survey aligned to the TSAT. Many districts used multiple methods to determine teachers' technology proficiency. These methods included observations by the technology staff, teacher requests for professional development and support, and feedback from administrators.

⁷ Information about the TSAT is available at http://www.doe.mass.edu/edtech/standards/sa_tool.html. The Department is in the process of updating the TSAT so that it will align with the new standards for students.

The TSAT has four levels, each of which lists an average of 25 skills. The four levels were created to align with the levels in the Massachusetts STaR Chart⁸, a tool that helps districts assess their readiness to use technology to improve student learning. To take the TSAT, teachers begin at the lowest level (Early Technology), checking off the skills they know and progressing to the next level once they have mastered the skills at each level. As the Figure 3 illustrates, there has been considerable progress in teacher technology literacy since the TSAT was first used in 2004. The number of teachers who are at the Early Technology level has decreased, while the number at the Advanced level has increased. This is good news, because it means that more teachers will be able to help their students develop the skills they need to succeed in higher education and the job market.

Figure 3



⁸ The Massachusetts STaR (School Technology and Readiness) Chart is available at <http://www.doe.mass.edu/boe/sac/edtech/star.html>

3. Technology Professional Development

According to numerous studies, in order for technology to impact student learning, teachers need to receive adequate and appropriate professional development⁹. Massachusetts districts are addressing the need for technology professional development, reporting, on average, that 76 percent of their teachers received some type of technology training in 2008-2009.

Districts indicated that about half of their teachers received formal professional development such as technology workshops, summer institutes, credit courses, or study groups. In addition, 61 percent of the teachers received ongoing technology professional development such as coaching and co-teaching. This use of ongoing professional development is in line with the Massachusetts State Plan for Professional Development's recommendation that professional development provide "on-the-job, informal support throughout the school year."¹⁰

Although the percentage of educators receiving online professional development is still less than those receiving other types, 239 districts reported some use of online professional development.

Table 2

Types of Technology Professional Development Received	
Professional development type	Percent of staff who received it
Formal professional development	51%
Ongoing professional development	61%
Online professional development	12%
Any type of professional development	76%

⁹ 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.

¹⁰ The Massachusetts State Plan for Professional Development is available at <http://www.doe.mass.edu/pd/stateplan/>.

4. Accessibility of Technology

In order to support teachers as they prepare students for higher education and careers, districts need to provide a robust technology infrastructure and ensure its reliability to maximize uptime for technology integration. In Massachusetts, districts can use the Department’s technology guidelines to assess their performance in these areas.

Computers

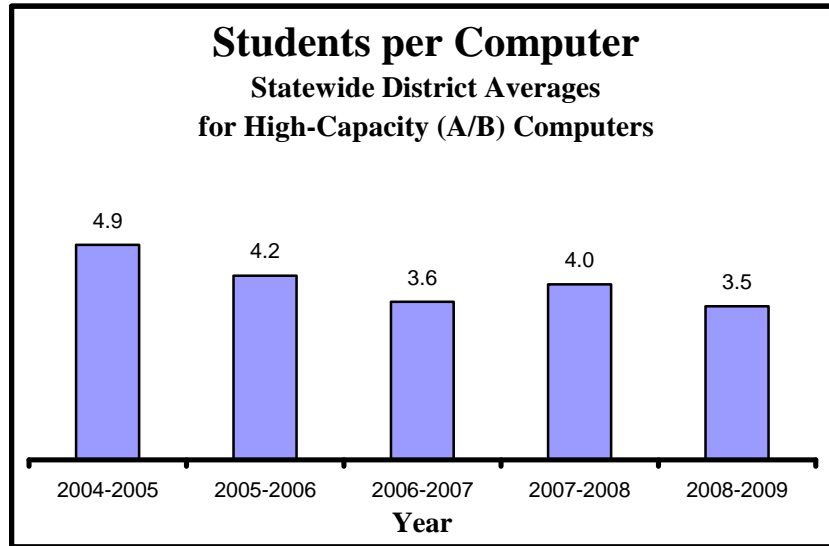
The Department updated the computer specifications in 2008 in collaboration with district technology directors. Type A computers are defined as “multimedia computers capable of running virtually all current software, including the latest high-end video and graphics programs.” Type B computers are defined as “multimedia computers capable of running most software except for the latest video and graphics programs.” Table 3 provides the specifications for memory and type of processor. Both Type A and B computers are considered “high-capacity computers.”

Table 3

Type of Computer	Specifications for 2008-2011
Type A	<u>Memory</u> : 1 GB RAM <u>Processor</u> : Windows 2.0 GHz CPU single or 1.0 GHz Dual Core or Macintosh G5 or better (or equivalent)
Type B	<u>Memory</u> : 256 RAM <u>Processor</u> : Windows 1.0-2.0 GHz CPU or Macintosh G4 or better running OSX (or equivalent)

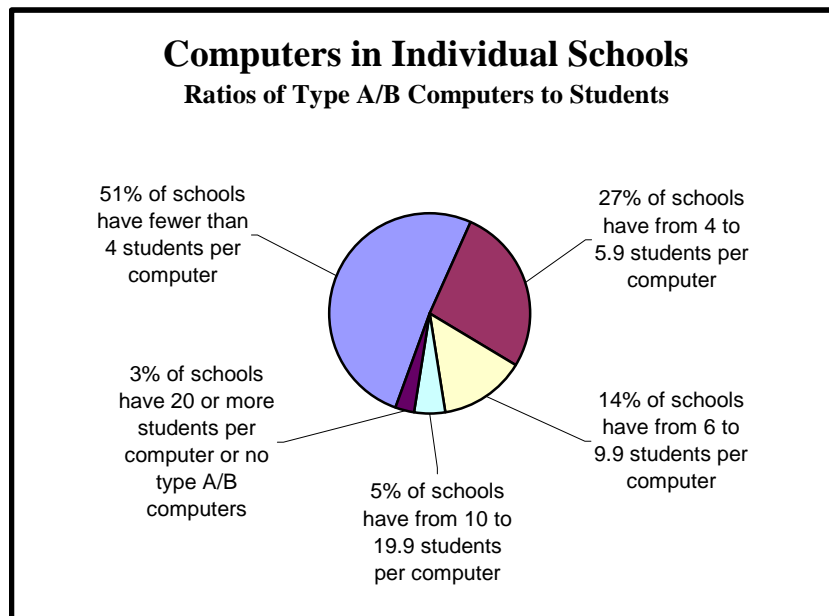
The Department’s guidelines recommend that districts maintain a ratio of fewer than five students per high-capacity Internet-connected computer. The ratios have been improving since 2004. The ratios worsened only slightly in 2008 when new specifications for high-capacity computers went into effect. This is good news, because it suggests that schools are purchasing new computers when the old ones are no longer able to meet all of their needs.

Figure 4



It is important to note that access to computers can vary greatly from one district to another. The disparity can be just as pronounced *within* districts, where one school may have a ratio five to ten times better than another school in the same district. (See Figure 5.) Unfortunately, a number of the schools with the worst ratios are middle or high schools, where students are in their final years of preparation for higher education and careers.

Figure 5



Simply having enough machines is not sufficient, however. Schools also need to be sure that the computer systems are up-to-date. Newer software applications, which are often more intuitive and engaging for students, generally require the use of robust computer operating systems and web browsers. Typically, older computers are not powerful enough to handle these new systems. Also, developers of technology products eventually stop supporting older operating systems, because it is not cost effective.

For school administrators, using older technology may result in difficulty accessing some of the Department's applications for submitting or accessing data. For teachers and students, older systems may preclude the use of some of the most innovative and engaging technology products, such as streaming video collections, interactive curriculum materials, and applications to assist students with disabilities.

According to the state technology guidelines, the goal is to eventually reach a ratio of one high-capacity computer for every student. According to the State Educational Technology Directors Association (SETDA), research from one-to-one laptop projects in other states has identified a number of positive outcomes, including an increase in student engagement and higher-order thinking skills, better grades and test scores, and higher rates of attending college.¹¹ Some Massachusetts schools are moving close to the goal of one-to-one computing; however, there is much room for improvement. In 2008-2009, just 1 percent of Massachusetts schools had a one-to-one ratio, while 10 percent of schools had ratios better than two-to-one, meaning that they had at least one computer for every two students.

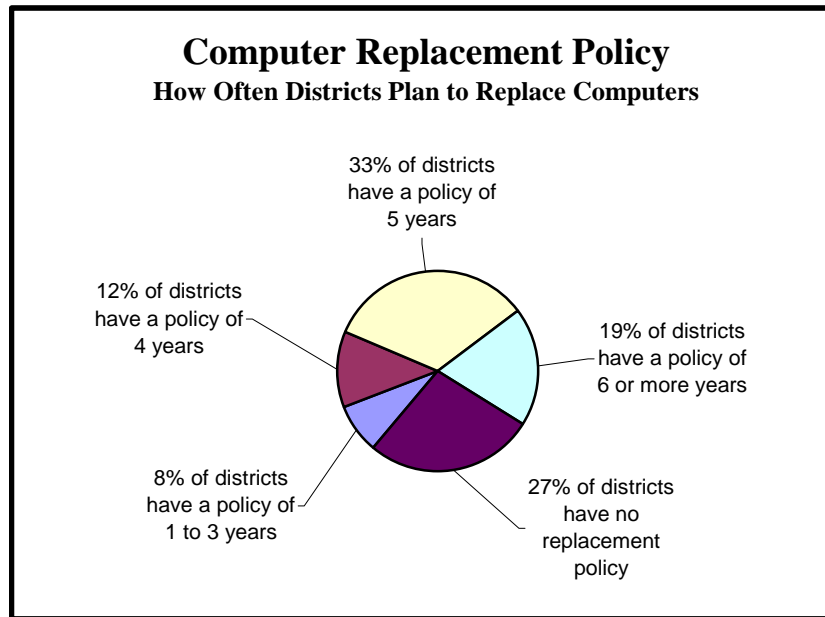
It is important to note that computer ratios may not give a full picture of the availability of computers to students. Even a school that appears to have a one-to-one ratio may not actually have a computer at every student's desk. Some of the computers may be located in places such as the school's library or computer labs. These labs may be reserved for computer classes, making them unavailable to teachers for curriculum projects.

¹¹ State Educational Technology Directors Association (SETDA), *2008 Gateway to Graduation Toolkit*, available at <http://www.setda.org/web/toolkit2008/student-engagement/program-examples> .

Computer Replacement Policy

In order to plan for the expenditures needed in order to provide up-to-date computers, it is a good idea to have a computer replacement policy. The percentage of districts that have such a policy has been rising and is currently at 73 percent. The average replacement cycle for those districts was 5 years. It should be noted that in lean budget years, districts may have difficulty implementing these policies.

Figure 6



Other Technologies

Many districts are investing in devices that can be used with their existing technologies to provide a richer, more engaging classroom experience. In some cases, these devices can help extend the reach of the existing technologies. For example, a digital projector allows the teacher to display whatever is on a computer, including video clips that relate to the lesson. The use of an interactive whiteboard with a projector enables teachers and students to interact with the projected image, making it possible to implement a variety of group activities. An interactive whiteboard also allows the teacher to save a digital version of anything written on the board; this can be helpful for students who need extra time to review the material. A digital video camera enables the teacher and students to create their own multimedia presentations, which can be edited on a computer and then shown to the class using the digital projector.

Over the past year, many districts have invested in additional digital projectors, interactive whiteboards, and video cameras for their schools. Table 4 presents ratios of the devices to classrooms. In other words, it shows how many classrooms need to share each device.

Table 4

Other Technologies in Schools	
<i>Ratios Based on District Reports</i>	
Technology device	Ratio of devices to classrooms
Digital projector	one for every 3 classrooms
Interactive whiteboard	one for every 8 classrooms
Video camera	one for every 15 classrooms

Maximizing Access to the Curriculum

Technology offers many ways to assist students with disabilities, as well as students whose first language is not English. For example, interactive whiteboards allow the teacher to save what is written on the board for students who have difficulty with note taking, while text-to-speech software allows students to hear text read aloud on the computer. For the 2008-2009 school year, 66 percent of districts reported that they included assistive technology in their professional development offerings for teachers.

Awareness of the importance of accessibility continues to be high, with 99 percent of schools reporting that they consider accessibility for all students when purchasing technologies. The availability of universally designed software also remains high. Defined as software with built-in features making it accessible to all students, universally designed software was reported to be available in 94 percent of school buildings in 2009.

A number of schools are using the services of MassMATCH, the state's federally funded assistive technology project coordinated by the Massachusetts Rehabilitation Commission. MassMATCH funds two regional assistive technology centers: one in Boston operated by Easter Seals and another in Pittsfield operated by United Cerebral Palsy. One of MassMATCH services is a short-term loan device program. This program allows educators to try out equipment with students as they assess what works best. MassMATCH also offers online services through which people can buy, sell, or give away equipment they no longer need, including a special service for schools.

Accessible Instructional Materials

As a result of legislation passed in 2006, most textbook publishers now send digital files to the National Instructional Materials Access Center (NIMAC) when asked to do so by a school that is purchasing books. Those files are made available to producers of Braille, large print, digital text, and audiobooks. Schools are able to access these materials for eligible students with disabilities, often at no cost, through state and federally funded providers: the Massachusetts Accessible Instructional Library (Braille), Recording for the

Blind and Dyslexic (specialized audio CDs and downloadable MP3 files), and Bookshare (downloadable text). According to reports from these organizations, Massachusetts school districts have been taking advantage of these services. In 2009-2010, 153 districts used the state's Accessible Instructional Materials Library, 356 districts and schools were registered for state-sponsored memberships with Recording for the Blind and Dyslexic, and 450 districts and schools were registered for federally supported Bookshare memberships.

From 2007 to 2009, Massachusetts joined 14 other states to participate in the Accessible Instructional Materials (AIM) Consortium organized by CAST (the Center for Applied Special Technology). Through this consortium, funded by a federal grant, Massachusetts has received funding, technical assistance, and an opportunity to collaborate with other states on how to best provide accessible instructional materials to students with disabilities. More than 100 Massachusetts educators participated in professional development funded through this program in 2008 and 2009. The AIM Consortium has produced a number of useful resources, which are available on the new website of the National Center on Accessible Instructional Materials.¹²

Digital Curriculum Materials

In 2009, 68 percent of districts indicated that they planned to purchase at least some of their curriculum materials in digital, rather than printed, formats. The use of digital materials offers some terrific benefits, such as the ability to engage students with multimedia and rich interactive resources. Digital text can also provide more options in terms of accessibility for students with disabilities. A major advantage of using digital materials is that many of them are available online at no cost.

A number of educators are using Teachers' Domain, a project of the WGBH Educational Foundation. Teachers' Domain provides access more than 2,200 high-quality digital media resources from public broadcasting, such as NOVA, Frontline, and American Experience, as well as from government agencies, museums, libraries and academic institutions. Most of the resources include background essays, discussion questions, and teaching suggestions. In 2009, Massachusetts Teachers' Domain was launched through a partnership with the Massachusetts Department of Elementary and Secondary Education. As a result, the resources have been aligned with the Massachusetts Curriculum Frameworks. Educators can view the alignment online once they complete a free registration process identifying themselves as Massachusetts teachers.

Educators are also taking advantage of the resources and training available through Verizon Thinkfinity. The Thinkfinity website provides teachers with over 55,000 educational resources, including standards-based, grade-specific, K-12 lesson plans and interactive tools and materials. All of these materials are reviewed by leading educational organizations to ensure that content is accurate and appropriate for students. Since 2007, the Verizon Foundation has provided annual grants to Lesley University and a partnership with the Massachusetts Department of Elementary and Secondary Education. These grants have allowed the Department to provide training to teachers to use the

¹² The National Center on Accessible Instructional Materials can be accessed at <http://aim.cast.org/>.

educational resources, as well as to validate the alignment of Verizon Thinkfinity resources with the Massachusetts Curriculum Frameworks.¹³

The popularity of digital curriculum materials underscores the importance of planning and supporting the use of technology. Although the materials may be free, educators and students may not be able to access them if, for example, the school's Internet connection is not sufficient or if the computers are outdated.

Connectivity

Districts continue to make progress in connecting their classrooms to the Internet. In 2008, 95 percent of districts reported that all of their classrooms were wired, up from 91 percent in the previous year. In addition, the average district had 99 percent of its classrooms and 98 percent of its computers connected to the Internet.

Although the data reported by districts suggests that most schools have high-speed connections, some of these connections may not be adequate for 21st century teaching and learning. Depending on how many computers are accessing the Internet simultaneously, a school's connection may not be sufficient to provide the needed access speeds. Moreover, according to a national report released in 2008 by the State Educational Technology Directors Association (SETDA),¹⁴ "schools will need to significantly upgrade their systems in order to keep pace with what children are accustomed to at home."

It is also worth noting that many schools are connected to the Internet through their district's wide area network. As a result, users in all of the district's schools are sharing an Internet connection. If too many computers are sharing a connection, teachers and students may not be able to access some of the rich digital resources that are beneficial in teaching and learning. Districts need to plan for current needs and future growth as they build their networks, as well as when they purchase additional computers to connect to existing networks.

The SETDA report recommends that, in order to provide the connectivity needed for technology-rich environments for the next five to seven years, districts need to provide an external connection to their Internet provider of at least 100 Mbps per 1,000 students/staff, and internal wide area network connections of at least 1 Gbps per 1,000 students/staff.

Access to the Internet Outside the School Day

It is important that students be able to go online to complete their homework so that they do not fall behind their peers. Since some students may not have Internet access at home, schools need to provide information on places that offer Internet access outside regular school hours.

¹³ Information about Verizon Thinkfinity and the Massachusetts partnership are available at <http://www.doe.mass.edu/edtech/teacher/thinkfinity.html> . /

¹⁴ *High-Speed Broadband Access for All Kids: Breaking through the Barriers* is available at <http://www.setda.org/web/guest/2020/broadband> .

The state guidelines recommend that schools provide information about places in the community where students can access the Internet before or after school. While 93 percent of schools provided this information, 66 percent of schools went a step further, allowing students to use the school's computers to access the Internet outside regular school hours. These schools offered access to students for an average of 8 hours per week before or after school. To further increase students' access to technology, 5 percent of schools (84 schools) allow students to take computers home.

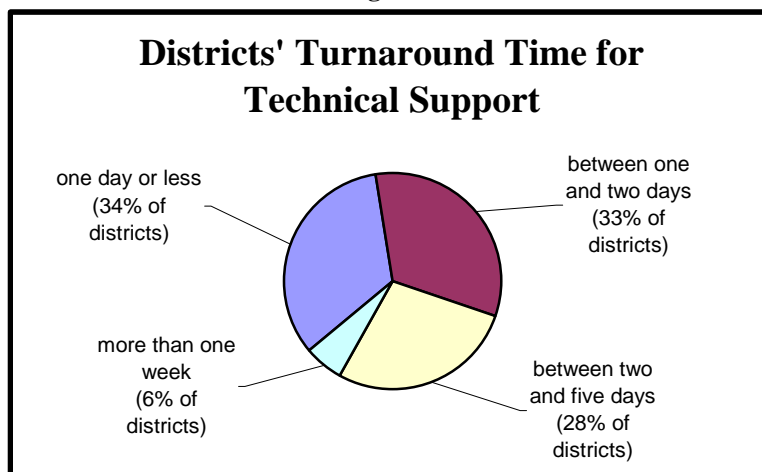
Technical Support

In order to minimize downtime and maximize the potential of technology to impact learning, the Department's technology guidelines recommend that districts have the equivalent of one full-time position (which can include contracted services) to support every 200 computers. In 2008-2009, fewer than 18 percent of districts had this level of support. On average, according to district data, a technical support person maintains approximately 477 computers.

Most districts employ multiple strategies to meet their technical support needs. Email is the most prevalent means of providing support, with 94 percent of districts using it, followed by phone support (85 percent of districts) and online support (61 percent of districts). Some districts reported other technical support strategies, including the use of contractors, students, paraprofessionals, and teacher leaders, to help with the workload. In addition, a number of districts are using online help desk applications to efficiently report and track requests for help. Several districts also reported the use of online tutorials to reduce the need for technical support.

Even with the increased number of computers to maintain, districts reported that technical support personnel were able to resolve problems in 2.5 days, on average, which is about the same as last year.

Figure 7



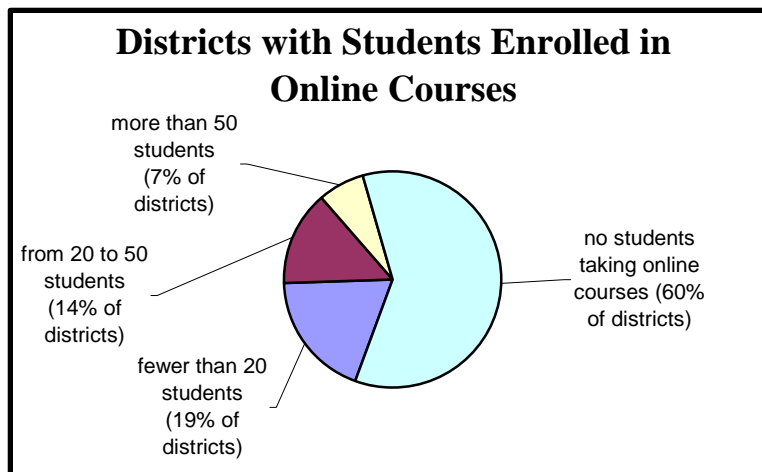
5. E-Learning and Communications

Distance Education

More than 12,000 Massachusetts teachers and students took online courses during the 2008-2009 school year, a 20 percent increase since the previous year. In addition, 73 percent of districts paid for or sponsored at least one online course for an educator or student.

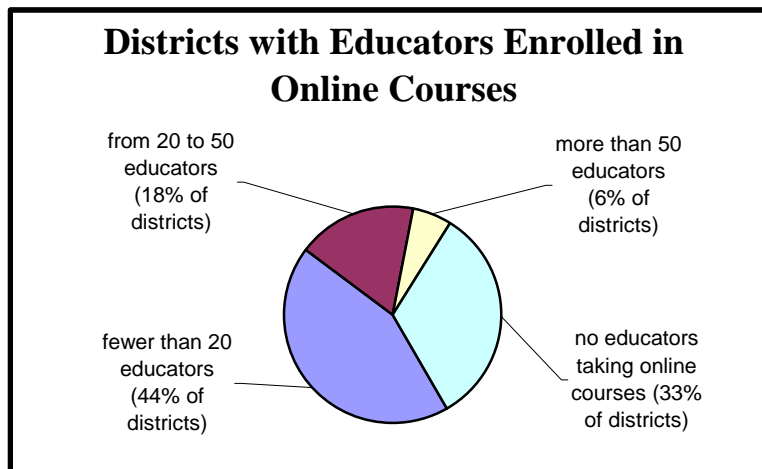
Statewide, 6,560 students took online courses in 2008-2009 that were paid for or sponsored by their district. These courses included all curriculum areas, with science courses offered in the greatest number of districts (28 percent of the districts reporting data), followed by mathematics (26 percent of districts), English language arts (26 percent of districts), and History and Social Science (26 percent of districts).

Figure 8



While 40 percent of districts reported at least one student taking an online course, 67 percent of districts reported at least one educator doing so. The total number of educators statewide who took courses or workshops sponsored by their districts was 5,400.

Figure 9



A number of Massachusetts educators also taught courses online. For 2008-2009, 24 percent of districts reported that one or more educators taught online professional development courses or workshops, while 19 percent of districts reported that one or more educators taught courses for students online. Many educators taught courses that involved teachers or students from other districts; however, a greater number of educators taught courses within their own districts. In all, 290 Massachusetts educators taught online professional development courses, while 151 educators taught online courses for students.

Conclusion

It is up to technology leaders to collaborate with their colleagues in other disciplines to explore ways that technology can help improve student learning and close the achievement gap. As the Educational Technology Advisory Council (ETAC) stressed in a recent statement, “Technology has created a vast new landscape of teaching and learning potential both in and out of schools. Teaching with technology creates many new opportunities for differentiated instruction that meet the needs of all students, regardless of ability.”¹⁵ As districts consider how they can best use the limited amount of available funding, technology leaders can provide valuable information on how new technologies can help advance the district’s goals.

This report has touched on key factors that contribute to the successful use of technology in teaching and learning, including a robust infrastructure, ample support for the use of technology, and increased professional development for teachers. District leaders need to keep these factors in mind as they plan how to strategically invest in and implement technology in their schools.

¹⁵ Massachusetts Educational Technology Advisory Council (ETAC), FY 2009 Council Statement, available at <http://www.doe.mass.edu/boe/sac/edtech/>.

Appendix

Local Technology Plan Guidelines

(School Year 2007-2008 through 2010-2011)

These guidelines are designed to help districts develop purposeful long-range technology plans. While not mandated, the guidelines represent recommended conditions for effectively integrating technology into teaching and learning.

There are several reasons that a school district should develop and maintain a technology plan. First, comprehensive planning helps the district take advantage of technology's power to improve teaching and learning. Technology has the power to engage and challenge students. Applications such as formative assessment tools can help teachers ensure that students are meeting the standards. By allowing teachers to access information about student learning, information systems make it possible for teachers to support individual students better. Online learning programs can increase the range of learning opportunities available to students, enabling them to study with experts and other students around the globe. Technology can also play a role in ensuring students' safety, by facilitating communication among school personnel and parents.

Funding is another reason technology planning is important. Every school district must have a long-range strategic technology plan approved by the Department of Education in order to be eligible for E-Rate discounts and federal and state technology grants. Each school district is required to develop a 3- to 5-year plan, which should be kept on file locally. Each year, as part of the technology plan approval process, the Department asks districts to report on the progress they have made in implementing their plans through the Department's secure web portal. The Department reviews this data, along with the district's long-range plan, to approve the district's plan. To facilitate this process, the Department asks the district to post its long-range plan on its website or to email a copy of the plan to the Department.

These guidelines are based on the School Technology and Readiness (STaR) Chart¹⁶ developed by the state's Educational Technology Advisory Council (ETAC). Using the STaR Chart, along with 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 benchmarks for districts to meet by the end of the school year 2010- 2011. The Department will use these guidelines to gauge the progress of districts' implementation in order to approve their technology plans annually.

¹⁶ Full text of the StaR Chart is available on the Department's website (<http://www.doe.mass.edu/boe/sac/edtech/star.html>).

Benchmark 1

Commitment to a Clear Vision and Implementation Strategies

- A. The district's technology plan contains a clearly stated and reasonable set of goals and implementation strategies that align with the district-wide school improvement plan. The district is committed to achieving its vision by the end of the school year 2010-2011.

- B. The district has a technology team with representatives from a variety of stakeholder groups, including school committee members, administrators, and teachers. The technology team has the support of the district leadership team.

- C. Needs Assessment
 - 1. The district assesses the technology products and services that will be needed to improve teaching and learning.
 - 2. The technology plan includes an assessment of the services and products that are currently being used and that the district plans to acquire.

- D. The district has a CIPA-compliant Acceptable Use Policy (AUP) regarding Internet and network use. The policy is updated as needed to help ensure safe and ethical use of resources by teachers and students.

- E. 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, infrastructure, hardware, software, professional development, support, and contracted services (including telephone services).
 - 3. The district leverages the use of federal, state, and private resources.
 - 4. For districts that plan to apply for E-rate reimbursement, the technology plan specifies how the district will pay for the non-discounted portion of their costs for the services procured through E-rate.

- F. Evaluation
 - 1. The district evaluates the effectiveness of technology resources toward attainment of educational goals on a regular basis.
 - 2. The district's technology plan includes an evaluation process that enables it to monitor its progress in achieving its goals and to make mid-course

corrections in response to new developments and opportunities as they arise.

Benchmark 2

Technology Integration and Literacy

A. Technology Integration¹⁷

1. Outside Teaching Time - At least 85 percent of teachers use technology every day, including some of the following areas: lesson planning, administrative tasks, communications, and collaboration. Teachers share information about technology uses with their colleagues.
2. For Teaching and Learning - At least 85 percent of teachers use technology appropriately with students every day to improve student learning of the curriculum. Activities include some of the following: research, multimedia, simulations, data interpretation, communications, and collaboration. (See the Massachusetts Technology Literacy Standards and Expectations¹⁸.)

B. Technology Literacy

1. At least 85 percent of eighth grade students show proficiency in all the Massachusetts Recommended PreK-12 Instructional Technology Standards for grade eight.
2. One hundred percent of teachers are working to meet the proficiency level in technology, and by the school year 2010-2011, 60 percent of teachers will have reached the proficiency level as defined by the Massachusetts Technology Self-Assessment Tool (TSAT)¹⁹.

C. Staffing

1. The district has a district-level technology director/coordinator.
2. The district provides one FTE instructional technology teacher per 60-120 instructional staff.
3. The district has staff dedicated to data management and assessment.

¹⁷ The Massachusetts Department of Elementary and Secondary Education defines technology integration as the daily use of technology in classrooms, libraries, and labs to improve student learning.

¹⁸ The Massachusetts Technology Literacy Standards and Expectations are available on the Department's website (<http://www.doe.mass.edu/edtech/standards.html>).

¹⁹ The Technology Self-Assessment Tool is available as an interactive tool on MassONE, as well as a printable PDF checklist (http://www.doe.mass.edu/edtech/standards/sa_tool.html).

Benchmark 3

Technology Professional Development

- A. At the end of three years, at least 85 percent of district staff will have participated in 45 hours of high-quality professional development²⁰ that includes 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, study groups, and online professional development. The professional 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 Tool.²¹
- D. Administrators and teachers consider their own needs for technology professional development, using the technology self-assessment tools provided by the Massachusetts Department of Elementary and Secondary Education or similar tools.²²

Benchmark 4

Accessibility of Technology

- A. Hardware Access
 - 1. The district has an average ratio of fewer than five students per high-capacity²³, Internet-connected computer. The Department will work with stakeholders to review the capacity of the computer on an annual basis. (The goal is to have a one-to-one, high-capacity, Internet-connected computer ratio.)
 - 2. The district provides students with access to portable and/or handheld electronic devices appropriate to their grade level.

²⁰ High quality professional development is described in the Massachusetts 2001 State Plan for Professional Development (<http://www.doe.mass.edu/pd/stateplan/>).

²¹ Details are available on the Department's website (http://www.doe.mass.edu/edtech/standards/sa_tool.html).

²² A sample administrator technology self-assessment tool is available on the Department's website (http://www.doe.mass.edu/edtech/standards/tsat_sampadmin.html). The Technology Self-Assessment Tool (TSAT) for teachers is also available as a printable document and as an interactive tool on MassONE (http://www.doe.mass.edu/edtech/standards/sa_tool.html).

²³ In 2007, the Department defined a high-capacity computer as a computer that has at least 256 RAM and either a Pentium 4 processor or a Macintosh G4 processor (or equivalent). The Department also refers to these as Type A computers.

3. The district maximizes access to the general education curriculum for all students, including students with disabilities, using technology in classrooms with universal design principles and assistive technology devices.
4. The district has procurement policies for information and instructional technologies that ensure usability, equivalent access, and interoperability.
5. The district provides classroom access to devices such as digital projectors and electronic whiteboards.
6. The district has established a computer replacement cycle of five years or less.

B. Internet Access

1. The district provides connectivity to the Internet in all classrooms in all schools including wireless connectivity, if possible.
2. The district provides bandwidth of at least 10/100/1 Gb to each classroom. At peak, the bandwidth at each computer is at least 100 kbps. The network card for each computer is at least 10/100/1 Gb.

C. Networking (LAN/WAN)

1. The district provides a minimum 100 Mb Cat 5 switched network and/or 802.11b/g/n wireless network.
2. The district provides access to servers for secure file sharing, backups, scheduling, email, and web publishing, either internally or through contracted services.

D. Access to the Internet Outside the School Day

1. The district works with community groups to ensure that students and staff have access to the Internet outside of the school day.
2. The district website includes an up-to-date list of places where students and staff can access the Internet after school hours.

E. Staffing

1. The district provides a network administrator.
2. The district provides timely in-classroom technical support with clear information about how to access the support, so that technical problems

will not cause major disruptions to curriculum delivery.

3. The district provides at least one FTE person to support 200 computers. Technical support can be provided by dedicated staff or contracted services.

Benchmark 5

E-Learning and Communications

- A. The district encourages the development and use of innovative strategies for delivering specialized courses through the use of technology.
- B. The district deploys IP-based connections for access to web-based and/or interactive video learning on the local, state, regional, national, and international level.
- C. Classroom applications of E-learning include courses, cultural projects, virtual field trips, etc.
- D. The district maintains an up-to-date website that includes information for parents and community members.
- E. The district complies with federal and state law²⁴, and local policies for archiving electronic communications produced by its staff and students. The district informs staff and students that any information distributed over the district or school network may be a public record.

²⁴ Information about state regulations is available from the state's Record Management Unit (<http://www.sec.state.ma.us/arc/arcrmu/rmuidx.htm>).