

**Medford Public Schools
Three Year Technology Plan
2008 – 2011**

September 24, 2008

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EXECUTIVE SUMMARY

This document contains the Three-Year Technology Plan for the Medford Public Schools developed by the Technology Advisory Committee. In developing the plan, we established a vision of the future Medford school educational environment enhanced by technology. We then, through an iterative process, developed an implementation plan that will, over a period of time, bring that vision to fruition.

The Technology Advisory Committee of the Medford Public Schools is composed of teachers, librarians, technology specialists, network services personnel, and parents. The Superintendent charged the committee with creating a plan that would build upon the district's strong commitment to technology and help guide the integration of technology in the schools.

The plan developed by the Technology Advisory Committee will be implemented over a three year period, and achievement of the plan's established goals will depend upon the resources available. Funding will be from a variety of sources including the school system's budget, building projects, grants, and capital expenditures.

The plan establishes a long-term vision for technology in Medford education: Medford Public Schools will be a leading community in the effective use of information technologies in education through our commitment to and achievement of technology integration.

The plan sets forth three major goals:

- I. Improve the integration of technology in the curriculum and its effectiveness.
- II. Maintain and further improve the technology infrastructure.
- III. Maintain and improve support services.

Full implementation of the proposed plan will require additional personnel, hardware, materials, and professional development/training. The committee believes that the plan will enhance the district's instructional program and enhance student learning.

This is an annual issue of the Three-Year Plan; it will be reviewed and updated on a yearly basis. The current revision focuses on the 2008/2009 school year and the two following years.

1. Technology Vision, Goals and Strategies

Vision Statement

Medford Public Schools is committed to: establishing the effective use of information technologies in education, to providing students with a high quality educational experience enhanced by the effective use of technology as a teaching/learning tool. providing students with technology skills needed to succeed in school in an ever changing technology rich world.

To achieve this vision Medford will provide:

- access to information technology resources within or exceeding the ratio and computing power mandated by state and federal government guidelines.
- networked resources that enable student, teacher, staff, and administrator communication and interaction.
- sufficient current resources and support for the advanced use of technology, including leading edge operating systems, hardware, networking, and applications.
- innovative ways to fund and implement the new technologies needed for district and school success.
- relevant and ongoing professional development to keep teachers at the forefront of the technology curve.

The Medford Public Schools will utilize technology:

As a medium for learning by:

- making available on-line resources to students;
- integrating technology learning and standards in the classroom;
- enriching student learning experiences;
- inspiring students to extend their work beyond what is presented by and to the teacher
- increasing creativity and imagination, by putting new skills and tools in the hands of students and educators and extending the bounds of what is possible within the curriculum.

As a way of extending the learning community by:

- providing a medium for more flexible communication throughout the learning community;
- facilitating communication between individuals and groups (teachers, students, parents, and administrators);
- increasing communication with and interaction in learning environments beyond Medford;
- increasing the sharing of learning where students can post or otherwise present their work; and enabling collaboration between and among groups of colleagues (teachers, students, and staff) as they learn and benefit from the capabilities of others.

As a means of transforming the learning environment by:

- facilitating opportunities to use new modalities and media to stimulate learning;
- providing an infrastructure that supports and extends the learning environment;
- encouraging experimentation, simulation, and exposure to new opportunities.

As a forum for enhancing the capabilities of our professionals by:

- accessing distance/virtual learning and attending workshops;

- providing resources for self-paced and just-in-time learning of technology and/or other curriculum topics; and
- collaborating with others to provide “classroom-ready” resource templates and technology-enriched project based units.

Goals and Strategies to Achieve Them

It is understood that individual schools may meet these goals at different times. Factors such as building projects, enrollment, funding, hardware, staffing, and networking issues will influence these accomplishments.

Technology Plan Goals	
I.	Improve the integration of technology in the curriculum and its effectiveness
II.	Maintain and improve existing infrastructure
III.	Maintain and improve support services

Specifically, Medford will utilize the following strategies to accomplish its three goals.

I. Improve the integration of technology in the curriculum and its effectiveness.

Strategy

Further incorporate technology into the curriculum

This will be accomplished by:

- developing a project-based curriculum.
- creating new technology elective courses for students.
- participating in the effective use of Blackboard.
- creating web-based connection between home, school, and community.

- locating creative financing via grants and federal resources.

Complete Standards-Based Education Project

The technology specialists will continue to help teachers develop lessons that incorporate the technology standards into other content areas. This will need to be an ongoing process as new technologies arise and content area curricula change.

Broaden professional development opportunities in technology

Professional development will be broadened by:

- Providing professional development in the area of project-based learning and integration of classroom technology.
- Developing new/advanced technology workshops/courses for the curriculum.
- Providing training and support for teachers to become lead technology teachers in their academic specialty.
- Creating technology study groups to develop teacher guides for integrating technology in the classroom.
- Providing more online training.

Please also see the section on professional development.

Utilize school-based technology committees

Evaluation of school technology needs would be well served if they originated from a broad-based consensus of the school's teachers, their principal, and the technology department. With impending budget shortfalls, these committees are reassessing the allocation of technology tools within their schools. For example, one middle school decided to reallocate classroom computers to create a new lab. Another example would be the establishment of centralized printing locations within certain schools to offset our current inability to replace broken printers.

II. Maintain and further improve the technology infrastructure.

Strategy

Address problems of limited technology in some areas

Although in general, Medford enjoys very favorable students to computer ratios, there are some sites and some programmatic areas that must be addressed:

- to design and install computer labs for academic classes where needed, including a language lab in the high school.
- to upgrade computer hardware and Internet access at the Curtis-Tufts.

Establish benchmarks for technology replacement

It is time to assess the replacement of equipment that no longer meets school needs. Our plan is to emulate the State guideline that, on average, places a computer in a category for three years and then is moved down to the next category. This will create a six year classroom life span for technology replacement. *(Note: Industry standard in business is normally a three year life cycle). At that time many of our existing computers will be either 6 or 8 computers, so our student-to-computer ratio will dramatically increase.

While a majority of these computers will still function at that time, some will have outlived their useful life as a classroom computer. Over eighteen hundred of these are currently four years old or older. Most of the machines will not be able to handle a more current operating system (OS). Security, virus protection, software, USB support, and even hard drive space are all becoming issues with the equipment and OS currently in place.¹

Our plan is to start replacing the computers, with the goal of maintaining the existing infrastructure. It will be incumbent upon us to carefully examine specific

¹ *There are locations within the district where these older computers may be reallocated to serve a non-instructional purpose. Aides, clerical, custodial, as well as grade and departmental offices, would all benefit from additional equipment.*

uses and locations for technology as replacement recommendations are made. The replacement plan calls for a six year replacement cycle for technology.

A computer is considered viable in Type A (currently 1 GB RAM, 2.0 GHz) for three years. It is then moved to Type B (currently 256 MB RAM, 1-2 GHz) for three years after which it is not considered by the Department of Education's guidelines as viable for classroom use. This will create a six year classroom life span for technology replacement. *(Note: Industry standard in business is normally a three year life cycle). It is important to note that each year the Type A and Type B definitions are upgraded to account for new and faster processors and the Department of Education recommends that districts allow for continuous upgrades in their budgets. If not, they caution districts that their student-to-computer ratio will increase which in turn will eventually place students at a disadvantage.

III. Maintain and improve support services.

Strategy

Enhance capacity for identifying and addressing problems

This will be accomplished by:

- the continuation of a web-based help desk for prioritizing and tracking inventory/problems.
- identifying technology staff training needs through a self-assessment instrument.
- providing supplemental training for technology staff.
- expanding technical expertise through training and mentoring.
- increasing technology support staff.

Simplify support by preventing problems

This will be accomplished by:

- install new computer labs, classroom clusters, and computer stations.
- upgrade memory and operating systems.
- upgrade virus protection and prevent adware on all systems.
- maintain adequate spares for hardware.
- enforce technology acquisition policies and standards.
- implement district-wide a centralized system to manage desktops.
- training of faculty and staff and troubleshooting technology related problems.

Establish staffing and support benchmarks

While support levels will never be that of industry, Medford needs to adequately support its investment in technology. The Medford technical staff currently supports a ratio of 1000 computers and each integration specialist supports 54 staff members. While the schools have not suffered from inadequate support, many systems in the district have only been maintained and not advanced. Sophos is currently our anti-virus software program. We must continue to monitor the support ratio we offer our users and recommend any changes in the annual review of the technology plan. We will strive to meet the following Commonwealth of Massachusetts Department of Education recommended ratios:

- at least one FTE support person per 100-200 computers.
- at least one FTE integration specialist per 60-120 users to support the integration of technology into the curriculum.

2. *Needs Assessment*

Medford Public Schools has become increasingly dependent upon its technology system, which is constructed by intricate relationships among hardware, software, networks, and people. This complex technology system is simply referred to as "the network." With this in mind, the Technology staff does an annual "needs assessment" for the district. This includes, but is not limited to: faculty and staff surveys, analysis of Help Desk data, research and other information gained from professional conferences and periodicals, etc.

Instruction and administration are impacted if the network is unreliable or users cannot accomplish their tasks. Potential new users will be reluctant to take the effort to incorporate technology into instruction if they hear the technology is unreliable.

MPS currently uses the Internet, a network connecting district buildings (intranet), and building level networks extensively for:

- Internet Access
 - Web browsing
 - email
 - student and teacher research
 - creation and maintenance of IEP plans (EasyIEP)
 - updates for antivirus software and operating systems
 - report student data to Massachusetts Department of Education
- District Wide Network (Intranet)
 - creating purchase orders
 - consolidating student data from different schools
 - central management of antivirus software
 - common user account database
 - district data entry and reporting of payroll and financial information
 - student health information (SNAP)
 - access to Internet

- Building level networks (local area networks)
 - access to Internet and intranet
 - file sharing/print sharing
 - instructional applications
 - presentations and video projections
 - access to library system (Winnebago Spectrum)

Additional applications planned for the intranet include:

- food service management and reporting
- access to longitudinal student test data analysis
- streaming video for science, social studies, and math
- sharing of social studies resources housed at the high school.

Good reliability and performance of the technology system is now essential for the daily operation of the schools.

Workstations

Current Resources

Overall, the district has an excellent ratio of students per workstation, showing an enviable availability of technology for students. The following table shows the students to workstation ratios at the different locations:

<i>Location</i>	<i>Workstations</i>	<i>Students</i>	<i>Students/ Workstation</i>
Brooks Elementary/ Columbus Elementary/ Roberts Elementary	795	1,501	1.9
High School/ Voc Tech/ District HQ	446	1,570	3.5
McGlynn K-8/ Andrews Middle	985	1,707	1.7
Curtis/Tufts	13	31	2.4
Fulton Heights	15	13	0.9
District wide	2,254	4,822	2.1
State Average			4.8

The 985 workstations in the Phase I schools were installed with Windows 2000 Professional. When the district purchased the computers for the Phase II schools, they came with Windows XP licenses. The Phase II computers were installed with Windows 2000 to retain consistency with the Phase I schools. In all, 1,780 workstations in the Phase I and II schools currently have Windows 2000 Professional.

The vast majority of workstations in the High School, Voc Tech, and District Headquarters use Windows 2000 Professional. An upgrade of technology at the High School included 170 new workstations with MS OS XP.

Limitations of Current Resources

The workstations in the Phase I and II schools are adequate for now. The district needs to begin replacement of workstations in McGlynn/Andrews in 2009/2010 and the Phase II schools each year following.

Hardware and software in Phase I schools will be considered inadequate by 2008-2009. The workstations in McGlynn Elementary/Middle and Andrews Middle (the Phase I schools) will be eight years old in the summer of 2008 and will start their eighth year of operation in the 2008-2009 school year. Companies usually refresh their computers on a

three year cycle. Other districts typically replace workstations on a five year cycle because they can no longer perform current academic tasks or because support costs become excessive. Many districts have come to understand that they will pay money to buy new computers or pay money to buy parts, pay for staff to repair them, and accept the downtime in the classroom while the parts are ordered and installed. At a certain point, it is more costly to repair than to replace.

Curtis/Tufts Alternative school has 15 Pentium III computers running Windows 2000 Professional that are connected to the Internet. The principal, secretary, and guidance counselor have more recent Gateway PCs, and there is a PC in the library used to access EasyIEP.

Fulton Heights Alternative School, now located at the Andrews Middle School, has a computer lab of 10 computers, mainly Gateway computers, running Windows 2000 Professional. The district already has 99% of its workstations running Windows 2000. The 1% older equipment at the High Schools is a source of unreliability and insecurity both because of the age of the equipment and the greater vulnerability of the older operating systems to malicious or accidental corruption.

Approach to Meet Needs

Although the district has workstation adequate resources for 2008-2009, the age of equipment in the Phase I schools will require major investments in 2009-2010. The district will review the use of technology in its instructional program during 2008-2009 and develop recommendations for purchase or lease in 2009-2010.

Internet Access and District Wide Area Network

Current Resources

All MPS schools can access the Internet. Curtis/Tufts Alternative School is connected via Comcast cable while the other schools are connected to the Internet through the Merrimack Education Center (MEC). Originally the High School, Brooks,

McGlynn/Andrews, Columbus and Roberts had direct connections to the Internet. A couple of years ago, the MEC network was redesigned so that the number of sites directly connecting to the Internet was reduced from five to two.

The following Figure 2-1 diagrams the current Internet access and district-wide network.

Figure 2-1: Current Network Infrastructure

Limitations of Current Resources

Connecting all elementary and middle schools together led to slowdowns of Internet and internal network traffic to the Phase I schools and, to some extent, to the Phase II schools. The McGlynn/Andrews Phase I complex houses two middle schools and one elementary school. In fall 2007, it generates approximately twice the Internet traffic of the three Phase II elementary schools combined. McGlynn/Andrews is connected to Brooks Elementary through a single 1.5 mbps link (see Figure 2-1). This same link is also used by the district office to consolidate student information from McGlynn and Andrews.

The current bandwidth will not support the planned applications starting in 2009-2010 that will impact both Internet traffic and traffic among the district sites. Applications planned for 2009-2010 that will impact the district-wide and Internet links include:

- online student access to a repository of history resources (10 GB) for high school and middle school classes (located in high school)
- use of streaming video over the Internet for enhancing instruction in science, social studies, and math classes
- a new student information system for teachers, principals, district administrators, guidance counselors, nurses, and special education that will be hosted outside the district
- access to and analysis of longitudinal student test data in the new student information system
- enhanced problem reporting software hosted outside the district

Additional applications will be added in 2007-2008, including the addition of a parent portal to the student information system where teachers can post homework

assignments, etc, food service point of sale applications, and additional online resources for use by students in other subject areas.

The current design of the district wide area network makes troubleshooting and resolving problems inherently difficult. As a result, the district sometimes must coordinate three different vendors to resolve problems. When problems occur on the district wide network, the district calls MEC, who calls Verizon to troubleshoot the lines. However, the district owns the routers, which were purchased from TENCORP as part of Phase II school construction. So if there is a suspected problem with the router, the district must call TENCORP because MEC does not provide coordination with this vendor.

Approach to Meet Needs

The district needs higher speed Internet access and communications among district sites at improved reliability. The district started with 56 kbps lines in the 1990s and its current network based on T1 lines has increased the original speeds by a factor of 28. This copper based technology has reached the end of its expansion capabilities and the district must look at new technologies that can cost-effectively meet its projected needs. Simply adding T1 lines is too costly and complex to meet future demands.

A new network technology that uses Ethernet over fiber optic cable to connect locations in a town or city has been deployed nationally for several years. In some places it is called Metro Ethernet. In Massachusetts, it is known as Switched Ethernet Service (SES). Malden Public School has already signed up to install this new service. Medford should implement the same technology using the configuration shown in Figure 2-2.

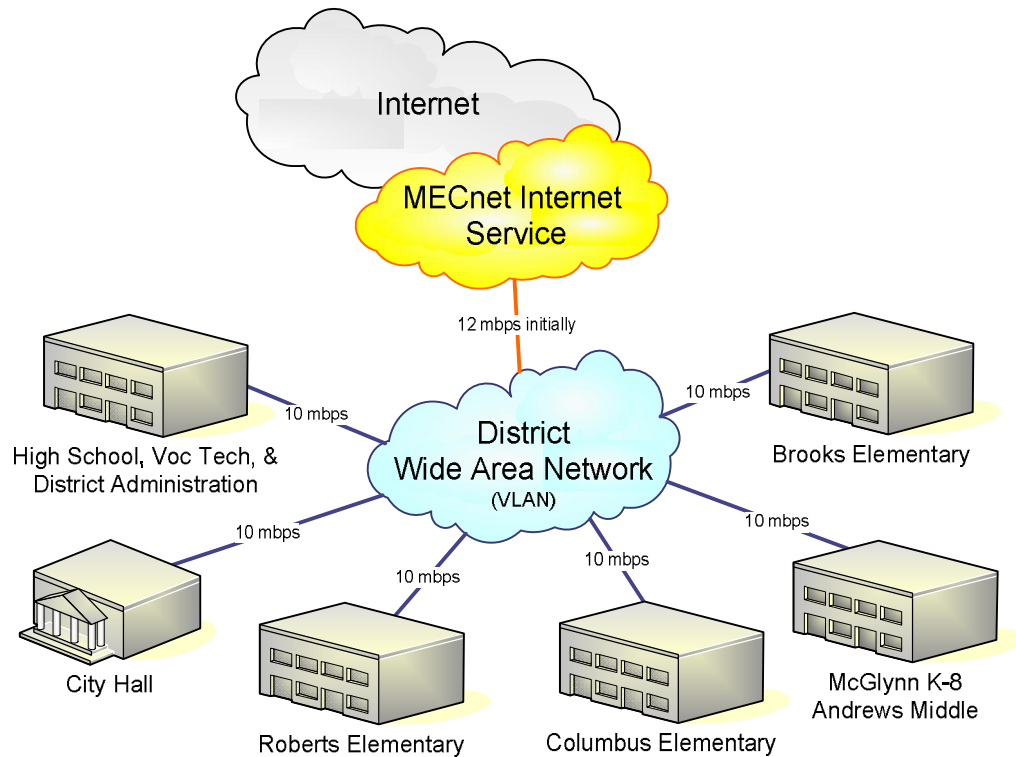


Figure 2-2: Recommended Primary Network Infrastructure

The new fiber-based switched Ethernet service has the following benefits:

- immediate 6 times increase in speed among schools, making MMS and SNAP more responsive
- allows 100 times growth (from 10 mbps to 1,000 mbps)
- inherently more reliable than the current copper-based networks
- access to the Internet from one school will not be impeded by network problems in another

The network connecting the district buildings is created by the telecommunications service provider (Merrimack Education Center-MEC) as a virtual local area network (VLAN). It is as if the district had a private network connecting all sites. The Internet service provider connects to the district VLAN. The MEC network will interface to the site networks through one or more Ethernet cables.

Five Year Refresh Plan

The city has completed this five year upgrade/refresh plan for the school district pending funds to support the plan.

Table 1 illustrates the present schools and computer workstations.

Table 1:

5 Year Refresh Plan

		Computers	Printers	Projectors
McGlynn Elem				
	Admin	41	4	
	Student	300	45	45
	Total	341	49	45
McGlynn Middle				
	Admin	21	6	
	Student	316	50	50
	Total	337	56	50
Andrews Middle				
	Admin	22	6	
	Student	369	50	50
	Total	391	56	50
Brooks				
	Admin	10	5	
	Student	268	51	51
	Total	278	56	51
Columbus				
	Admin	11	5	
	Student	248	44	44
	Total	259	49	44
Roberts				
	Admin	12	6	
	Student	260	44	44
	Total	272	50	44
MHS				
	Admin	26	26	6
	Admin/Acad	13	13	
	Guidance: 6,	9	6	
	Submasters	8	8	
	Student	333	60	15

	Total	389	113	21
Voc				
	Admin	10	10	2
	Student	124	20	4
	Total	134	30	6
Curtis-Tufts				
	Admin	2	2	0
	Student	17	4	0
	Total	19	6	
Fulton				

Projected Five Year Replacement Plan

Projected Replacement

year 1	Andrews	391
year 2	McGlynn Middle	337
year 3	McGlynn Elem	341
	Columbus	259
	Total	600
year 4	Roberts	272
	Brooks	278
	Total	550
year 5	MHS	389
	Voc	134
	Total	523

Telecommunications Services

Current Resources

The district currently receives its phone service from Verizon, its long distance service from AT&T, and its cell phone service from Nextel.

Limitations of Current Resources

The current local and long distance services are largely meeting district needs. The district does not expect the number of phone lines to increase significantly over the next few years nor the quantity of long distance calls to significantly increase.

The need for additional cell phones has been increasing over the last few years and this trend is expected to continue.

Approach to Meet Needs

Only minor cost adjustments in the range of 2-3% are anticipated for local and long distance service.

At best, competition will keep total expenditure increases for cell phones to around 10%.

Projections must be reevaluated on an annual basis based on prior year expenditures and any major programmatic changes.

3. Professional Development

The Medford Public Schools already offers its teachers a wide variety of technology workshops through its Professional Development Academy. Medford will provide professional development that:

- targets critical applications (e.g., the district's new student information system) and delivers professional development and mentoring on:
 - features and functionality (e.g., attendance, gradebook, discipline, etc.)
 - analysis capabilities (e.g., using data from the gradebook and assessment results to inform instruction);
- addresses advancements with technology with appropriate and timely training (K-3 training, SIMS, electronic grade books, etc.);
- broadens teachers' abilities to address a variety of student learning styles through universal design for learning;
- enhances appreciation/understanding/knowledge of technology;
- encourages creative integration of technology in the curriculum;
- increases teacher technology competence;
- increases teachers' opportunities to broaden experiences of students;
- introduces cutting edge technologies to teachers; and
- increases teachers' skills and techniques to improve instruction.

4. Budget

The following table shows the 2008-2009.

Budget Item	2008-2009
Staffing	1,250,989
Network & Technical Support	339,587
Computer Teachers and Librarians	541,216
Administrative Applications Support	159,181
Technology/Library Administrators	180,405
Consulting Services	30,600
Workstations and Servers	290,000
Replace All Windows 95 and 98 With Windows XP	
New File Server for High School	
Upgrades for High School and Middle Schools	250,000
Hardware Maintenance and Supply Budget	40,000
Software	109,500
Student Related Software Packages (estimate*)	78,000
Improved Service Desk Software	2,000
Improved Internet Filtering	9,500
Software Maintenance	20,000
Internet, District-Wide, and LAN Networks	87,180
Network Upgrade for High School	
Internet and District Wide Network Upgrade	87,180
Telecommunications	178,657
Local Telephone Service	108,853
Long Distance Service	22,291
Cell Phones	47,513
Estimated E-Rate Reimbursements	-132,918
Total Cost	1,783,408

Evaluation Process to Monitor Progress

The district utilizes the Massachusetts Department of Education's annual Mass DOE Tech Plan Implementation Report (<http://www.doe.mass.edu/edtech/techplan/>) as its principal evaluation process to monitor progress in implementing its technology plan. Medford submits its implementation report annually using the Department's online electronic forms.

The Technology Advisory Committee understands that achievement of the proposed plan is an ongoing process and is subject to modification in the context of an ever-changing technology landscape. In order to assess progress toward attaining the technology goals, the Committee will develop a set of metrics for each strategy per goal and then conduct a yearly evaluation. The Committee will meet annually to review the results of the evaluation and report on the current status of the goals and to recommend adjustments to the three-year plan. It is understood that individual schools may meet these goals at different times. Factors such as building projects, enrollment, funding, hardware, staffing, and networking issues will influence these accomplishments.

Appendix A:
INSTRUCTIONAL TECHNOLOGY STANDARDS:
PROPOSED For
Medford Public Schools

Recommended Instructional Technology Standards
Grades K-12

The Recommended Instructional Technology Standards for Medford Public Schools were developed with reference to the Massachusetts Recommended PreK ó 12 Instructional Technology Standards (October 2001) and the National Educational Technology Standards Project (NETS 2000) of the International Society for Technology in Education (*ISTE*).

Standard 1: Students will understand the terminology for, and demonstrate effective use of, computers and related technologies as learning tools.

Standard 2: Students will understand and demonstrate safe and responsible use of computers and related technologies.

Standard 3: Students will develop strategies and locate, identify, select, and evaluate information using computers and related technologies.

Standard 4: Students will explore ideas, solve problems, and derive meaning using appropriate software and related technologies.

Standard 5: Students will communicate facts, express ideas, and exchange information using computers and related technologies.

Appendix B:
THE COMMONWEALTH OF MASSACHUSETTS
Local Technology Plan Guidelines

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.

The Department of Education has developed this new set of guidelines for schools to use in technology planning. These guidelines are not mandated but rather recommended benchmarks² for districts to meet. 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 2010-2011.
- 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.
- 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.

² The word benchmark in this document is defined as a reference point in the implementation of the local technology plan.

Benchmark 2

Technology Integration

A. Teacher and Student Use of Technology

1. (a) Outside the Classroom

At least 98% 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)³.
- 4.** The district has a 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.** Technology professional development is sustained and ongoing and includes coaching, modeling best practices, district-based mentoring, and study groups. The professional development includes concepts of universal design and scientifically based, researched models.
- B.** 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 Tool⁴. 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.

³ TSAT is based on "[Educational Technology Standards and Performance Indicators for All Teachers](#)" developed by National Educational Technology Standards (NETS) as well as the [STaR \(School Technology and Readiness\) Chart](#) developed by the Educational Technology Advisory Council (ETAC).

⁴ Districts and teachers may use the TSAT online interactive application available on VES (Virtual Education Space) or a locally developed application.

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.
 - 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.