MASSACHUSETTS SCHOOL TECHNOLOGY AND READINESS CHART (STAR CHART)

Massachusetts Education Technology Advisory Council's[1] (ETAC's) School Technology and Readiness Chart (STaR Chart) is designed to promote best practices in the use of technology in the Commonwealth's schools. Districts can use it to find suggested next steps along the technology continuum to improve teaching, learning, and educational management. It can also be used to inform decision/policy makers about the complexity of the issue and how multiple elements must be addressed simultaneously to ensure the effectiveness of technology implementation and use.

The STaR Chart is organized to address the impact of technology in four broad realms. Each realm contains multiple focus areas that describe a typical progression from early through advanced technology use. Each level builds upon the capabilities of the earlier level. The focus areas recommended for use in the Massachusetts Local Technology Plan Benchmarks are indicated below by an "*." For these identified focus areas, ETAC recommends the STaR Chart's "Proficient Tech" level as the targeted "Level of Progress."

1. Teaching and Learning

    - Impact of Technology on Teacher Role

    - Patterns of Teacher Use*

    - Design of Instructional Setting

    - Curriculum Areas

    - Patterns of Student Use*

2. Educator Preparation and Development

- Content of Training

- Capabilities of Educators*

- Leadership of Principals, Teacher Leaders, and District Administrators

- Models of Professional Development

- Levels of Understanding

- Universal Access: Integration of Universal Design and Assistive Technology

3. Administration and Support Services

- Vision and Planning

- Technical Support (hardware, operating system, network)*

- Technology Integration Specialist*

- Budget Levels

- Budget Allocated for Technology (Total Cost of Ownership)*

4. Infrastructure for Technology

- Universal Design and Accessible Technology Considerations (e.g. Section 508)

- Students Per Instructional Computer*

- Internet Access Connectivity/Speed*

- E-learning Environments*

- LAN/WAN *

- Other Technologies

- Safety and Security*

The STaR Chart was derived from the Texas chart[2] of the same name several years ago. The Massachusetts STaR Chart has subsequently been updated several times. This is the first update since November 2006.[3] Note that the axes of the 2006 STaR chart have been transposed for the 2010 version.

WHY A STAR CHART

There are several reasons why ETAC maintains this chart:

1. ETAC believes that any strategic technology plan for the Commonwealth should reflect the best practices incorporated in the chart. All plans should consider these expectations for schools, teachers, students, and infrastructure as goals to strive for over time.

2. ETAC believes it is important to have clear standards for every school district. We recommend that Massachusetts Local Technology Plan Benchmarks be defined by the Proficient Tech level of the following focus areas:

    - Patterns of Teacher Use (Row B)
    - Patterns of Student Use (Row E)
    - Capabilities of Educators (Row G)
    - Technical Support (Row M)
    - Curriculum Integration Staffing (Row N)
    - Budget Allocated for Technology (Row P)
    - Students per Instructional Computer (Row R)
    - Internet Access (Row S)
    - E-Learning Environments (Row T)
    - LAN/WAN (Row U)

- Safety and Security (Row W)

3. The STaR chart provides a common set of goals for guidance to the Massachusetts Department of Elementary and Secondary Education when distributing technology grants. This guidance is part of ETAC's charge from the Commissioner.

STAR CHART ASSUMPTIONS

There are several assumptions built into this work:

1. Technology should be integrated into teaching and learning so that its use extends opportunities and potential for all students.

2. The effective use of technology involves the many elements specified by the focus areas. Technology in education, used appropriately and effectively, is a complex set of interactions of people, materials, infrastructure and continuous support. It is not a single investment at one time.

3. The chart will be reviewed annually and updated as needed.

4. The chart is "forward looking" because technology constantly changes and educators need to consider how these changes impact teaching and learning and educational management.

The chart strikes a balance between what is reasonable in schools given the current funding and what is desirable given our goals for student learning and each community's expectations.

1. TEACHING AND LEARNING

Row	Focus Areas	Levels of Progress			
		Early Tech	Developing Tech	Proficient Tech	Advanced Tech
(A)	Impact of Technology on Teacher Role	Mostly teacher-centered lectures. Minimal student use of technology in instruction.	Mostly teacher directed learning. Students use technology to work on individual projects.	Mostly teacher-facilitated learning. Students use technology for cooperative projects in their own classroom.	Mostly student-centered learning, teacher as mentor/facilitator. Students use technology to communicate and collaborate outside the classroom.
(B)	Patterns of Teacher Use	85% of teachers use technology as a productivity tool (e.g., email, grades) and/or as a classroom supplement (e.g. drill and practice).	85% of teachers explore using technology to support curriculum goals (e.g. research, lesson planning).	85% of teachers use technology for research, lesson planning, multimedia and graphical presentations, and simulations. Teachers share technology uses with colleagues.	85% of teachers integrate evolving technologies that transform the teaching process by allowing for greater levels of access, interest, inquiry, analysis, collaboration, creativity, and content production.
(C)	Design of Instructional Setting	Mostly computer labs or libraries; scheduled use only.	Labs, libraries, many classrooms; flexible scheduling.	Lab, libraries, all classrooms, and portable technology (e.g. wireless laptops or handheld electronic devices); flexible scheduling.	Seamlessly integrated throughout classes and all content areas. Technology is available anytime both in school and within the community.

Row	Focus Areas	Levels of Progress			
		Early Tech	**Developing Tech**	**Proficient Tech**	**Advanced Tech**
(D)	**Curriculum Areas**	Limited to teaching technology skills at different grade levels.	Use of technology is minimal in a few curricular areas across grade levels.	Integrated into most Curriculum Framework areas and activities at all grade levels.	Integral to all curricular areas at all grade levels.
(E)	**Patterns of Student Use**	Less than half of students show proficiency in all Massachusetts Technology Literacy Standards and Expectations[4] for their grade.	More than half of students show proficiency in all Massachusetts Technology Literacy Standards and Expectations for their grade.	Almost all of students show proficiency in all Massachusetts Technology Literacy Standards and Expectations for their grade.	All students show proficiency in all Massachusetts Technology Literacy Standards and Expectations for their grade.
(F)	**Content of Training**	Technology skills (email, word processing, Iinternet browser use, etc.) for teachers' professional use.	Training encompasses more complex professional uses (district applications such as attendance and report cards, scanners, cameras) and curriculum integration strategies.	Training directly ties technology to its use in content areas and how to effectively manage it in the classroom.	Training focuses on modeling, mentoring, and adopting new technologies as well as the integration of Universal Design and access considerations for all students.

2. EDUCATOR PREPARATION AND DEVELOPMENT

Row	Focus Areas	Levels of Progress			
		Early Tech	**Developing Tech**	**Proficient Tech**	**Advanced Tech**
(G)	**Capabilities of Educators**	100% meet TSAT and/or local district teacher technology competencies and implement them into the school environment.	80% meet TSAT and/or local district teacher technology competencies and implement them into the school environment.	80% meet TSAT and/or local district teacher technology competencies and implement them into the school environment.	80% meet TSAT and/or local district teacher technology competencies and implement them into the school environment.
(H)	**Leadership of Principals, Teacher Leaders and District Administrators**	Recognizes benefits of technology in instruction to improve learning outcomes for all students. Minimal personal use (email, word processing, Internet browser use, etc.). Awareness of national standards for administrators.	Supports use of technology in instruction. Uses technology in daily work. Approaching proficiency of national standards for administrators.	Recognizes and identifies exemplary use of technology in instruction. Uses technology skills in daily work such as research and communication and models appropriately with staff. Provides constructive feedback to teachers on their technology use.	Promotes exemplary use of technology in instruction. Models and uses in daily work in communication, presentations, online collaborative projects, and management tasks. Develops a school culture that expects all teachers to use technology. Advocates in the community for the integration of technology in instruction. Expects all teachers to use technology well.

Row	Focus Areas	Levels of Progress			
		Early Tech	**Developing Tech**	**Proficient Tech**	**Advanced Tech**
(I)	**Models of Professional Development**	Whole group, skill-based training with minimal follow-up.	Whole group curriculum-based training with follow-up to facilitate classroom implementation.	Coaching, modeling best practices, district-based mentoring. Involvement in a development / improvement process. Study groups.	Creates a culture of inquiry, sharing and knowledge building. Anytime learning available through a variety of delivery systems (e.g., just-in-time support, mentoring, peer observation).
(J)	**Levels of Understanding**	Most at entry or adoption stage (Students learning to use technology; teachers use technology to support traditional instruction).	Most at adaptation stage (technology used to enrich curriculum). Most beginning to use with students.	Most at appropriation stage (technology is integrated, used for its unique capabilities).	Most at invention stage (teachers discover and accept new uses for technology).

Row	Focus Areas	Levels of Progress			
		Early Tech	**Developing Tech**	**Proficient Tech**	**Advanced Tech**
(K)	**Universal Access: Integration of Universal Design and Assistive Technology**	Emerging awareness of universal design and assistive technologies (hardware/software) limited to special educators; few examples across the district of universal design strategies or assistive technology used to promote access to the general curriculum.	Awareness of universal design and assistive technologies (hardware/software) by special educators & some general educators; universal design strategies or assistive technology used to promote access to the general curriculum demonstrated across all grade levels.	Awareness of universal design and assistive technologies (hardware/software) by special educators & most general educators; universal design strategies or assistive technology used to promote access to the general curriculum demonstrated across all grade levels; staff are designated to provide AT assessment, procurement, support (training) and maintenance.	Systemic adoption of universal design strategies throughout the curriculum and the seamless integration of assistive technology to promote access to the general curriculum for all students; staff are designated to provide AT assessment, procurement, support (training), and maintenance.

3. ADMINISTRATION AND SUPPORT SERVICES

Row	Focus Areas	Levels of Progress			
		Early Tech	**Developing Tech**	**Proficient Tech**	**Advanced Tech**
(L)	**Vision and Planning**	Minimal technology plan; technology used mainly for administrative tasks such as word processing, budgeting, attendance, grade book.	The technology plan is aligned with the Massachusetts Technology Plan, and is approved by the School Committee & supported by the Superintendent. Plan collaboratively developed by key stakeholders (e.g., teachers, parents, community members, local business, and individuals with disabilities), guiding policy and practice. Addresses local district teaching and learning standards.	In addition, the Technology Plan is integrated into district plan; used for internal planning, budgeting, applying for external funding and discounts. Teachers and administrators have a vision for technology use in support of student learning, teacher professionalism, and data management.	The technology plan and vision are focused on improving the success of all students based on needs, research, proven teaching and learning principles and is actively supported by the School Committee and Superintendent. Technology plan is collaboratively developed, guiding policy and practice; updated at least annually.

Row	Focus Areas	Levels of Progress			
		Early Tech	**Developing Tech**	**Proficient Tech**	**Advanced Tech**
(M)	**Technical Support (hardware, operating system, network)**	Some technical support and minimal support tools to resolve 95% of problems in greater than five days. Problems cause major disruptions to curriculum delivery using technology.	Sufficient technical staff and support tools to resolve 95% of problems in two to five days. Same-day technical support for infrastructure problems by call-in. Problems sometimes cause major disruptions to curriculum delivery using technology. Designated Network Administrator.	Sufficient technical staff and support tools to resolve 95% of problems within two days. Same-day in-classroom technical support available. Problems infrequently cause major disruptions to curriculum delivery using technology. Network administrator.	Sufficient technical staff and support tools to resolve 95% of problems within one day. Technical support is readily available on-site for both infrastructure and application problems. Problems do not cause major disruptions to curriculum delivery using technology. Network administrator.
(N)	**Technology Integration Specialist**	No district level Technology Director. Local instructional technology support is inconsistent.	District level Technology Director. One-half instructional technology specialist per 60-120 staff.	District level Technology Director. Dedicated instructional technology specialist—one half person per 30-60 staff. Dedicated staff at district level for data management and assessment.	District Technology Director. Dedicated instructional technology specialist—one half person per 30-60 staff. Dedicated staff at district level for data management and assessment and to help produce integrated curriculum content.

Massachusetts School Technology and Readiness Chart (STaR Chart)

Row	Focus Areas	Levels of Progress			
		Early Tech	**Developing Tech**	**Proficient Tech**	**Advanced Tech**
(O)	**Budget Levels**	Budget for hardware and software purchases and professional development.	Budget for hardware and software purchases (new and replacement) and professional development, minimal staffing support, and some ongoing costs.	Budget for purchases, professional development, adequate staffing support, and ongoing costs. Other state, federal, and local programs directed to support technology funding. Business partnerships, donations, and other local funding designated for technology.	Budget for purchases, incentives for professional development, sufficient staffing support, and ongoing costs. Appropriate budget to support district technology plan.
(P)	**Budget Allocated for Technology (Total Cost of Ownership)**	Less than $175 per student.	Between $175- $300 per student.	Between $300 - $425 per student	$425 or more per student

Row	Focus Areas	Levels of Progress			
		Early Tech	**Developing Tech**	**Proficient Tech**	**Advanced Tech**
(Q)	**Universal Design and Accessible Technology Considerations (e.g., Section 508)**	Considerations for universal design and accessible technologies are limited to the Individual Education Program (IEP) process for students with disabilities. Procurement policies for information and instructional technologies do not ensure usability, equivalent access, or interoperability.	Considerations for universal design and accessible technologies are established in areas of high student use (e.g., libraries, computer labs); inconsistent implementation of procurement policies for information and instructional technologies that ensure usability, equivalent access, and interoperability.	Considerations for universal design and accessible technologies are established in areas of high student use (e.g., libraries, computer labs), some classrooms and administrative offices; routine implementation of procurement policies for information and instructional technologies that ensure usability, equivalent access, and interoperability.	Universal design and accessible technologies considerations are established throughout the district; procurement policies for information and instructional technologies that ensure usability, equivalent access, and interoperability in accordance to the guidelines established by Section 508.

		Levels of Progress			
Row	Focus Areas	Early Tech	Developing Tech	Proficient Tech	Advanced Tech
(R)	**Students Per Instructional Computer**	10 or more students per Type A or B computer; no firm computer replacement policy established by district.	Fewer than 10 students per Type A and B computer; replacement policy established; one computer per teacher.	Fewer than 5 students per Type A and B computer; replacement cycle established for 6 years or less; one computer per teacher—possibly a laptop for working at home. Most students have access to handheld electronics. Maintains a list of places students can use technology outside of school.	One student per Type A and B computer or other electronic device. Replacement cycle established for 5-6 years or less; one computer per teacher—possibly a laptop for working at home. 75% of computers meet Massachusetts A/B standards. School works with community to provide equitable access to technology for students and community members after school hours.

4. INFRASTRUCTURE FOR TECHNOLOGY

Row	Focus Areas	Levels of Progress			
		Early Tech	Developing Tech	Proficient Tech	Advanced Tech
(S)	Internet & WAN Access, Connectivity, and Speed	Dial-up connectivity to the Internet available only on a few computers.	Direct connectivity to the Internet available at each school and in most rooms. Adequate bandwidth to the school to avoid most delays.	District Internet connection of 10 Mbps per 1,000 students and staff district-wide.[5] School connection to district WAN of 100 Mbps per 1,000 students/staff to avoid most delays. Easy access for students and teachers, including some wireless.	District Internet connection of 100 Mbps per 1,000 students and staff district-wide.[6] School connection to district WAN of 1,000 Mbps per 1,000 students/staff. Easy access for students and teachers including most wireless connectivity to enable interactive presentations and video.

Row	Focus Areas	Levels of Progress			
		Early Tech	**Developing Tech**	**Proficient Tech**	**Advanced Tech**
(T)	**E-Learning Environments**	Web- and/or satellite-based interactive learning opportunities delivered synchronously or asynchronously, on a scheduled or unscheduled basis, primarily for professional development on a limited basis.	Expanded web- and/or satellite-based interactive learning opportunities with the possible addition of asynchronous video streaming or synchronous videoconferencing. The addition of courses for professional development for teachers and student courses at the high school and college level (K-16).	Building upon Developing Tech, development of connections for improved access to web-based and/or interactive IP-based video learning on the local, state, regional, national, and international level (school to school, district to district, school/district to state, state to state, country to country). Applications to include courses, cultural projects, virtual field trips, etc.	Seamless IP-based infrastructure expanded to K-16 to allow development of high-quality web- and video-based content. Content distribution available for all students and teachers. Archives allow for content review asynchronously and sharing/distribution of these resources.

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Row	Focus Areas	Levels of Progress			
		Early Tech	**Developing Tech**	**Proficient Tech**	**Advanced Tech**
(U)	**LAN**	Limited print/file sharing network at each school for lab, administration, and some classrooms. Some shared resources and some secure storage space. Minimum 10/100 Mbps Cat 5 hubbed network.	Most rooms connected to Internet via WAN and wireless connectivity where possible at each school with student access. Minimum 10/100 Mbps Cat 5 switched network. Basic servers for sharing some resources at each school.	All rooms connected to Internet with significant wireless connectivity at each school with sufficient bandwidth for effective student access. Minimum 100 Mbps Cat 5e switched network. District-owned servers or cloud computing provides secure storage, backups, applications, schedule, email, and website. Students, teachers and parents have easy access to educational resources from home and school (e.g., web portal).	All rooms connected to Internet with significant wireless connectivity at each school with sufficient bandwidth for effective student access. Minimum 100 Mbps/1 Gbps Cat 5e/6 switched network to classroom. Different services (data, phone, video, guest access, etc.) on different virtual LANs. All schools have sufficient bandwidth for content delivery through resources such as video streaming and conferencing. Students, teachers and parents have easy access to educational resources from home and school (e.g., web portal).

Row	Focus Areas	Levels of Progress			
		Early Tech	**Developing Tech**	**Proficient Tech**	**Advanced Tech**
(V)	**Other Technologies**	Shared teacher use of resources such as telephone, TVs, VCRs, DVD players, and classroom sets of programmable calculators.	Shared use of resources such as telephone, computer video projectors, or interactive white boards, classroom sets of programmable calculators, digital cameras, and scanners.	Dedicated and assigned use of common technologies such as telephone, computer video projectors, or interactive white boards. Programmable calculators assigned to each student as needed. In each school, there is shared use of specialized technologies, digital cameras, scanners, handheld electronic devices.	Readily available fully equipped classrooms with computer/video projectors, interactive whiteboard, and other technology to enhance student instruction. Use of new and emerging technologies.

Row	Focus Areas	Levels of Progress			
		Early Tech	**Developing Tech**	**Proficient Tech**	**Advanced Tech**
(W)	**Safety and Security**	Backup and restoration procedures and virus protection to guard individual computers. District-wide acceptable use policy in place.	Basic firewall protection and diligent upgrading of network vulnerabilities added to protect against external threats. Protection against a wide range of malware (viruses, worms, Trojans, rootkits), adware, and spyware. District-wide responsible use policy in place, as well as policy on connecting student/staff-owned devices to school network.	To Developing Tech, add adequate network and server availability protection for expanded capabilities and to ensure dependable access. Protection of workstations from internal network attacks. Encryption of sensitive personal data on local networks. Network supports board policy on connecting student/staff-owned devices (guest devices) on the network.	Usage authentication added for mobile computer and home/external access requirements. Use of virtual LANs (VLANs) to protect network infrastructure and sensitive data. If guest devices are allowed on the network, guest traffic is on an isolated VLAN and/or guest devices are checked for currency of anti-virus software and operating system security patches.

END NOTES

[1] Educational Technology Advisory Council to the Massachusetts Board of Education and the Commissioner, http://www.doe.mass.edu/boe/sac/edtech/

[2] *Texas School Technology and Readiness (STaR) Chart*, http://starchart.esc12.net/. The Texas Teacher STaR Chart is intended to assist all classroom teachers in assessing needs and setting goals for the use of technology in the classroom to support student achievement.

[3] *Massachusetts STaR Chart (School Technology and Readiness Chart)*, November 2006

[4] *Massachusetts Technology Literacy Standards and Expectations*, Massachusetts Department of Elementary and Secondary Education, approved by the Massachusetts Board of Education on April 29, 2008, http://www.doe.mass.edu/edtech/standards/itstand.pdf

[5] Based on recommendations the State Education Technology Directors Association (SETDA) in *High-Speed Broadband Access for All Kids: Breaking Through the Barriers* for network speeds for "next 2-3 years" for a technology-rich learning environment, June 2008, http://www.setda.org/web/guest/2020/broadband

[6] Based on recommendations the State Education Technology Directors Association (SETDA) in *High-Speed Broadband Access for All Kids: Breaking Through the Barriers* for network speeds in "5-7 years" for a technology-rich learning environment, June 2008, http://www.setda.org/web/guest/2020/broadband