Maynard Public School District

Technology Plan

July 2008 – June 2011

Presented to the MPS School Committee

Date: _____

Approved by the MPS School Committee

Date: _____

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1. Introduction

The National Research Council points out that the intellectual capabilities needed to obtain well-paying jobs in today's economy include using the following set of skills: the ability to engage in sustained reasoning, manage complexity, test solutions, evaluate information, collaborate, and communicate. In addition, to succeed in today's economy requires that students know how to use these skills in conjunction with current information and communication technology (ICT) tools. These tools include online learning and collaboration software, data retrieval and analysis programs, and spreadsheets, word processors, and other computer applications.

Because mastering the use of ICT tools helps students to succeed in college and beyond, it is essential that students be taught to use these tools within the context of the core academic curriculum. For example, prior to the information and technological revolution middle school students might study the similarities and differences among the states by memorizing and discussing different features of the states. With the advent of computers and the Internet, the data itself is easy to find. The challenge and the value lie in being able to organize, conceptualize, represent, store, present, and ultimately make meaning from the information.

Technology gives teachers more tools to differentiate their instruction in order to better support the diverse learning styles and accessibility needs of their students. Universal Design for Learning (UDL) seeks to increase the flexibility of curricular materials in order to increase their accessibility to different kinds of learners and the use of digital media and its underlying technology is the cornerstone of that flexibility. This flexibility is an important part of meeting the Individuals with Disabilities Education Act (IDEA) and its call for universal access to the general curriculum.

Technology allows teachers to present the curriculum in more compelling and effective ways. For example, in a high school physics course students engage in understanding the physical world by constructing scientific models to describe, explain, predict, and to control physical phenomena. Computer simulations can help enhance student understanding in ways not possible in the traditional classroom or laboratory by allowing them to explore concrete and abstract physical concepts virtually.

Finally, technology allows teachers, administrators, support staff, students, and parents to operate and communicate more effectively and efficiently. For example, teachers can use their computers to outline their lessons and make handouts. Having these materials in electronic form makes amending, updating, and sharing the materials much easier than before. Student records can be stored electronically making information exchange and data retrieval more efficient and effective. Collaboration among all of these parties is made easier by being able to post homework assignments on the web, send emails, and electronically submit grades and attendance.

To ensure that the Maynard Public School District keeps pace with the information revolution, the district must be diligent not only in keeping our technology up-to-date and providing the necessary technical support, but in ensuring that our teachers have access to sustained, high quality, professional development to promote best-practice classroom integration of the technology.

2. Vision Statement

The Maynard Public School District needs to educate its students to keep pace and thrive in a society increasingly dependent on technology, information, and knowledge. With the guidance of skilled educators and community members, all students must have the opportunity to use technology to become actively engaged and take responsible roles in their learning as they conduct inquiries, solve problems, create meaning, and communicate in individual, collaborative, and interdisciplinary settings. As a result, students emerge with the skills and motivation to practice life-long learning as effective citizens of our democratic way of life and productive members of our community.

Guiding Principles

- Technology is a tool that supports 21st Century learning skills including information seeking, analysis, reasoning, and problem solving skills, information and communication skills, and inter-personal, collaborative, and self-direction skills.
- Technology supports the diverse access and learning needs of all our students.
- Meaningful technology use encourages active, independent, and life-long learning.
- Technology helps facilitate learning by expanding it beyond the walls of the classroom.
- All students and teachers must have equal access to tools and technology.
- Teachers must be supported in their use of technology with working, up-to-date technology, timely technical support, and continuous, meaningful, high quality professional development and coaching.

A district-wide Technology Assessment was conducted in the fall of 2004 to establish a foundation of information for the purpose of developing a technology profile of the Maynard Public School District. The assessment resulted in a report that provided recommendations for the district to improve, expand, and sustain technology and to develop a strategic technology plan and budget that would establish teaching and learning environments for the 21st century. Based upon two guiding documents from the Massachusetts Department of Education; The Local Technology Planning Guidelines and Benchmarks, and the Massachusetts School Technology and Readiness Chart, a clear picture of Maynard Public School District's technology profile was established.

The resulting Technology Plan, released in 2005, was aligned with the Massachusetts Local Technology Planning Guidelines and Benchmarks and supported the overall mission, vision, and guiding principles of the district. It was strategically designed to bring the district from a predominantly early level of technology readiness to a predominantly proficient level over the next three years as outlined in the Massachusetts School Technology and Readiness (STaR) Chart. The overall Technology Plan goals were to:

- Provide a three-year strategic vision of technology innovation and support in the district; and
- Demonstrate a forward thinking technology strategy for the district to develop teaching and learning environments that would provide students with 21st Century learning skills and prepare teachers to instruct with 21st Century tools.

3. Accomplishments:

Since the release of the 2005 Technology Plan, the state of technology in the Maynard Schools has improved substantially. With the dedication and hard work of our support staff, tutors, teachers, technology integration specialists, and administrators, and with the ongoing financial support from the community, we have accomplished the vast majority of the objectives put forth in the 2005 plan while attaining the goal of becoming a predominantly proficient district on the Massachusetts School Technology and Readiness (STaR) Chart.

Specific objectives that were accomplished include the following:

- Established an inventory and replacement policy to replace the oldest 20% of the desktop computers each year (5 year replacement cycle)
- Replaced all ~350 outdated Pentium II desktop computers in FY2005/06
- Added a computer lab at the Fowler Middle School
- Added additional computers to the High School and Middle School libraries
- Added additional computers to the High School CAD Lab
- Added two mobile labs to the High School to improve classroom computer access
- Added laptops to Elementary School to improve classroom computer access
- Established plans and procured funding for installing a lab at the Elementary School
- Established an inventory and computer replacement policy for servers to replace the oldest 25% of the server computers each year. (4 year replacement cycle)
- Added network switches with more than 100 additional network ports
- Added 2 mobile projector carts with laptops to the High School
- Added 4 mobile projector carts with laptops to the Elementary School
- Added projectors to the High School and Middle School
- Created 8 "interactive classrooms" in the High School with ceiling projector, fixed interactive white board, and professional development for classroom integration
- Installed a ceiling projector in High School library
- Added CD and DVD players to all schools
- Added 30 Alphasmart Dana wireless handhelds to the Elementary School
- Implemented a caching web proxy to conserve Internet bandwidth
- Upgraded internet bandwidth from 1.5Mbs to 3.0Mbps
- Upgraded all servers to Windows 2003 Server with Remote Administration
- Increased server manageability and utilization through server virtualization
- Implemented district-wide automated tape backup system
- Implemented district-wide centralized patch management system
- Upgraded backbone bandwidth and reliability by replacing aging 100Mbps fiber switches with 1000Mbs GBIC transceivers
- Installed temporary wireless network at Elementary School
- Installed permanent wireless network at High School
- All attendance and grades are recorded and managed electronically at the Middle and High Schools
- Standardized desktop software configurations across the district to ensure that faculty, administrators, staff, and students have access to the software programs they need

- Increased availability, accessibility, and security of user data by implementing network storage and roaming profiles for all users accounts
- Subscribed to eLibrary and Grolier online resource databases
- Use of EdLine for parent-teacher communication in Middle and High Schools
- Piloting use course management system, at Middle and High Schools
- Improved the design and content of school and district websites
- Established District technology standards for students
- Increased technology integration staff time at all schools
- Hired a Technology Coordinator
- Created a Desktop Support Technician position
- Regularly received donations of fully functional computer monitors

4. Goals:

While the computer hardware, software, and network infrastructures now deliver productive and effective ICT services to all students, faculty, administrators, and staff in the district, there remain challenges, as outlined in this section, to realizing the district's technology goals and becoming a predominantly advanced district on the Massachusetts School Technology and Readiness Chart.

A. Technology Integration

Expanding the effective use of our course management system
Course management systems are increasingly being used in K-12 and Higher Education for their ability to help differentiate instruction, engage students more fully with the material and each other, provide opportunities for reflective writing, and increase access to course materials outside the classroom. With the pilot of our course management system we are beginning to see how we can realize these benefits. These benefits, at least initially, often come at an increase in the amount of time that teachers spend preparing, assessing, and managing their materials and students. Like any new practice, it gets easier as it becomes more familiar but teachers must be supported in their efforts to benefit their students through these technologies.

B. Professional Development

1. **Increasing technology integration professional development participation**
   As we continue to more fully integrate technology into the curriculum, it is vital that participation in technology integration professional development increases. Technology integration is challenging and the role of professional development in its success is paramount. It takes professional development that is systemic, sustained, and high-quality to transform the curriculum.

2. **Increasing in-house technology professional development opportunities**
   As our in-house expertise in various aspects of technology integration increases, so must the opportunities for sharing that expertise with other faculty members also increase. By using our expertise to provide high-quality, in-house professional development, we build and maintain a culture of coaching and collaboration around technology integration.

3. **Increasing awareness and training of differentiating instruction with technology**
   One of the many benefits of technology integration is how it enhances the instructors' ability to differentiate the instruction based on students' accessibility and learning needs. This is a primary goal of technology integration and a more formal approach to its applications will be beneficial for teachers and students alike.

4. **Increasing awareness and training of data driven decision making processes**
   Data driven decision making processes are critical for ongoing assessment of procedures and practices. Increasing awareness and training on these processes will help inform decisions through the examination and analysis of all relevant information.

C. Technical and Instructional Staffing

Increasing technology integration specialist staffing levels at all schools
Technology integration specialists are critical in assisting classroom teachers with the integration of technology into their practice. They are the experts in how technology facilitates and improves teaching, learning, and understanding across all subject levels. They provide day-to-day support, ongoing coaching, small-group professional development, and facilitate cross-curriculum projects. Our current technology integration staffing levels at the Elementary and High schools are insufficient to support the levels of technology integration we seek.

D. Community Collaboration and Communication

Increasing the number of personnel contributing to school and district web sites
Keeping the community abreast of what is going on in our schools is an important part of encouraging community involvement, celebrating our students' successes, and providing a window into the culture and values of our district. Currently only a small number of technology personnel are involved in publishing and maintaining information on the new school and district websites. As our new websites mature we will be working to deploy tools and provide training to allow non-technical personnel to update content of the websites without changing the design.

E. Funding Resources

1. **Maintaining E-Rate eligibility for partial funding of telecommunications services**
   The E-Rate program helps offset charges for telephone, Internet, and other telecommunications services. To maintain E-Rate eligibility, the District Technology Coordinator maintains a current technology plan on file with the Massachusetts Department of Elementary and Secondary Education (formerly the Department of Education) and on the district website and performs an annual filing with the DESE detailing the current status of technology in the district and progress made on the technology plan.

2. **Continuing to advocate for increased technology funding in district budget**
   The majority of the funding to support our technology goals comes from the general budget. The current technology budget is more than adequate to cover ongoing operational costs including telecommunication services, software licensing and maintenance, hardware maintenance and repairs, subscription services, and printer maintenance and supplies. The District Technology Coordinator will apply the remaining budgeted funds to either the desktop computer replacement program or to other technology initiatives that support the goals and objectives of this technology plan. Once the goal of a fully funded desktop computer replacement program has been achieved, more funds will be available for the other technology initiatives.

3. **Increasing the amount of technology funding obtained through grants and partnerships**

Many of the objectives laid out in this technology plan are not difficult to achieve and require only moderate levels of funding. Since the technology budget continues to lack sufficient funds to achieve all of our objectives, we will continue to do what we can to increase the amount of technology funds obtained through grants and partnerships.

F. Instructional Software and Online Resources

Finding, evaluating, acquiring, and deploying new computer applications for students, faculty, administrators, and staff

Keeping up with the latest computer programs is an ongoing task. As new versions and new packages are released, they must be evaluated to ensure that they're suitable for their prospective users. For teacher and student software that means assessing its educational and pedagogical value, for staff and administrator software it means assessing its productivity and task value. All packages must also be assessed for proper operation within the computer and network environments, as well as for deployment, management, and support costs. This is an ongoing effort that takes time and effort up front, but results in a more robust environment with better operations and lower support costs.

G. Hardware

1. **Fully funding the desktop replacement program:**
   As stated in the guiding principles, teachers must be supported with working, up-to-date, and readily accessible technology so that they can fulfill the district's technology vision. To ensure that Maynard does not once again get saddled with outdated technology that costs more to support than to replace, a 5 year replacement program has been in effect for the past three years including aggressive purchasing in the first year to expedite the retirement of obsolete computers. Additionally, new computer purchases have included up to five years of next business day on-site service for a fraction of what it would cost of to hire or contract the repairs. Unfortunately the replacement program lacks a fully funded budget line and by necessity has been cobbled together year to year and funded as much as possible. The negative impact of continued funding shortages for this program will increase with time as computers age without replacement and hardware demands grow to support new software.

2. **Increasing the number of interactive white boards and projectors at all schools**
   The installation of interactive white boards and ceiling mounted projectors to form an interactive classroom in 8 of the High School classrooms has created a lot of excitement across the district. Teachers using the interactive classrooms are daily discovering new ways that the technology helps their students through differentiating instruction, making notes available after class, and interacting with virtual objects. The equipment, although fixed in a classroom, can be removed and reinstalled with minimal expense, especially if the new classroom were specifically designed to accommodate it. Adding additional interactive classrooms will allow us to continue to increase the number of teachers integrating this technology into their instruction.

3. **Increasing classroom access to computers in the Elementary School**

Due to its age and construction, the Elementary school presents significant challenges to increasing classroom access to computers, in many cases barely accommodating one computer per classroom. Additionally, mobile labs, carts with laptops that can be moved from room to room, are not suitable for the multi-level nature of the building because they can weigh several hundred pounds and are not easily or safely moved up and down the ramps connecting the levels. A better solution is to put 4-8 laptops at each pod where they could be used together in one classroom or divided among the classrooms as the teachers see fit.

4. **Increasing infrastructure capacity, availability, and manageability**
   Storage requirements are continually increasing as our faculty, students, staff, and administrators create and store more electronic materials. Our current storage, while adequate, is distributed among 5 servers making it relatively difficult to add capacity, especially as 3 of them do not support hot-swapping and live insertion of drives. Because we have a reliable, high-capacity, fiber connection between the schools, a better solution is to migrate to a centralized storage array that the servers connect to over a storage area network (SAN). This will allow us to centrally manage and provision all of our storage and allow us to more fully leverage the advantages of server virtualization.

H. Network Infrastructure and Connectivity

1. **Adding a permanent wireless networks to the Elementary school**
   The Elementary school, with its dependence on laptops for classroom and teacher computers, very much needs a permanent wireless network. This is not technically difficult, but requires funding for equipment and installation.

2. **Adding a permanent wireless network to the Middle school**
   The Middle school would also benefit from a permanent wireless network. This would allow increased benefit from faculty and administrator laptops and provide an infrastructure for future innovation. The concrete block construction of the Middle school makes this a somewhat more expensive undertaking than the other schools as the wireless signals have difficulty penetrating the concrete blocks requiring more access points to provide coverage.

3. **Increasing network capacity to the Coolidge administration building**
   While the main campus LAN enjoys the capacity and reliability of the gigabit fiber connections between the three schools, the ADSL network connection to the administration building leaves much to be desired. Increasing the available bandwidth and reliability of that connection, whether by VPN, dedicated fiber, or wireless link would yield performance benefits for users and manageability benefits to IT staff.

4. **Increasing Internet bandwidth**
   Demand for Internet bandwidth also continues to rise and is projected to continue rising as more applications and services move to the cloud. Plans for increasing Internet bandwidth to 10Mbps and beyond should include fiber and CATV based internet connections.

5. **Implementing a help desk system with automatic ticket generation**
   A computerized help desk system with automatic ticket generation is a tool for users to report problems, interact with tech support personnel, track resolution, and access a knowledge base. It is also a tool for tech support personnel to manage caseload, identify and track trends, and identify and target improvement efforts. Implementing a system will help us to continue to improve the quality and timeliness of tech support for students, faculty, administrators, and staff, and to provide improvement data for the technology support personnel.

I. Administrative Software

1. **Automating management and synchronization of disparate databases**
   We maintain an increasing number of databases that need to be managed and kept synchronized including the school-to-home communications services such as EdLine, ConnectED, and ConnectEDU, and the internal school databases for health, cafeteria, student records, libraries, IEPs, and computer accounts among others. As only a handful of these databases keep themselves synchronized automatically, the bulk of it has to be done by hand, a process that can be tedious and error prone. A better solution is to automate the exchange of data between the databases so that authorized updates propagate quickly and accurately.

2. **Increasing data quality and availability for data driven decision making processes**
   With so many disparate and proprietary databases, it can be difficult to find and access the data required to make an informed decision in a timely fashion. A centralized data warehouse based on an open database architecture will enable us to make better use of the information we maintain for decision making processes.

J. Access to the Internet Outside of the School Day

1. **Increasing availability of school computers outside of school hours**
   As more student work is done on computers, the need for students to have access to computers outside the school day increases. While the town library has computers that students make good use of, there are labs of idle computers in the schools that students could use if the supervision of a trained adult were available. This supervision could be in the form of a community volunteer, a stipended position, or a salaried position, with training being provided by the school.

2. **Increasing availability of computers in the community**
   The implementation of the desktop computer replacement policy produces a steady stream of surplus computers. While most of them are in need of repair and/or at the end of their usable life, there will be opportunities for the school to pass along some of the better surplus computers to the community preloaded with free and open source software. There are several challenges to doing this effectively without creating a financial burden for the recipient. 1) Operational computer monitors are not usually available as surplus so they must be acquired by the recipient, and 2) Internet access and proper disposal of the equipment will always be the responsibility of the recipient. Therefore, we believe that

these computers are better suited to becoming secondary computers within a household that already has internet access and a monitor rather than a household's first computer.

3. **Providing students with internet accessible file storage**
   As more student work is done on computers, the need for students to be able to access their school files from off-campus computers increases. Currently students use USB flash drives and email to make their files available off-campus. A better solution would be to provide students with secure, Internet accessible, file storage where they could keep their files and access them from any Internet connected computer.

K. Student Technology Standards

Identifying and administering a student technology self assessment survey based on district standards
Currently the assessment of our students' technology skills is based on informal observations by the technology integration staff. A better method of understanding our students' technology skills is to develop and administer a technology self-assessment survey to a random sample of students. While not as comprehensive as a full-scale test of skills, we believe it to be a reasonable method of getting valid results from a reasonable commitment of student time.

L. Teachers and Administrators Technology Standards

Increasing awareness of district technology standards
Greater awareness and active promotion of the standards will encourage more teachers to use them as part of their curriculum development. This can be done in conjunction with technology integration specialists as they work with teachers to implement their integration goals.

5. Summary

The improvements to the technology environment made in the past few years have greatly increased the opportunities for using technology to support student learning. To continue our success it is imperative that we demonstrate our commitment and maintain this momentum by continuing to provide our schools with high quality equipment, services, support, and professional development in an efficient and cost effective manner.