Technology background and funding history

Realizing the value of the opportunities that technology affords to schools in terms of learning, administration, and operations, requires learning devices capable of running the modern software and services that teachers want to use, faculty and staff devices capable of running the modern software and services that increase capabilities and efficiency, server and network infrastructure to provide services and access to these learning and operational services, ongoing professional development for teachers to integrate new technologies into their practice, media resources to support development, research, and curriculum development, and technical support to help keep it all running smoothly in the classrooms and offices.

Table 1 shows that for at least the last nine years Shrewsbury's spending on instructional materials, equipment, and technology--as reported by the Massachusetts Department of Elementary and Secondary Education--has lagged the neighboring communities in the Assabet Valley Collaborative and the DART communities of Natick, Walpole, Chelmsford, and Arlington which were identified by the Department of Elementary and Secondary Education (DESE) as being similar to Shrewsbury in terms of grades span, total enrollment, and special populations.

This chronic underfunding has resulted in students throughout the system with limited access and outdated learning devices. The exception to this is the middle school students in grades 5-7 that are supported by the Personal Learning Device program. As we transition grades 8-12 to the program over the next two years and replace outdated elementary school devices, WiFi and network upgrades will be necessary to ensure access. Our media centers have also suffered from chronic underfunding and are in need of funds to restore and sustain their collections.

Without adequate funding in FY 2015, replacement projects and new initiatives to benefit student learning will be completed more slowly or not at all. When project timelines slip we risk incurring additional monetary, service level, and opportunity costs as we stretch the life of the equipment still further, lose the ability to coordinate dependent and mutually reinforcing projects, and fail to realize benefits from technology that we do not have.

For example, the 1:1 program is scheduled to start up at the high school in FY 2016, requiring a large initial purchase of equipment to get it started. However the WiFi at the high school needs an investment to make it 1:1 ready. Inadequate WiFi will jeopardize the program so if sufficient funds are not available in the FY 2015 budget to build out the WiFi, we'll be forced to put other projects on hold and use their funds for the WiFi instead. It will likely be two years before we can even think about resuming those deferred projects because FY 2016 will also need substantial resources as mentioned above.

Table 2 shows the additional funding for instructional materials, equipment, and technology the schools would have received under three scenarios; 1) Shrewsbury's per pupil expenditures

were equal to the median of the AVC and DART districts, 2) Shrewsbury's per pupil expenditures were equal to the mean of the AVC and DART districts, and 3) Shrewsbury's per pupil expenditures were equal to the state average.

While the budget request for technology may seem large, the increase is being driven mostly by one-time costs that address projects that were deferred due to chronic inadequate funding. When the projects are completed, the steady-state per-pupil spending for technology will still be below the state average.

Table 1 - Spending comparison of instructional materials, equipment, and technology for neighboring and similar districts

	2005	2006	2007	2008	2009	2010	2011	2012	Mean
Westborough	$333	$289	$424	$714	$302	$487	$430	$343	$415
Nashoba	$350	$354	$350	$434	$432	$400	$348	$299	$371
State Avg	**$337**	**$360**	**$356**	**$362**	**$357**	**$394**	**$422**	**$377**	**$371**
Berlin-Boylston	$389	$517	$558	$314	$387	$302	$250	$230	$368
Berlin	$187	$201	$558	$533	$403	$349	$305	$301	$355
Milbury	$204	$374	$397	$268	$336	$398	$329	$293	$325
Northborough	$230	$240	$301	$281	$332	$464	$279	$279	$301
North/Southboro	$221	$488	$431	$231	$278	$273	$271	$157	$294
Marlborough	$447	$321	$272	$365	$241	$342	$239	$116	$293
Natick	$401	$242	$244	$222	$212	$306	$331	$325	$285
Mean	**$257**	**$278**	**$303**	**$299**	**$275**	**$294**	**$282**	**$261**	**$281**
Southborough	$161	$165	$214	$278	$262	$400	$333	$419	$279
Median	**$228**	**$254**	**$273**	**$271**	**$267**	**$288**	**$284**	**$286**	**$269**
Walpole	$227	$302	$259	$274	$315	$242	$217	$214	$256
Chelmsford	$251	$204	$207	$185	$227	$200	$289	$450	$252
Hudson	$182	$266	$273	$222	$198	$197	$228	$302	$234
Boylston	$224	$187	$282	$278	$271	$153	$231	$213	$230
Maynard	$263	$224	$173	$174	$231	$270	$307	$162	$226
Grafton	$168	$201	$184	$201	$170	$236	$362	$155	$210
Arlington	$228	$271	$122	$157	$153	$144	$156	$328	$195
Shrewsbury	**$155**	**$153**	**$209**	**$247**	**$204**	**$135**	**$172**	**$115**	**$174**

Table 2 - Additional funding for instructional materials, equipment, and technology had Shrewsbury been spending at more like neighboring and similar districts

Year	Enrollment	Additional funding if at AVC & DART Median	Additional funding if at AVC & DART Mean	Additional funding if at State Average
2005	5876	$426,010	$597,720	$1,069,432
2006	5901	$596,001	$735,986	$1,221,507
2007	5895	$374,333	$555,440	$866,565
2008	5905	$141,720	$305,748	$679,075
2009	5841	$365,063	$416,009	$893,673
2010	5943	$906,308	$946,918	$1,539,237
2011	5947	$666,064	$654,500	$1,486,750
2012	6007	$1,027,197	$878,023	$1,573,834
Total		**$4,502,695**	**$5,090,344**	**$9,330,073**

Technology - Learning Devices

Key Points

- Learning devices allow students, faculty, staff, and administrators to access and build the global knowledge network by using the Internet to publish and access curriculum resources and communicate and collaborate with peers, experts, and other learners.
- Our middle school personal learning device program ensures that every student will have access to an individually assigned device while at school and the opportunity for access at home. This program is funded primarily through the annual fees families pay to take home a district-owned device or use their family-owned device at school.
- At the middle and high schools, computer labs offer students the ability and opportunity to engage in sustained work that is more complex than is easily accomplished with a personal device. This might include extended research, producing long or complex documents, numerical simulations, and design.
- In the elementary schools, classroom devices such as iPads, Chromebooks, laptops, and desktops allow teachers to differentiate their instruction and increase options and flexibility for engagement, remediation, and extension resulting in a more individualized experience and environment for the students.
- Throughout the district students many students with learning disabilities need to use software that requires access to a desktop or laptop in the classroom to access the curriculum and complete their schoolwork.
- The new Partnership for Assessment of Readiness for College and Careers (PARCC) tests that will eventually replace MCAS will be technology based and require investing in equipment and supplies in order to be able to securely administer the assessment.

Budget Needs

- Cost of the final year of seed money for the middle school Personal Learning Device program before all grades 5-8 are participating: $95,000
- Cost of additional units for annual faculty laptop program refresh: $75,000
- Cost of additional laptops for new hires: $87,400
- Cost of additional iPads for new hires: $21,600
- Oak has a lab with computers that are too old and unreliable to be useful that should have been replaced several years ago but were not due to budget cuts. Cost of replacing all computers in a lab: $38,000
- Most elementary desktop computers are out-of-date and need to be replaced with mobile devices such as iPads and Chromebooks. Cost of replacing old and outdated computers in elementary school classrooms: $75,000
- Most desktop and laptop computers used for Special Education programming are out-of-date and need replacing. Cost of replacing old and outdated computers used for special education programming: $75,000
- Cost of equipment and supplies for PARCC testing: $20,000

Total New Costs: $487,000

Technology - Interactive Projectors

Key Points

- Interactive projectors are permanently mounted in the classroom and support Universal Design for Learning (UDL) principles by reducing the barriers to meaningfully integration of digital media into the learning environment. The inclusion of a document camera allows student work and other physical objects to be quickly and easily shared and seen by all.
- Thanks to the generosity of the elementary PTOs and the Garden Party, nearly every core elementary classroom has or will have an interactive projector and document camera.
- Thanks to the newly completed building project, all classrooms at Sherwood are fully outfitted and represent the new standard that we are trying to attain in our other classrooms.
- There are currently 2 classrooms in the Oak Middle School that have interactive projectors and there are 34 projector carts that have been purchased over the years using Garden Party and appropriated funds leaving a shortage of 24. With the entire school going 1:1 next year all classrooms will need at least a projector cart. We will ensure universal classroom projectors by purchasing as many interactive projectors as we can while still purchasing carts for the remaining classrooms. We will also move projector carts from the elementary schools when they are no longer needed.
- Shrewsbury High School has or will have projector carts for nearly every classroom that have been purchased over the years using Garden Party and appropriated funds. Interactive projector installation at the high school is scheduled to start in 2016.

Budget Needs

- Most core elementary school classrooms have or will have an interactive projector by the end of this school year. If more elementary classrooms are in use next year then the costs of additional installations can be covered with Garden Party donations provided that they are similar to previous years. Appropriated funds needed: $0
- Oak is the next school that needs interactive projectors installed and will be outfitted with them over the next four years. Currently 25 classrooms lack any kind of projector. If the number of classrooms in use at Oak stays the same then we will get interactive projectors for approximately 25% of the core classrooms. If the number of classrooms in use at Oak goes up then we will get fewer interactive projectors and more projector carts. Cost for year 1 of 4 to outfit all Oak classrooms with interactive or cart projectors: $52,500
- Most high school classrooms have or will soon get a projector cart. If more high school classrooms are used next year then Garden Party donations will cover the costs of additional projectors if donations are similar to previous years.

Total New Costs: $52,500

Technology - Media Services, Educational TV Studio, and Professional Development

Key Points

- Media centers still need books, periodicals, and reference materials for student, faculty, staff, and administrators to use for research, enrichment, remediation, and extension. A complete and up-to-date collection of books, ebooks, databases, and periodicals promotes and facilitates research, exploration, and development.
- The Educational TV Studio (ETS) at Shrewsbury High School provides students with unique opportunities to explore broadcast video as students write and make news segments, short films, documentaries, and promotional pieces. They also record community events such as sports, plays, and special events. In the process they practice a wide range of real-world skills such as writing, camera techniques, project management, communication, and teamwork while providing a valuable community service.
- Professional development gives teachers opportunities to learn, develop, practice, and reflect on new instructional practices that wouldn't be possible without technology. Technology integration into the curriculum and practice usually follows the progression from Substitution to Augmentation to Modification to Redefinition (SAMR). Professional development can include attending a conference or summit, attending a workshop and then following up with reflection and collaboration time with colleagues, or taking an internal graduate credit course.

Budget Needs

- The book collections in the media centers of our schools are in need of restoration after years of relying solely on fundraisers and scarce building based funds. Cost for year one of three to restore the collections: $60,000
- The media centers will require dedicated, annual funding to keep from falling behind: $27,000
- When the Educational TV Studio (ETS) at Shrewsbury High School was designed and installed, it included provisions for a cost-effective upgrade to High Definition (HD) with the idea that it would be upgraded to HD when HD equipment was more available and less expensive. That time is now. In fact, if we defer this upgrade we are at risk for the current HD technology to be superseded requiring a complete redesign of the studio. Cost to upgrade Ed TV studio at SHS to HD: $20,000/year for three years.
- For many years professional development has not been adequately funded requiring reducing opportunities and limiting participation. Costs for additional, ongoing professional development: $8,000

Total New Costs: $115,000

Technology - Infrastructure

Key Points

- Ubiquitous, high capacity wireless networking (WiFi) allows students, teachers, and administrators to use their digital devices and the Internet to access and build the global knowledge network by publishing and accessing curriculum resources, and communicating and collaborating with peers, experts, and other learners.
- Satisfactory WiFi depends on having an adequate number of access points for the size of the space and the number of devices, sufficient networking equipment and connections to handle the internal network traffic, and sufficient bandwidth to the Internet.
- IT hardware, software, and services increase the availability of learning opportunities, communication and collaboration, and productivity and operational efficiency. Key software and hardware resources require support and maintenance to ensure maximum availability and minimum downtime.

Budget Needs:

- WiFi in the elementary schools is currently provided by hand-me-down equipment and is less consistent and reliable. Cost to improve the WiFi coverage, capacity, and consistency for the elementary schools: $92,000
- WiFi in the high school lacks coverage and capacity to support a 1:1 program. Cost to get Shrewsbury High School ready for 1:1: $50,000
- Many of our school buildings are served by a single, 1Gbps connection to the network core. To increase capacity and reliability we need to utilize existing, unused fiber to provide dual 10Gbps connections to Sherwood, Oak, and Shrewsbury High School. Cost to upgrade network equipment at these sites: $80,000
- Cost increase to migrate to service and decommission overloaded and unreliable web filters: $17,000
- Cost increases for annual network maintenance and support: $15,000

Total New Costs: $237,000

Technology - Tech Support Personnel

Key Points

- The Tech Support Team consists of four Tech Support Specialists, an AV specialist, an IT Operations Specialist, and an IT Systems Manager.
- Demand for technical support has been increasing even before the introduction of the Personal Learning Device Program in the middle schools which added significantly to the workload. The continuingly increasing number of devices being serviced requires additional tech support personnel in order to provide the service levels and response times that the students and teachers need.
- The technology department also designs, operates, maintains, and trains teachers and administrators on the use of our Audio-Visual (AV) systems throughout the district, including the Educational Television (ETS) studio, interactive projectors, digital media and CATV distribution, PA systems, and projector carts. We also support inside and outside groups using our facilities that need these services.
- Projects are taking longer to complete, tech support response and resolution times are suffering, and tier 1, 2 and 3 tech support staff are spending more time on crisis management than prevention because the tech support personnel are so heavily loaded.

Budget Needs

- Cost to align the existing tech support contracts for more equity and flexibility: $20,000
- Cost to add one FTE of technical support at the middle school level: $40,000
- Cost to add one FTE of AV/technical support to assist throughout the district: $40,000
- Cost to add one FTE of data support specialist to assist with state reporting, data coordination, and project management: $55,000

Table 1 - Increase in tech support requests

School Year	Tickets	% Increase over previous year
2010-2011	3074	NA
2011-2012	3229	5%
2012-2013	7927	59%
2013-2014 (projected)	8623	8%

Total New Costs: $155,000