# Using Technology to Support Student Learning and School Improvement: A Long Term Plan for Lexington

Respectfully submitted by:

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## Introduction

Over the last two years, the Lexington School District has undertaken a process of rebuilding its technology program. A commitment has been made by the Town through its capital budget to provide necessary funds to replace the School District's technology workstations and to address its network equipment needs. The Technology Department has instituted procedures to better manage the network, to develop maintenance routines, and to launch the District's new student information program.

This year the School District has set as one of its major goals to "enhance the district's capacity to utilize technology both as an instructional and administrative tool." This goal is not an isolated goal but linked to other district goals and to recommendations in recent school reports. One of the other district goals for the current year is to "expand the district's capacity to use data to assess programs and student work." The Report of the visiting NEASC Committee for the High School noted "…the use of technology to support teaching and learning is inadequate, especially given the community's expectations that students will be prepared for the 21st century." The Mathematics Curriculum Review Committee in its recent update indicates an area needing future improvement is "increased training in the use of technology as an instructional tool." The Action Plan for Equity and Excellence (2009) calls for implementing data-informed, action oriented Professional Learning Communities at the different levels and utilizing data analysis software to analyze and disseminate MCAS and reading data (AIMSWEB). Utilizing data analysis software would require improving current data storage/retrieval systems and providing tech support/training. The Science and Technology/Engineering Curriculum Review Committee recommends as a year two goal "the use of technology as a learning tool for both students and teachers." Technology is indeed interwoven into the fabric of much of what the School District needs to do.

Accordingly, in January 2009, Superintendent Paul Ash commissioned this study of Lexington's technology program. The goal was to review the current technology program and to recommend a four-year technology plan that identifies the human resources, professional development, hardware, and technology materials (software, subscription services) needed to support high quality instruction, communications among constituent groups, and administrative uses of data.

# Methodology

(1) Reviewed background district materials including
- Lexington's Technology Plan 2006-2010/11
- School by school technology hardware and software inventory
- Overview of network configuration
- Current Technology Staff organization including job descriptions
- Overview of student information system (X2) implementation timeline
- Review of 12/31/07 High School Improvement Technology Committee Report
- Review of earlier district-wide technology studies

(2) Conducted three plus days of focus group meetings with the following individuals and groups
- Central Office Administrators
- District SPED Leadership Team
- Elementary teachers (focus group from each school)
- Elementary principals
- Middle School Leadership Team from each school
- Middle School teachers (multiple groups from each school)
- High School Leadership Team (principal, vice-principals, department-heads)
- High School teachers (three different groups)

(3) Completed an on-line survey completed by 341 Lexington educators (Appendix A)

This on-line survey was conducted using SurveyMonkey.com website. Appendix A includes summary survey data for the 341 respondents for all but the last two questions that were open ended questions. Comments answering the last two questions will be on file with the whole report. Using the analysis protocols made possible through SurveyMonkey.com, it was possible to sort the respondent answers in order to view responses by individuals at a particular grade level (e.g. High School, Middle School, etc) or at a particular teaching assignment (English, math, etc.)

(4) Reviewed technology research in schools and current practices of technology use in schools

(5) Analyzed technology personnel configurations in comparative Massachusetts districts

# Key Findings

## Areas of Strength

### 1. Ongoing district commitment to technology equipment purchases

The Lexington Schools has committed to a plan for technology capital purchases for FY09 through FY12 of $600,000 a year. Capital expenditures in this amount has been approved by the town for FY10 purchases. Such a plan is essential to replacing outdated technology and equipping classrooms with equipment suitable for servicing Lexington's students, teachers, and administrators.

### 2. Strides made by Technology Department in updating technology equipment and network

Over the last three years the Technology Department has replaced 1000 of its oldest computers, updated hundreds of other computers to extend its useful life, overhauled and upgraded all student staff file servers, made major upgrades in the wide area and local area networks to a managed switched environment, instituted procedures to manage network bandwidth, and begun a program to launch the District's new student information system X2. The close cooperation between Lexington School staff and Town technology staff allows for a more seemless updating of network/Internet services.

### 3. Dedication and skill set of current Technology Department staff

This observer has been impressed with the dedication, the work ethic, and the "technical" knowledge base of the Technology Department members. They work very long hours to accomplish their different tasks. Also noteworthy was the documentation provided this observer by the Technology Director as to the current technology inventory and status. It was very comprehensive and easy to follow.

### 4. Individual technology success stories at all different levels

Some of the success stories involve formal and informal learning communities of educators that have been established at the school levels or in the case of the high school at the department level to foster solid technology practices. These learning communities need to be encouraged and expanded upon in the future. In addition, focus group meetings and the on-line survey featured many positive comments at all school levels on the effectiveness of the classroom projection systems and, where available, the "electronic" whiteboards in promoting positive instruction practices. Also cited in terms of hardware was the use of student response system "clickers" as a formative assessment tool. In addition, teachers cited the use of Internet sources for science simulations, history photo journals, music/oral presentations in foreign languages, virtual manipulatives in math, and business simulations. Introduction of Discovery Education's subscription based on-line video service has met with success in providing teachers with a source of video clips in all subject areas and at all grade levels. A few teachers have successfully employed blogs to facilitate on-line class discussions. Curriculum software has been instrumental in secondary school mathematics to foster an understanding of geometry (Geometer's Sketchpad). In special education, the use of Kurzweil software has been of benefit for those having access to the software and hardware for supporting students with reading in the content areas.

# Areas of Concern

## 1. Technology is significantly underused or used inconsistently by Lexington educators

The teacher survey was sorted to study different groups of teachers. The study found:

- For High School teachers in the academic areas of math, science, English, history, foreign language, nearly 50% have their students use technology once a month or less to carry out classroom activities with 25% having their students using it once or twice a year or less.

- For Middle School teachers in the academic areas of math, science, English, history, foreign language, nearly 42 % have their students use technology once a month or less to carry out classroom activities with 29% using it once or twice a year or less.

- For Grade 4 and 5 classroom teachers, 56% have their students use technology 3-4 times a month or less.

Of equal significance, when teachers were asked to comment on areas of student use of technology during class time

- Nearly 25% of Grade 4 and 5 teachers reported they never or rarely have students use a computer or portable writing device for writing, and an additional 35% have students use such a tool for writing instruction only occasionally.

- Nearly 36% of Middle School English teachers reported they never or rarely have students use a computer or portable writing device for writing, and an additional 36% have students use such a tool for writing instruction only occasionally.

- 54% of High School and Middle School math teachers reported they have their students use technology once a month or less to carry out activities. *(Note-math teachers responding to survey might not have thought of graphing calculators as technology).*

- Over 50% of High School and Middle School science teachers reported they never had students use probes (e.g. thermometers) attached to a computer.

In their professional work, an overwhelming percent of teachers (about 80%) use technology regularly to make handouts for students, or to perform research and lesson planning using the Internet. Only, 25% of Lexington educators create and maintain a webpage.

## 2. Lexington educators are eager to move ahead and expand upon their technology use. However, they are frustrated and feel stymied by several aspects of the District's technology program

In focus group meetings, Lexington educators stated very strongly that the district is not where it should be in terms of technology. Educators said they can't rely on the hardware, educational software is very spotty or non-existent, training is not in place to assist educators on how to use technology to support curriculum and instruction practices, and there is a disparity of technology experiences for students in instruction and a disparity in use among educators. Most importantly, over and over again, one theme was repeated---there has to be a greater understanding of what the educator needs to do in the classroom and in the workplace when using technology. Also, there has to be greater guidance/mentoring on the important ways to integrate technology into the curriculum and into our understanding of how to use data.

Survey results supported the focus group statements.

63% of High School respondents and 68% of Middle School respondents consider *computers too unpredictable- they crash or software doesn't work right* (nearly 50% rated it a 5 major obstacle on a 1-5 likert scale)

53% of all respondents *would be more likely to use computers if technology support was more readily available*, 61% responded in this manner in the Middle school and 68% in Grades 4 & 5.

51% of all respondents cited *insufficient or inadequate software as an obstacle* with this percentage reaching 60% at the upper elementary grade level.

42% of respondents consider *there is insufficient or inadequate professional development on how to use technology with classroom instruction.* This percent is over 50% at the High School and upper elementary grades.

## 3. District is significantly understaffed in terms of technology personnel

A survey of some comparable school districts for indicate that although Lexington has comparable numbers of technology staff supporting network facilities and managing data, the district has substantially less personnel supporting technology as repair technicians and as instructional technology specialists. (See table below). These two types of support staff are the ones that are in the buildings supporting individual teachers and administrators with a myriad of different technology situations.

| | **Lexington** | Andover | Winchester | Wellesley | Needham | Concord -Carlisle | Newton |
|---|---|---|---|---|---|---|---|
| Network/ TechAdmin | 2 | 2 | 1 | 2 | 1 | 1 | 3 |
| Data Manager | 2 | 2 | 1 | 2 | 2 | 1 | 4 |
| Web Design/On-line facilitator | | | | | | | 2 |
| **Technicians/ HelpDesk** | **3** | **4** | **2.5** | **4.5+ 5.5 assist.** | **2** | **5** | **7** |
| **Instructional Technology Specialists** | **0 (have 1 applications instructor)** | **5** | **3** | **4** | **5** | **5** | **10.2+ 1 coord-inator** |
| | | | | | | | |
| | | | | | | | |
| Student Enrollment | 6235 | 6123 | 4100 | 4896 | 5115 | 3143 | 11700 |

The State D.E.S.E. benchmarks recommends at least 1.0 FTE to support 200 computers. Currently, Lexington has 3 technicians supporting approximately 2100 computers or 1 technician per 700 computers, and this ratio will get worse as additional workstations are added to the Lexington system.

Instructional technology specialists are essential components of successful technology programs. Instructional technology specialists have classroom teaching experiences. These specialists will consult with teachers, model effective teaching with technology, collaborate with teachers to develop

appropriate, technology-rich lessons, and provide workshops on technology integration. Also, these individuals provide valuable guidance and insights to the technology department as they move forward with the district's program. Massachusetts D.E.S.E. benchmarks recommend 1.0 FTE instructional technology specialist per 60-120 instructional staff. Lexington has over 600 instructional staff and 1 individual providing training in different applications, and this individual does not have classroom teaching experience.

## 4. Strategy for the purchase and deployment of technology doesn't maximize student technology use or educator productivity

Such a strategy would involve wireless computer environments with an emphasis on student wireless laptop workstations that are in the classrooms or can be brought to the classrooms. With the exception of Fiske School, a wireless technology environment is extremely limited in all of the schools with only one or two wireless access points plus wireless access on the mobile carts. There is no wireless access in the Central Office.

At the elementary schools (with the exception of Fiske), there are on average two desktop computers in each classroom. Wireless laptops are not available for students to use in their classrooms, and teacher laptops cannot access the network without being hardwired.

At the high school, wireless access is only available in the library area and with the mobile computer carts in the different departments. The ratio of students to computers of about 1:5 is a much higher ratio than in the elementary or middle schools. Increasing student technology use would mean increasing the total number of wireless student laptops at the school and on lab carts.

At the middle schools, wireless carts have computers that are extremely old and unreliable.

## 5. Educational software is lacking

Educational software is lacking for several reasons.

(1) There is an extremely limited budget for the purchase of software by the district. The FY 09 budget had approximately $48,000 set aside for software purchases from the Technology Department budget. Additional monies are provided by other school budgets. Although it is somewhat difficult to get a comparison figure in this area, Quality Educational Data, an educational technology data vendor, estimated an average $17.42 for per pupil expenditure for instructional software for the 2004-05 school year. Assuming an inflation rate of 3% a year this figure would extrapolate to a $19.60 per pupil expenditure. For the size of Lexington's school district this would mean a $122,200 yearly expenditure.

(2) At the elementary and middle school levels, some of the educational software, popular with teachers, was not updated by the software vendor to work with the new operating systems. The district has not purchased new software titles that might cover similar curriculum goals.

(3) Little attention has been made in recent years by the district to support technology software purchases for the learners in mathematics or language arts, especially the struggling learner. FASTT Math software, a product with a proven track record of success for elementary mathematics students, has plans for only a rollout to only a single elementary school next year. The Lexington Math Curriculum Review Committee recommended purchasing this software for all of the elementary schools. Currently, there are excellent CD math software games produced by Everyday Math in conjunction with their math program. The only major software for supporting English Language Arts instruction at the elementary or middle school levels is Microsoft Word and Kidspiration. No software is available to support reading instruction or reading fluency.

(4) Little attention has been provided to incorporating subscription services that provide software applets on-line in different curriculum areas for a yearly subscription price.

## 6. Professional development in educational technology use is very sparse and is needed

Information gathered through both focus group meetings and the on-line survey emphasize the strong need that Lexington educators have for professional development in learning to use technology to further curriculum and instructional goals.

From the on-line survey,

42% of respondents consider *there is insufficient or inadequate professional development on how to use technology with classroom instruction.* This percent is over 50% at the High School and upper elementary grades.

When asked to determine what professional development would be beneficial

- Approximately 60% of all respondents indicated *professional development would be beneficial that focused on integrating technology with classroom activities*
- Approximately 60% of all respondents indicated *professional development would be beneficial that focused on differentiating classroom activities for different learners*
- Approximately 50% of all respondents indicated that *professional development would be beneficial that focused on learning to use technology as an assessment tool*
- Yet, about 50% of all respondents thought that *professional development that focused on learning specific application (i.e. Microsoft Word, PowerPoint) software was not needed.*

Over 80% consider *ongoing training provided by an in-house teacher with technology expertise* as an effective way of providing professional development, over 50% rating it a 5 very effective on a 1-5 likert scale.

Over 80% cite *release time for professional development related to technology* as being an effective strategy.

When asked for suggestions for next steps by the school district, a significant number of elementary school teachers in their open ended responses on the survey, stressed the need for in-house professional development. Examples of these responses were the following;

*"…there needs to be more professional development opportunities (for technology) offered within schools."*

*" Classroom teachers absolutely need support from an educator skilled in technology use to effectively use technology in our instruction."*

*" I feel that the lack of an Integration Technology Specialist has had a negative impact on our effectiveness."*

*"One to one mentoring to introduce and coach staff use of specific technology"*

## 7. Technology is not being used effectively for collecting and analyzing student data/information for the purpose of improving instruction

Lexington educators report: (1) the lack of a database tool where appropriate student assessment data can be entered and then analyzed and (2) the lack of professional development training of appropriate curriculum leaders and teachers in assessing student data. Currently, Lexington student assessment data is found in different spreadsheets and databases throughout the district. A promising answer will be the D.E.S.E. Data Warehouse software. The state has already purchased software

licenses for each school district and has already provided training (and will provide additional training) in using the Warehouse software. MCAS data for the past several years, as well as student names for each district, have been entered by the State. A series of standard reports can be accessed for this data. An upgrade procedure will permit school districts to enter local assessment data into Data Warehouse. In the future, a procedure will also be introduced to permit school districts to directly port over information from their student information system (Lexington uses X2 system).

## 8. School web sites are not effective in communicating information about teacher class activities and procedures. There is also a lack of uniformity in the kinds of information that each school provides with their web site.

Only, 25% of Lexington educators currently create and maintain a webpage. Moreover, 56% of Lexington educators do not know how to create or maintain a web page and another 18% sometimes need help to do this task. Part of the problem is the authoring tool selected to construct a web page. On-line subscription services are now available for teachers that make constructing a web page no more difficult than using Microsoft Word. Some monies are required by the school system to purchase this type of service and a short amount of professional development training needs to be provided to teachers to utilize the web-authoring tool.

Looking over the different school sites, it was difficult for this observer to find the same type of information (i.e. calendar, teacher web sites, curriculum when navigating between the different schools).

## 9. No systemic way at looking at educational technology future trends

This observer saw no evidence that attention was being given to such future technology trends as

- virtual classrooms (students taught through on-line methods or through combination of on-line and traditional classroom means)
- the incorporation of 21st century skills
- the use of Web 2.0 tools such as blogs, wikis, and on-line discussions in educational settings
- building a data culture using technology
- 1 to 1 use of computers by students

## What the Research Says About Technology

Technology, not only encourages and engages students more effectively, but most importantly enhances student performance and achievement levels. The following information does not pretend to be an exhaustive study of either the publications or the research on technology use in schools. Nevertheless, the references below strongly suggest how important educational technology is to the fabric of a school environment.

*- In a summary of research on professional development the North Central Regional Educational Laboratory in 2007 stated "Ongoing professional development is necessary to help teachers learn not only how to use new technology but also how to provide meaningful instruction and activities using technology in the classroom….teachers cannot be expected to learn how to use educational technology in their teaching after a one-time workshop. Teachers need in-depth, sustained assistance not only in the use of the technology but in their efforts to integrate technology into the curriculum"*

*- Technology has a vital role to play in enabling data-driven decision making. Web-based test data reporting systems provide an important interface to testing results by organizing raw data into information that can be aligned to standards and providing teachers with a platform to analyze their own classroom data. (North Central Regional Educational Laboratory, 2007)*

*- A Meta-Analysis of Writing with Computer Studies form 1992-2002 found a positive overall effect that was about one-half standard deviation on the quantity of student writing and four-tenths of a standard deviation on the quality of writing. These effects tended to be higher for middle and high school students. (Russell, Boston College, 2002)*

*-"The impact of (Scientific Learning) Reading Assistant (software) on fluency growth was evaluated with mainstream students in Grades 2-5. Half of the classrooms in two schools used the software in thirty-minute sessions, once or twice a week over 17 weeks. Across all four grades, fluency gains were significantly greater for students who used the software than those who did not, averaging 43% (E.S.=0.91) greater than normative expectations over grades. Project sponsored by the Carlisle Foundation and NICHD."*

*- National Council for Teachers of Mathematics cites as one of its six guiding principals that technology is essential in teaching and learning mathematics. It influences the mathematics that is taught and enhances student learning.*

*- 4th and 8th graders whose teachers used computers for simulations and applications performed better on the National Assessment of Educational Progress assessment (NAEP) in mathematics than students whose teachers did not. (Wenglinsky 1998)*

*- "The effects of using FASTT Math approach can be quite striking." Data shows with study by Hasselbring and Goin "that math-delayed students receiving instruction with FASTT Math approach gained, on the average, 19 new fluent facts while their math-delayed peers receiving traditional instruction gained no new facts and their non-math delayed peers gained only 7 new facts." (Scholastic White Paper)*

*- Use of science probes in the teaching of physics has the possibility for large student learning gains. At both the college and high school levels there is a significant gain in the understanding of concepts associated with force and motion (Thornton, Tufts Uiversity)*

*- A review of research literature by BECTA published in 2004 found that the use of simulations and modeling in the natural sciences resulted in increased learning and retention by students. (C. Lemke, 2006).*

*- "Social networking accelerates learning and is facilitated by technology. " Students are highly motivated to communicate via technology be it text messaging, email,… (on-line discussions), or videoconferencing. Social networking via technology can connect students to a broad range of interactivity that sharpens and extends thinking and piques intellectual curiosity."(C. Lemke, 2006)*

# MAJOR RECOMMENDATIONS

In the next section, I recommend a series of action steps to be delineated over the next several years in each of the areas of personnel, hardware, software, curriculum, professional development, data analysis, Internet, communications, and data culture. However, before setting forth these action steps, I submit to the Lexington School District the following five overarching recommendations.

## 1. Increase the staffing of the Technology Department

This is the single major recommendation. Without increased staffing, Lexington's problems will continue and may even worsen. Technology will continue to be significantly underused and/or used inconsistently by Lexington educators. The district's ongoing investment in computer hardware will not bring the gains in student instruction or in appropriate educator uses for communication and data gathering.

This report calls for acting immediately in the hiring process (*see Action Plan Personnel*) and adding 3 field technicians for the 2009-10 school year and hiring 2.0 FTE instructional technology specialists to service the elementary and middle schools. Over the next several years, the technical staff needs to increase significantly beyond those hires to reach a total of 5.0 FTE instructional technology specialists and 6 field technicians plus 5 technology "aides" that can support the routine maintenance of technology. The inclusion of additional staffing through the hiring of a Director of Educational Technology and Assessment and the hiring of instructional technology specialists will certainly address the areas of concern noted in an earlier section In addition these new hires with classroom and other educational experiences will serve to weave more effectively educator input into determining short-term and long-term technology strategies.

## 2. Construct near-term and long-term studies and procedures for determining technology needs and responding to these needs

Over the near-term, studies need to be made and procedures implemented in the following areas: hardware status and deployment, current software availability and purchases, Internet access and speed, SPED technology implementation, professional development in technology usage, establishment of promising practices in the different school environments. In addition, cost studies for capital technology purchases need to be reexamined in order to include costs for wireless environment in all school buildings, utilization of electronic whiteboards in classrooms, deployment of wireless laptops and other technology appliances. These studies would be conducted by the Director of Educational Technology and Assessment with active involvement of Technology Department members and appropriate administrators and teachers from the district.

## 3. Purchase needed software and subscription based Internet materials to support curriculum objectives

As stated in earlier section, the budget for the purchase of software by the district is limited. The budget assigned to Technology Department for software purchase is approximately $48,000. For the size of Lexington's school district, a much larger figure should be set aside. Moreover, at the elementary and middle school levels, educational software titles, that were popular with teachers, were not updated by the software vendors to work with the new operating systems. Additional powerful software packages are also now available that would be beneficial to Lexington's struggling learners

and need to be purchased. Bottom line, there is a dearth of curriculum related software currently available to teachers. To be able to play catch up and purchase the needed software, this report recommends that the district set aside some additional monies.

## 4. Professional development opportunities need to be provided in a much more substantial and sustainable manner by the school district

Professional development is imperative in the area of technology. The hiring of instructional technology specialists will provide valuable opportunities for on-going mentoring individually and with small groups. However, more will need to be done. As a district professional development committee conducts a study of the different professional development initiatives, it would be essential that a member of this committee be the Director of Educational Technology and Assessment. In addition, the district and school administrators should work closely with the Director of Educational Technology and Assessment to develop professional development opportunities at the school and department levels.

## 5. Over time, the school district needs to establish expectations for technology use by teachers, administrators, and staff

Such expectations cannot be set in the near-term. Procedures must be first implemented to address the areas of concern associated with professional development, maintenance, and technology deployment. Eventually, teachers and administrators should work together to establish basic expectations for the use of technology to improve student academic achievement and instructional practices. These expectations, or core experiences, may be set through separate documentation (see Appendix B for example) or though incorporation into documents such as the curriculum reviews. Additional expectations need to be encouraged in the future in the areas of (1) relevant communications by having every teacher have their own updated website, and (2) using data to analyze and improve instructional practices.

# ACTION STEPS

# Personnel

*Technology change is organizational change is instructional change. Technology does not work in schools where it is dropped into the existing organizational structure and instructional process. If technology is to impact educational outcomes, then instructional and organizational systems must be simultaneously overhauled (Levinson, Eliot, and Denis Doyle).*

**2009-10 Action Steps**

1. Increase number of technicians by adding 3 field technicians so district has 6.0 FTE technicians.

2. Establish building base model for field technician deployment with technicians being assigned to buildings at each level : high school, middle schools, elementary schools

3. Hire 2.0 FTE Instructional technology specialists 1 for elementary schools and 1 for middle schools These specialists could be Lexington teachers with strength in using technology in classroom settings.

4. Recommend to Director of Student Services to redirect "portion" of consulting money currently used to pay AllTech vendor for evaluations to hiring Assistive Technology specialist. *Currently $90,000 is budgeted for this contracted service. A portion of this money would still be used for AllTech assistance and the rest to pay for the salary of Assistive Technology Specialist.*

5. Secure partial secretarial support for Technology Department *Currently there is no secretarial support for the department.*

**6.** Budget implications
Currently there is approximately $20,000 for a position that has not been filled for next year. Cost would be $35,000 for each additional field technician. Cost of instructional technology specialists would depend on placement on current teacher's salary schedule. If Lexington teachers were to assume this role then there would be a replacement cost for that teacher which should be at the lower end of the scale.

**2010-11 Action Steps**

1. Add 5.0 FTE additional tech support staff as technology "aides" to support ongoing maintenance and installations at building level.

2. Hire 2.0 FTE additional Instructional technology specialists -1 additional for elementary and 1.0 for middle school

3. Add 1.0 FTE equivalent Instructional technology specialist at high school by reducing class load of current high school teachers (by 0.25 to 0.5 each) so they can assume technology mentoring role.

4. Hire Lexington students for summer 2011 to assist staff with installations-maintenance.

5. Create "small" stipends for school based and a district based web editor.

6.Conduct small study of personnel organizational structure in winter/spring to determine effectiveness of delivery model.

**Long term action steps 2011-2013**

1.Carry out recommendations of study of organizational structure made in 2011-12

# Hardware

## 2009-10 Action Steps

1. Emphasize purchasing of wireless hardware for all schools for student stations *Emphasis at the high school and middle school will be on computer carts. At the high school and middle school, wireless laptops would augment current equipment in SPED resource areas. At the elementary school the emphasis will be on wireless laptops in individual classrooms for Grades 3-5.*

2. Add large number of wireless access points in all schools and in district office *Currently only Harrington School is completely wireless. High School library has wireless access. For other schools and for the rest of the high school, access is limited to the roving computer carts in the buildings. Central Office has no wireless access.*

3. Study the possibilities of redeployment of existing computers especially at elementary school to get greater number of student computers into the classrooms.

4. Add additional wireless computers to high school. *Currently there are 414 computers for approximately 1980 students which is a ratio of about 1 :5 a much higher ratio than in the elementary or middle school.*

5.Investigate and determine cost for complete wireless environment in all schools with sufficient bandwidth for future operations.
6. Investigate speed of internal networks to determine if access times are satisfactory.

7. Investigate and determine cost for updating classrooms in all the schools with "electronic whiteboards" *Different cost estimates would be provided so the school district could make a decision on the extent it wishes to provide classrooms with these "electronic whiteboards". The cost estimate would depend on which type of "electronic whiteboard" is selected for purchase. Based upon this study, carry out first phase of purchase of this technology.*

## 2010-11 Action Steps

1. Continue with plans for redeploying and adding technology hardware to maximize academic experiences. *Part of this would include involve investigating the potential of introducing into the mix the new "net computers"*

2. Outside vendor installs wireless network in high school.

3. Add additional wireless access points to other schools. If money is available, 1 middle school has wireless network installed throughout building.

4. Carry out next phase of plan for installing “electronic whiteboards” in the different school classrooms.

## Long term action steps 2011-2013

1. Continue with plans for redeploying and adding technology hardware to maximize academic experiences.

2. Wireless networks installed in all remaining schools.

3. Continue with strategic deployment of "electronic whiteboards"

4. In 2012 study the feasibility at high school of setting up a separate server/network configuration for students and teachers using their personal computers from home.

# Curriculum & Professional Development

## 2009-10 Action Steps

1. Introduce and support use of promising practices for using technology by classroom teachers. These promising practices would emphasize one of the following: (1) different deployments of technology in classrooms or in department areas, (2) the use of software and on-line subscription technology tied to different curriculum goals, (3) different teacher instructional practices

2. Dir. of Educational Technologies and Assessment or his/her representative represented on curriculum review committees.

3. Conduct investigation on how Lexington should use an on-line curriculum mapping tool to better communicate curriculum to staff and to the public.

4. Incorporate technology practices into science curriculum review.

5. Director of Educational Technologies and Assessment is represented on Professional Development Committee.

6. Encourage professional development activities during school day through variety of strategies. During selected half-day Thursdays professional development provided at elementary schools. Substitutes hired to allow for half day trainings at middle school and high school, where substitute would replace 1 classroom teacher in morning another in afternoon.

7. Introduce after-school workshops with participation awarded though salary scale credits.

8. Develop plans to reinstitute Lexington Summer Camp.

## 2010-11 Action Steps

1. Disseminate promising technology practices for wider usage across schools and across departments.

2. Begin curriculum mapping pilot using recently developed curriculum review materials in mathematics and science.

3. Director of Educational Technology and Assessment along with Technology Department staff provide on-going guidance to curriculum review project in English Language Arts.

4. Launch Lexington Summer camp in Summer, 2010

5. Continue with professional development strategies introduced in previous year. Attempt this year is to bring teachers on board who are more reluctant users of technology.

## Long term action steps 2011-2013

1. By 2013 basic technology core experiences defined in all curriculum areas and in all grade levels. All teachers will be expected to carry out these experiences that are linked to curriculum goals. Teachers and curriculum leaders would be the ones in professional learning communities determining what these experiences would be.

2. Continue and expand upon Lexington Summer Camp in Summer, 2011

# Internet

**2009-10 Action Steps**

1. Increase bandwidth to different schools
Current bandwidth of 10 mbs. is unsatisfactory. Even promised future RCN capacity of 20-25 MBS capacity for the district is unsatisfactory. Each school should have this capacity independently.

2. Purchase and deploy content filter for Internet
There is no content filter currently on the Internet. This leads to all sorts of instructional problems. Also very importantly eligibility for Federal technology grants is contingent upon compliance with the Federal Children's Information Protection Act which Lexington is not in compliance with because of lack of filter. This means that the District can not take advantage of a savings of approximately 40% in telephone and Internet costs which would be paid through Federal eRate funding. Also, Title II D entitlement technology federal money could not be used for purchase of computers or Internet related services.

3. Conduct study to determine bandwidth needs for years 2012 and beyond.

**2010-11 Action Steps**

1. Carry out steps recommended in Internet study of previous years.

**Long term action steps 2011-2013**

1. None at this time.

# Software

**2009-10 Action Steps**

1. Purchase needed software to support elementary and middle school instruction. Software available in different formats depending on vendor. Most is installed on computers but others are available through online subscription Currently, there is almost no software available aimed at the elementary school level to support curriculum objectives.

2. Purchase software to support district's goal of supporting struggling learners. No software currently exists to support Lexington District's goal of reducing the achievement gap for struggling learners. Software recommended by the Math Curriculum Review Committee and has proven successful in many other districts should be purchased to be used on a volunteer basis in all 6 elementary schools. Currently FASTT Math is only being planned for 1 elementary school's use. Software should also be purchased to support small pilot(s) for struggling readers.

3. Investigate technology alternatives to popular software titles used by Lexington teachers that are no longer available due to upgrades of operating system.

4.Budget implications of software purchases
Approximately $48,000 is set aside in FY10 Technology Department budget for software purchases. This money appropriation needs to be augmented with additional funds to provide for purchases outlined in action steps 1,2, and 3.

**2010-11 Action Steps**

1. Provide funding for technology software recommendations recommended by science curriculum review committee and make strategic purchases.

2. Purchase on-line subscription to curriculum mapping system and begin pilot program.

3. Purchase needed software to support software for struggling learners in reading and writing. If necessary, purchase additional software to fully utilize FASTT Math software in all the elementary schools.

4. Purchase different online subscriptions to support curriculum initiatves in math and science.

5. Work with SPED staff to purchase needed software to support their student and teacher populations.

**Long term action steps 2011-2013**

1. Conduct study with the support of curriculum leaders and administrators to determine curriculum needs in terms of software.

2. Address study needs through software purchases.

# Communications

**2009-10 Action Steps**

1. Bring together appropriate educators to evaluate current school and district web site construction.

2. Encourage a cadre of teachers to develop their own web sites employing on-line vendor template. *(Constructing a teacher web site is no harder with current on-line vendor templates than using Microsoft Word.)*

**2010-11 Action Steps**

1. Begin planning process for new District and School web sites with committee of educators.

2. Construct graphic organizers for each type of school web site and for the district web site that documents all the information that should be on these sites and how this information is positioned.

3. Secure an outside school website vendor to host site and supply necessary templates. Select individual school and district editors.

**Long term Action Steps 2011-2013**

1. By 2013 teachers have their own individual web sites.

2. In 2011-12 the new district and school web sites are launched. School and district web editors maintain updated web sites.

# Data Culture

**2009-10 Action Steps**

1. Solidify introduction of student information system software X2 by conducting appropriate training. Key staff members from all schools learn how to run needed reports in attendance and run reports by subgroups. All High School faculty trained on full use of gradebook. Middle school faculty trained to enter attendance electronically. Elementary school teachers trained to enter attendance and possibly lunch counts electronically.

2. Introduce Lexington administrators and curriculum leaders to D.E.S.E.'s Data Warehouse which allows for analysis of MCAS data and incorporation of local assessment data. Provide training to key educators.

3. Key administrators/curriculum leaders including the Director of Educational Technologies and Assessment participate in workshops on the topic of data assessment and professional learning communities.

**2010-11 Action Steps**

1. Carry out next steps of student information software (X2) deployment and training. Areas of involvement would extend into the elementary schools and more extensively into the middle school. Pilot programs conducted at middle schools and High School with parent portals for viewing student grades and attendance.

2. Develop small pilot groups consisting of key teachers and curriculum leaders study how to use data to support instruction and improve instructional activities. Use Data Warehouse and other appropriate technology assessment software.

**Long term Action Steps 2011-2013**

3. By 2013, all teachers and administrators at all levels become comfortable with needed features of the X2 student information system.

# Appendix A

# Summary Responses  of Lexington On-Line Survey

# Technology At Lexington Public Schools

**1. How many years have you taught at your current school/district?**

| | Response Percent | Response Count |
|---|---|---|
| Less than 1 | 13.2% | 45 |
| 1-2 | 14.7% | 50 |
| 3-5 | 15.2% | 52 |
| **6-10** | **26.4%** | **90** |
| 11-20 | 21.4% | 73 |
| More than 20 | 9.1% | 31 |
| | ***answered question*** | **341** |
| | ***skipped question*** | **0** |

**2. How many years have you taught throughout your career?**

| | Response Percent | Response Count |
|---|---|---|
| Less than 1 | 1.8% | 6 |
| 1-2 | 5.3% | 18 |
| 3-5 | 14.4% | 49 |
| 6-10 | 22.3% | 76 |
| 11-20 | 25.8% | 88 |
| **More than 20** | **30.5%** | **104** |
| | ***answered question*** | **341** |
| | ***skipped question*** | **0** |

**3. At what grade level or levels do you currently teach? (You may select more than 1 choice.)**

| | Response Percent | Response Count |
|---|---|---|
| Grades K-3 | 29.6% | 101 |
| Grades 4-5 | 23.8% | 81 |
| Middle School | 23.5% | 80 |
| **High School** | **38.7%** | **132** |
| | ***answered question*** | **341** |
| | ***skipped question*** | **0** |

**4. What is your primary teaching assignment?**

| | Response Percent | Response Count |
|---|---|---|
| **All (elementary education)** | **21.4%** | **73** |
| English/Language Arts | 10.0% | 34 |
| Math | 7.3% | 25 |
| Social Studies/History | 7.9% | 27 |
| Science | 8.5% | 29 |
| Special Education | 17.6% | 60 |
| Librarian | 2.1% | 7 |
| Foreign Languages | 5.9% | 20 |
| Music | 1.8% | 6 |
| Physical Education/Health | 4.4% | 15 |
| Visual Arts | 1.8% | 6 |
| Other (please specify) | 11.4% | 39 |
| | ***answered question*** | **341** |
| | ***skipped question*** | **0** |

**5. Is part of your work in Lexington of an administrative nature (ie. department head, coordinator, chairperson, etc.)?**

| | Response Percent | Response Count |
|---|---|---|
| Yes | 8.8% | 30 |
| **No** | **91.2%** | **311** |
| | ***answered question*** | **341** |
| | ***skipped question*** | **0** |

**6. How often do you perform the following in your professional work?**

| | Never | Once-twice a year | Several times a year | Several times a month | Several times a week | Response Count |
|---|---|---|---|---|---|---|
| Make handouts for students using a computer | 3.4% (11) | 2.8% (9) | 9.2% (30) | 22.1% (72) | **62.6% (204)** | 326 |
| Record student grades using an electronic gradebook (either software or over Internet) | **44.5% (145)** | 4.0% (13) | 17.2% (56) | 12.3% (40) | 22.1% (72) | 326 |
| Use a digital camera to get images into a computer | **35.0% (114)** | 21.8% (71) | 19.0% (62) | 16.0% (52) | 8.3% (27) | 326 |
| Perform research and lesson planning using the Internet | 3.7% (12) | 5.2% (17) | 12.9% (42) | 30.4% (99) | **47.9% (156)** | 326 |
| Use software (i.e. PowerPoint, Excel) to create a presentation | 20.2% (66) | 22.1% (72) | **23.9% (78)** | 17.5% (57) | 16.3% (53) | 326 |
| Create and maintain a webpage | **69.6% (227)** | 6.7% (22) | 2.5% (8) | 8.9% (29) | 12.3% (40) | 326 |
| Create or participate in a blog or online discussion form | **69.3% (226)** | 8.9% (29) | 9.8% (32) | 5.8% (19) | 6.1% (20) | 326 |
| Assess or monitor student progress using a computer | **35.9% (117)** | 10.4% (34) | 17.2% (56) | 14.4% (47) | 22.1% (72) | 326 |
| | | | | | ***answered question*** | **326** |
| | | | | | ***skipped question*** | **15** |

| 7. Indicate your comfort level in using technology in each of the following areas. | | | | | |
|---|---|---|---|---|---|
| | **I don't know how to do this** | **I can do this, but I sometimes need help** | **I can do this by myself** | **I can teach others how to do this** | **Response Count** |
| Use a word processor to create documents | 0.0% (0) | 2.1% (7) | 29.4% (96) | **68.4% (223)** | 326 |
| Use a graphic organizer such as Inspiration or Kidspiration | **36.2% (118)** | 16.6% (54) | 35.0% (114) | 12.3% (40) | 326 |
| Use a digital camera to get images into a computer | 15.0% (49) | 17.2% (56) | 32.8% (107) | **35.0% (114)** | 326 |
| Find appropriate information for school on the Internet | 0.0% (0) | 2.8% (9) | 38.3% (125) | **58.9% (192)** | 326 |
| Use video editing software to produce a video or slideshow | **52.1% (170)** | 23.3% (76) | 15.3% (50) | 9.2% (30) | 326 |
| Use software (i.e. PowerPoint, Excel) to create a presentation | 14.4% (47) | 23.9% (78) | **31.0% (101)** | 30.7% (100) | 326 |
| Create and maintain a webpage | **55.8% (182)** | 18.1% (59) | 14.1% (46) | 12.0% (39) | 326 |
| Create a blog or online discussion forum | **67.5% (220)** | 12.3% (40) | 14.7% (48) | 5.5% (18) | 326 |
| Create a podcast | **84.7% (276)** | 6.4% (21) | 6.7% (22) | 2.1% (7) | 326 |
| Use a computer projection system | **31.6% (103)** | 17.2% (56) | 23.3% (76) | 27.9% (91) | 326 |
| | | | | ***answered question*** | **326** |
| | | | | ***skipped question*** | **15** |

**8. During class time how often do your students use technology as they carry out class activities?**

| | Response Percent | Response Count |
|---|---|---|
| Never | 12.9% | 42 |
| **Once-twice a year** | **16.9%** | **55** |
| About once a month | 15.0% | 49 |
| 3-4 times a month | 15.0% | 49 |
| Once a week | 10.7% | 35 |
| 2-3 times a week | 15.0% | 49 |
| Daily | 14.4% | 47 |
| | ***answered question*** | **326** |
| | ***skipped question*** | **15** |

**9. During "class time", how often do students perform the following activities during the year?**

| | Never | Rarely | Occasionally | Frequently | Does not apply | Response Count |
|---|---|---|---|---|---|---|
| Students work "individually" on school work using computers | 15.6% (51) | 16.0% (52) | **35.6% (116)** | 26.4% (86) | 6.4% (21) | 326 |
| Students work "in groups" on school work using computers | 21.5% (70) | 27.6% (90) | **34.0% (111)** | 9.5% (31) | 7.4% (24) | 326 |
| Students perform research or find info using the Internet or CD-ROM | 18.1% (59) | 18.4% (60) | **33.7% (110)** | 23.3% (76) | 6.4% (21) | 326 |
| Students use a computer or portable writing device for writing | **30.4% (99)** | 16.3% (53) | 24.5% (80) | 22.1% (72) | 6.7% (22) | 326 |
| Students use computers to solve problems | **32.5% (106)** | 25.2% (82) | 24.8% (81) | 7.4% (24) | 10.1% (33) | 326 |
| Students present information to a class using a computer | **37.4% (122)** | 22.4% (73) | 25.8% (84) | 6.1% (20) | 8.3% (27) | 326 |
| Students use probes (e.g. thermometers, etc.) attached to a computer | **77.3% (252)** | 4.6% (15) | 3.7% (12) | 0.3% (1) | 14.1% (46) | 326 |
| Students use computers to communicate with individuals not in that school. | **72.4% (236)** | 8.0% (26) | 6.7% (22) | 2.8% (9) | 10.1% (33) | 326 |

| | | |
|---|---|---|
| | ***answered question*** | **326** |
| | ***skipped question*** | **15** |

| **10. Rate how much each of the following conditions provide an obstacle for you in making more effective use of technology.** | | | | | | |
|---|---|---|---|---|---|---|
| | **1 Not an obstacle** | **2** | **3** | **4** | **5 Major obstacle** | **Response Count** |
| Difficult to access computers in labs and/or library | 22.6% (72) | 11.6% (37) | **25.1% (80)** | 22.6% (72) | 18.2% (58) | 319 |
| Do not have enough computers for all of my students | **27.3% (87)** | 10.7% (34) | 15.0% (48) | 21.6% (69) | 25.4% (81) | 319 |
| Insufficient or inadequate software | 16.0% (51) | 11.9% (38) | 21.3% (68) | 23.5% (75) | **27.3% (87)** | 319 |
| Insufficient or inadequate professional development on how to use technology with classroom instruction | 14.7% (47) | 16.3% (52) | **27.0% (86)** | 19.7% (63) | 22.3% (71) | 319 |
| Prof. development prepares me to use technology, but I do not have enough time to practice | 15.4% (49) | 16.9% (54) | **31.0% (99)** | 18.2% (58) | 18.5% (59) | 319 |
| There is too much course material to cover in a year to make room for technology use | **38.6% (123)** | 18.2% (58) | 23.2% (74) | 11.3% (36) | 8.8% (28) | 319 |
| Not sure how to make technology relevant to my subject | **53.0% (169)** | 19.7% (63) | 17.2% (55) | 6.3% (20) | 3.8% (12) | 319 |
| Internet is too slow | **27.0% (86)** | 17.2% (55) | 19.7% (63) | 16.6% (53) | 19.4% (62) | 319 |
| Computers are too unpredictable- they crash or the software does not work right | 13.5% (43) | 15.7% (50) | 18.8% (60) | 19.1% (61) | **32.9% (105)** | 319 |
| Would be more likely to use computer if technical support was more readily available | 14.4% (46) | 13.8% (44) | 18.8% (60) | 20.7% (66) | **32.3% (103)** | 319 |
| Too easy for students to use inappropriate Internet sites | **39.8% (127)** | 20.4% (65) | 18.2% (58) | 12.5% (40) | 9.1% (29) | 319 |
| | | | | ***answered question*** | | **319** |
| | | | | ***skipped question*** | | **22** |

**11. What kinds of professional development would be most beneficial to you?**

| | 1 Not needed | 2 | 3 | 4 | 5 Very beneficial | Response Count |
|---|---|---|---|---|---|---|
| Managing my computer desktop (opening programs, printing, etc.) | **74.3% (237)** | 9.1% (29) | 7.8% (25) | 3.8% (12) | 5.0% (16) | 319 |
| Learning about research sources on the Internet | **45.5% (145)** | 20.4% (65) | 17.6% (56) | 8.8% (28) | 7.8% (25) | 319 |
| Learning to utilize network services efficiently (email, saving to server) | **57.7% (184)** | 16.0% (51) | 13.8% (44) | 6.6% (21) | 6.0% (19) | 319 |
| Learning to use an online gradebook | **41.4% (132)** | 12.5% (40) | 19.4% (62) | 12.9% (41) | 13.8% (44) | 319 |
| Integrating technology with student writing | **31.0% (99)** | 15.7% (50) | 16.6% (53) | 17.2% (55) | 19.4% (62) | 319 |
| Integrating technology with classroom activities | 18.2% (58) | 10.7% (34) | 22.9% (73) | 19.7% (63) | **28.5% (91)** | 319 |
| Learning specific application software (Microsoft Word, PowerPoint, etc.) | **38.6% (123)** | 13.8% (44) | 14.4% (46) | 14.7% (47) | 18.5% (59) | 319 |
| Learning to use the Internet to engage students with online discussions, blogs, podcasts, etc. | **29.2% (93)** | 11.6% (37) | 22.9% (73) | 19.4% (62) | 16.9% (54) | 319 |
| Learning to use technology to differentiate classroom activities for different learners | 11.6% (37) | 4.4% (14) | 21.9% (70) | 25.7% (82) | **36.4% (116)** | 319 |
| Learning to use technology as an assessment tool | 11.0% (35) | 9.7% (31) | 24.1% (77) | 23.5% (75) | **31.7% (101)** | 319 |
| | | | | | ***answered question*** | **319** |
| | | | | | ***skipped question*** | **22** |

| 12. What would be effective ways to provide professional development in technology? | | | | | | |
|---|---|---|---|---|---|---|
| | 1 Little effect | 2 | 3 | 4 | 5 Very effective | Response Count |
| Workshops and seminars; run by an outside source | 13.2% (42) | 12.9% (41) | **33.9% (108)** | 19.7% (63) | 20.4% (65) | 319 |
| University or college course work | 21.9% (70) | 18.5% (59) | **29.5% (94)** | 14.1% (45) | 16.0% (51) | 319 |
| Attending conferences | 20.4% (65) | 19.7% (63) | **28.8% (92)** | 17.2% (55) | 13.8% (44) | 319 |
| Online or web-based professional development | 14.1% (45) | 16.6% (53) | **32.6% (104)** | 19.4% (62) | 17.2% (55) | 319 |
| Mentor/colleague | 2.8% (9) | 5.0% (16) | 23.5% (75) | 27.9% (89) | **40.8% (130)** | 319 |
| Ongoing one-on-one training facilitated by an in-house teacher with technology expertise | 2.8% (9) | 4.7% (15) | 14.7% (47) | 26.3% (84) | **51.4% (164)** | 319 |
| Ongoing small group training facilitated by an in-house teacher with technology expertise | 2.8% (9) | 2.5% (8) | 11.9% (38) | 27.6% (88) | **55.2% (176)** | 319 |
| Release time for individual professional development related to technology | 2.8% (9) | 2.8% (9) | 17.2% (55) | 25.1% (80) | **52.0% (166)** | 319 |
| | | | | ***answered question*** | | **319** |
| | | | | ***skipped question*** | | **22** |

| 13. Briefly describe an effective use(s) of technology currently occurring in your building or your department. | |
|---|---|
| | Response Count |
| | 257 |
| ***answered question*** | **257** |
| ***skipped question*** | **84** |

| 14. What specific step(s) should Lexington Public Schools encourage and support to promote technology's use in your department/school? | | |
|---|---|---|
| | | **Response Count** |
| | | 272 |
| | ***answered question*** | **272** |
| | ***skipped question*** | **69** |

# Appendix B

## Examples of Technology Core Experiences

Grade 3
Grade 5
High School Science

# Elementary School Technology Core Experiences

| Grade | Modeling and Simulations | Communications | Research | Teacher Productivity |
|---|---|---|---|---|
| **3** | **Develop fluency with math facts**<br>All students complete sessions in *FasttMath* to support fluency with facts. | ***Write with a clear focus, coherent organization, and sufficient detail. Use knowledge of standard English conventions in their writing, revising, and editing.***<br>Students use AlphaSmarts and/or computers with appropriate software *(Stationery Studio* and *Word* ) to support writing across the curriculum<br><br>***Use technology as a communication tool.***<br>Students use either *KidPix, Word, Stationery Studio, or Kidspiration* in the development of products, which communicate an understanding of the core curriculum<br><br>***Read with fluency and phrasing in a way that makes meaning clear.***<br>For at risk learners, special educators and classroom teachers use *Soliloquy Reading Assistant* to assist in fluency and comprehension development. | ***Identify, locate, and utilize print and non-print reference sources.***<br>All students conduct a project around Hopedale History involving research using technology and print sources. Technology sources include *The Memorial School Research site* completed by teachers for the students' use.<br><br>***Explore and use a variety of strategies to solve problems. Critically use electronic sources to gather, analyze, and present information and ideas.***<br>Students use teacher-selected Internet sites to support instruction in social studies, science, language arts, and math. | Teachers are able to operate computer hardware, software and equipment such as a computer projector.<br><br>Teachers use email.<br><br>Teachers use PowerSchool to take attendance, and submit lunch counts.<br><br>Teachers are able to store/retrieve personal and student files from the building server.<br><br>Teachers prepare classroom materials and presentations using programs such as *Word*, *United Streaming*, and *PowerPoint*.<br><br>Teachers are able to use key Internet sites to access appropriate classroom materials<br><br>Teachers use *TeacherWeb* (or another program) to keep their website up-to-date with relevant and appropriate information about their class.<br><br>Special Ed teachers utilize IEP software to develop educational plans and evaluation reports. |

# Elementary School Technology Core Experiences

| Grade | Modeling and Simulations | Communications | Research | Teacher Productivity |
|---|---|---|---|---|
| **5** | ***Develop fluency with math facts***<br>All students complete sessions in *FasttMath* to support fluency with facts.<br><br>***Develop understandings of different cultures and science concepts.***<br>View and respond through classroom discussions or individual reflections to appropriate video segments from *United Streaming*. | ***Write with a clear focus, coherent organization, and sufficient detail. Use knowledge of standard English conventions in their writing, revising, and editing.***<br>Students use AlphaSmarts and computers to support writing across the curriculum.<br><br>***Demonstrate improvement in organization, content, paragraph development, level of detail, style, tone, and word choice (diction) in their compositions after revising them.***<br>Students use *Inspiration* for concept mapping and *AlphaSmarts* for prewriting activities.<br><br>***Use technology as a communication tool.***<br>Students use either *KidPix, Word, PowerPoint, or Inspiration* in the development of products, which communicate an understanding of the core curriculum<br><br>***Read with fluency and phrasing in a way that makes meaning clear.***<br>For at risk learners, special educators and classroom teachers use *Soliloquy Reading Assistant* to assist in fluency and comprehension development. | ***Gather information from a variety of sources, analyze and evaluate the quality of the information they obtain, and use it to answer their own questions.***<br>All students conduct a project involving research using technology and print sources. Technology sources include *Webquests, Scavenger Hunts; and electronic databases.*<br><br>***Organize information useful and beneficial to themselves and/or others.***<br>Organize gathered information using graphic organizer software *Inspiration*.<br><br>***Explore and use a variety of strategies to solve problems. Critically use electronic sources to gather, analyze, and present information and ideas.***<br>Students use teacher-selected Internet sites and learn to use kid-safe search engines (*Yahooligans, KidClick, Google One Key*) to support instruction in social studies, science, language arts, and math. | Teachers are able to operate computer hardware, software and equipment such as a computer projector.<br><br>Teachers use email.<br><br>Teachers use PowerSchool to take attendance, and submit lunch counts.<br><br>Teachers are able to store/retrieve personal and student files from the building server.<br><br>Teachers prepare classroom materials and presentations using programs such as *Word*, *United Streaming*, and *PowerPoint*.<br><br>Teachers are able to use key Internet sites to access appropriate classroom materials.<br><br>Teachers use *TeacherWeb* (or another program) to keep their website up-to-date with relevant and appropriate information about their class.<br><br>Special Ed teachers utilize IEP software to develop educational plans and evaluation reports. |

# High School Technology Core Experiences

| Dept. | Modeling and Simulations | Communications | Research | Teacher Productivity |
|---|---|---|---|---|
| **Science** | All Grade 8 Science students use interactive web sites to study curriculum concepts dealing with properties of matter( phase changes, molecular structure) and human body systems and biological processes (diffusion, osmosis, etc.).<br><br>Grade 8 students view United Streaming video segments that relate to these concepts mentioned above as well as concepts in earth and space science.<br><br>All Earth Science students use *Vernier* lab probes to study magnetic field reversals with respect to seafloor spreading, temperature changes and rates of weather, and collecting weather data.<br><br>All Biology students use online animation activities for their textbook chapters *Biology Exploring Life* to gain an understanding of key concepts.<br><br>Biology students complete virtual labs from Pearson web site. | All science students are provided opportunities to share knowledge of specific topics to the class using presentation tools such as PowerPoint or Web pages.<br><br>All high school science students will use *Microsoft Word* to deliver formal lab reports.<br><br>All high school science students use either *Logger Pro* or *Excel* to analyze data and reate graphs and charts.<br><br>All 7th grade students create a podcast with their unit Catastrophic Events<br><br>All Grade 8 students create a cell city analogy poster using *Word* , a travel brochure about a planet using *Publisher* and a poster about an element using *Word* or *PowerPoint*<br><br>All Grade 9 student use Word/Excel to prepare their posterboard for the Peak Intellectual Experience. | All science students use Internet for research on both teacher-directed and student-driven topics and subjects. This includes webquests as well as for ninth grade students research for the Peak Intellectual Experience (PIE).<br><br>All Earth Science students use real-time USGS and NOAAA data to make predictions on earthquakes and weather.<br><br>All Biology students utilize inter-active activities from *ww.classzone.com* (flipcards-vocabulary review-concept maps) and use teacher directed web sites to research information about biomes, cells, and anatomy and physiology.<br><br>All Astronomy students use real-time NASA data to make predictions.<br><br>All Physics students will use online college labs to enhance labs which cannot be conducted at a high school lab. This includes frictionless labs. | Teachers are able to operate computer hardware and software and equipment such as a computer projector.<br><br>Teachers use email.<br><br>Teachers use *PowerTeacher* to take attendance, submit grades, and access student information<br><br>Teachers are able to store/retrieve personal and student files from the building server<br><br>Teachers prepare classroom materials and presentations using programs such as *PowerPoint*, *Word*, and *United Streaming*.<br><br>Teachers use and share Internet sites with students.<br><br>Teachers use *TeacherWeb* (or another program) to keep their personal website up-to-date with homework and long-term projects. |

# High School Technology Core Experiences

| Dept. | Modeling and Simulations | Communications | Research | Teacher Productivity |
|---|---|---|---|---|
| **Science (continued)** | All chemistry students use *Vernier* probes to perform gas law experiments and study the properties of solution labs.<br><br>All Physics students use *Vernier* lab probes to study Newton's laws, kinematics, thermal properties, and fluid dynamics.<br><br>All Advance Biology and AP Biology students use on line simulations and animations referenced in their textbooks and CD-ROMs from *Cyber-ED* to gain a better understanding of key biological concepts (i.e. enzyme function) and processes (i.e. respiration) for the different body systems.<br><br>All AP biology students use *Vernier* probes to conduct transpiration-dissolved oxygen, osmosis experiments.<br><br>All Astronomy students use NASA's *New Worlds* modeling system to study the current events of the universe. | Biology students utilize interactive summative activities (flipcards-vocabulary review-games-concept maps). | . All AP Biology student use Internet websites to answer bioinformatics problems by data analysis. | |