Madison Metropolitan School District
Doyle Administration Building
545 West Dayton
Madison, WI 53703
Phone: 608-663-1607
Fax: 608-204-0341
http://www.madison.k12.wi.us

Madison Metropolitan School District

Information (Library Media) & Technology Plan

July 1, 2009 – June 30, 2012

Submitted by:
Daniel Nerad, Superintendent of Schools

Signature of Superintendent
Board Approved on Monday, May 4, 2009

Executive Summary

Extensive planning and feedback was conducted during the development of the plan involving many different stakeholders – teachers, library media specialists, counselors, psychologists, social workers, nurses, secretaries, computer tech support staff, principals and administrators, parents, students, community agencies, local businesses and business groups, higher education faculty and staff – in order to create the most comprehensive plan possible that meets all of the community's needs.

Key Issues

Access for All – There is compelling evidence that technology access – especially in regard to Internet access – is not currently equitably distributed within the community (and the nation as a whole) particularly as it relates to the socio-economic status of households. In order to be competitive in a global economy all students (and their parents) must have equitable access to technology in their public schools. The issue extends beyond the school into student's homes and neighborhoods and must be addressed in that context.

Recommendations: Acquire and deploy technology using a strategy that recognizes the socio-economic access divide so that all students can be assured of contemporary technology-based learning environments. Increase public access to District technology resources outside the regularly scheduled school day so that it is open to parents, students and the community. Implement very specific actions to collaborate with all stakeholders within the community to address these issues. Explore options for families to gain access to computers for use in their homes.

Professional Development – Without an understanding of what technology can do, the hardware simply won't be used. The feedback is overwhelming that the teacher is key to any technology strategy. Their learning – and access to technology – must be a high priority.

Recommendations: Create four staff positions that provide technology integration professional development support. Create part-time instructional support roles within each school as coaches for teachers and staff. Embed technology within all content-based professional development. Focus on high leverage, low cost options technology tools such as Moodle, Google Apps, Drupal, wikis, and blogs. Create an offering of basic technology professional development courses – both online and face-to-face for staff to access. Create an annual showcase conference opportunity for teachers to share their learning with each other.

Attending to Basics – The MMSD technology infrastructure has been slow to keep up with changes in network issues such as Internet capacity and bandwidth. Fiber-based Internet access was just completed this school year. Emerging technologies include wireless, which opens many more flexible learning opportunities for students. While the number of computers in Madison schools is not significantly behind volumes in other school districts, the age of the computers is significantly older with a current nine-year replacement rate. The District needs to ensure that the basic infrastructure for the core systems are up-to-date and stable, e.g., email, printing, copying, faxing, and telephony.

Recommendations: Investigate network upgrade options, especially wireless. Deploy these technologies across all schools as rapidly as possible. Implement a personal computing plan that replaces all student instructional computing devices every four years and three years for administrative and instructional staff computers. Explore lower cost mobile netbook and hand held devices to supplement any desktop computers.

Student Centered Focus – Create and deploy a technology system that is visionary and seeks to engage students. We must find ways to leverage emerging technologies in order to improve student learning. Professional development is key to that end as well as adequate and appropriate technology tools. Yet we must also find ways to engage students in the process of determining what technology we should use and how to promote their learning.

Recommendations: Create a technology advisory leadership team that includes students, their parents, and their teachers to review emerging technologies, recommend usage, and monitor effects. Create opportunities for students to participate as co-instructors for professional development courses targeted at staff. Leverage the deep and visionary skills of the community to help us identify emerging technologies and deploy them effectively and efficiently. Continue to expand the Madison Virtual Campus (MVC) effort to provide additional learning offerings for students and professional development options for staff.

Efficiencies – Continuously explore operational efficiencies in technology. This includes all instructional and functional processes as well as the District's technology infrastructure.

Recommendations: Review emerging technologies with a district technology leadership team as well as with a community advisory group. Explore IT-based collaboration efforts in infrastructure and joint purchases with other agencies and school districts. Explore methods of reducing system costs through such things as cloud computing, software as a service, and virtualization of software and hardware.

Support – Ensure that adequate technology support is provided to all users as technology continues to grow. Efficiencies can be used to manage some of the support requirements, but inevitably more technology creates increased calls for technical support. Support needs are found at the desktop computer and printer levels, with questions about software use, and in maintaining the entire system network. Within MMSD, the current computer to technician ratio is 650 to 1 whereas the Gartner industry standard is 150 to 1.

Recommendations: Increase the number of technicians by two to reduce the computer to technician ratio from 650 to 1 to 550 to 1. Increase the level of technical support again if additional personal computers are acquired to further reduce the student to computer ratio to 2 to 1, adding an additional 5 technicians. Increase the network specialist staff by one. Utilize students in some supervised manner tied to the curriculum to assist in the satisfying the technology support needs of schools. Use students to assist with other technology efforts such as maintaining elementary school web sites.

Information and Technology Plan

July 1, 2009 – June 30, 2012

Madison Metropolitan School District

Oversight Committee

Kurt Kiefer	Chief Information Officer
Lisa Wachtel	Executive Director, Teaching & Learning
Ann Yehle	Executive Director, Educational Services

MMSD Technology Plan Committee

Freddi Adelson	Coordinator – Health Services and ADA
Gabrielle Banick	Coordinator – Career and Technical Education
Lynda Chen	Micro Computing Supervisor, Technical Services
Mark Evans	Director, Technical Services
Mark Lea	Coordinator - Information and Communications Technology
Colleen Olmsted	Materials Selection Librarian
Julie Palkowski	Coordinator – Fine Arts
Tim Peterson	Coordinator – Science & Environmental Education
Kelly Pochop	Online Learning Facilitator (Madison Virtual Campus)
Terri Regner	Educational Services
Brian Sniff	Coordinator – Mathematics
Paula Srite	T&L Web Designer and Madison Virtual Campus Support
Marcia Standiford	Media Production Manager
Chris Stoner	Micro Computing Supervisor, Technical Services
Patty Weynand	Educational Services
Gretchen Wolfe	Coordinator – Talented and Gifted
Marcy Worzala	Educational Services
Mary Jo Ziegler	Coordinator – Language Arts/Reading

Submitted by:
Daniel Nerad, Superintendent of Schools

Signature of Superintendent
Board Approved on Monday, May 4, 2009

Table of Contents

Introduction

A. Analysis of Relevant Research and Best Practices

A review of recent research concerning the impact of information technology on student achievement suggests the following organizing concepts are critical: (a) a robust school library media program, (b) sustained systematic professional development, (c) effective use of technology by students that fosters higher order thinking, (d) authentic inquiry/problem-based learning, and (e) staff adoption and use of technology during teaching practices.

1. A Robust Library Program

There is a significant amount of recent research concerning student achievement and the presence of high quality school library media programs. The watershed study concerning student achievement, the "Colorado Study," was completed by Keith Curry Lance, Lynda Welborn and Christine Hamilton-Pennell in 1993. In regard to student achievement, that study concluded that:
The size of a library media center's collection and staff is a strong predictor of academic achievement,

- The instructional role of the school library media specialist (SLMS) influences the collection and ultimately, academic achievement,
- LMC expenditures influence staffing levels, collection size, and ultimately, academic achievement,
- Of school and community variables, only the absence of at risk factors was a stronger predictor of student achievement than variables related to LMC size (Lance, Welborn, Hamilton-Pennell, & Colorado. State Library & Adult Education Office, 1993, p. 92).

Subsequent replications of the first Colorado study, in Alaska (1998), Pennsylvania (1999), Oregon (2000) and a second time in Colorado (1999) using similar methodologies generated similar findings. Some of those findings are:

- Level of LMC program development was a strong predictor of student performance,
- Level of staff activities related to the teaching of information literacy were strong predictors of student performance,
- Individual visits to the LMC were correlated to test scores, and
- The availability of Internet-capable computers in the LMC was related to test scores (Lance, 2002).

In addition to the Colorado-styled studies, some of the other studies of note featuring correlations between student achievement and library media programs are the "Massachusetts Study" and the "Texas Study." Results of the Massachusetts study revealed positive correlations between Massachusetts Comprehensive Assessment Scores (MCAS) results and:

- The existence of a school library,
- Per pupil book counts,
- Increased student use,
- Library hours,
- The existence of a library instruction program,
- The presence of a full-time librarian,
- The presence of non-professional assistance,
- Curriculum aligned with state standards (especially in schools with a high percentage of free and reduced lunch), and

- At the high school level, the presence of a library automation system (Baughman, 2000, p. 4).

The Texas Study, comparing Texas Assessment of Academic Skills (TAAS) results with a host of demographic and school programmatic variables, found:

- Socio-economic indicators were the best predictors of student test performance,
- 52% of schools with librarians met minimum TAAS expectations, while only 21% of schools without librarians met minimum TAAS expectations, and
- Library variables explained four percent of student performance in reading at the elementary level, 3.9 percent at the middle school level and 8.2 percent at the high school level (Smith, 2001, p. 14).

Many of the recent studies confirm the results of previous research. New statewide studies from Illinois (Lance, Rodney, & Hamilton-Pennell, 2005), Indiana (Callison, 2004), Ohio (Todd & Kuhlthau, 2004) and Delaware (Todd, 2005) have each served to confirm previous findings and have each added unique new understanding to the subject.

Wisconsin's own study of school library media programs (Smith, 2006) was completed in the spring of 2006. Key findings from the Wisconsin Study appear to be related to the relationship between LMC staffing levels and student achievement in reading and language arts. Higher WKCE scores in reading and language arts, were found to correlate with higher levels of library staffing at all educational levels (Smith, 2006, p. 9). The Wisconsin study indicated that LMC staffing levels explained 3.4% of WKCE reading scores and 3.2% of WKCE language arts scores at the elementary level. LMC staffing levels were also found to account for 9.2% of WKCE reading performance at the middle school level. At the high school level, LMC staffing was found to account for 7.9% of the variance in WKCE reading scores and a whopping 19% of WKCE language arts variance (Smith, 2006, p. 9)

2. Sustained Systematic Professional Development

Staff development, in Fullan's words, "is conceived broadly to include any activity or process intended to improve skills, attitudes, or performance in present or future roles" (Fullan, 1990, p. 3). Many of the characteristics of a positive school culture, including "norms of continuous learning and improvement" and "opportunities for staff reflection, collective inquiry and sharing personal practice" (Peterson, 2002, p. 11), are directly related to staff development efforts. In general, staff development that meets the following three criteria: (a) focuses on content, (b) involves hands–on activities and (c) is integrated into the daily life of the school is more likely to produce improvements in staff knowledge and skills (Gordon, Moore, & Gordon, 2001, p. 935).

Cradler (1994) synthesized research study findings on the impacts of technology on teachers. Among the many positive impacts on teachers was a shift to a more student-centered approach and also increases in partnerships with business to support technology (Cradler, 1994). Career and Technical Education teachers regularly use business leaders and employers as advisory committee members and resources in the classroom. Concomitantly, as a result of these partnerships, teachers' technology use is enhanced as well as their professional development (Lowrie, 2000).

3. Effective Student Use of Technology

Recent research related to the impact of computer use on student achievement is mixed. "The debate churns on over the effectiveness of computers as learning tools. Although there is a growing disillusionment with the promise of computers to revolutionize education, their position in schools is protected by the fear that without them students will not be prepared for the demands of a high-tech 21st century" (Monke, 2005 / 2006). Probably the most well-known study casting doubt on the effectiveness computers in both schools and at home was the 2004 study conducted by Fuchs and Woessmann for the Munich-based Center for Economic Studies (CES). This study compared computer availability at home

and at school to student achievement. The authors found no significant relationship between computer availability at school and student achievement in mathematics and reading achievement, but found a negative relationship between student achievement and computer availability at home. Fuchs and Woessmann concluded that the "mere availability of computers at home seems to distract students from effective learning" (Fuchs & Woessmann, 2004).

In "The Impact of Education Technology on Student Achievement" (Schachter, 1999) provides a useful overview of the research related to the impact of technology on student achievement. This report analyzed the results of the 5 largest studies of education technology prior to the year 2000. These five largest studies and the findings in each regarding the impact of technology on student achievement are as follows:

Meta-analytic studies of findings on computer-based instruction (Kulik, 1994)

- Students usually learn more in classes using computer-based instruction. There is some evidence that students in special education may benefit more than students in regular education classes from computer-based instruction,
- College and adult students seem to learn more in less time when they receive computer-based instruction.
- Students seem to enjoy their classes more when computer-based instruction is included.
- Computer use did not always generate positive affects on student attitude.

Research Report on the Effectiveness of Technology in Schools (Sivin-Kachala & Bialo, 2000)

- Statewide technology improvement measures have been correlated to improvements on standardized tests in Idaho and West Virginia.
- Use of word processing software and/or e-mail positively impacts writing skills of students.
- Students using technology that focuses on problem-solving, and hands-on experimental activities in mathematics classes demonstrate superior conceptual knowledge.
- In social studies classes, learning advantages were noted for students who develop multimedia presentations.
- Kindergartners who are technology users demonstrate greater ability in the areas of vocabulary, reading comprehension, and conceptual knowledge.
- Student populations with special education needs have improved achievement as a result of technology use. Speech recognition technologies are especially valuable for students with disabilities.
- When concepts involve a visual component, interactive video is effective.
- There seems to be little, if any, proof that there are significant differences between in the effectiveness of instruction that originates locally and instruction delivered via distance education technologies
- Technology can also play a key role in improving student motivation and self-concept especially in language arts and writing instruction, mathematics instruction, science instruction, telecommunications technology, and video technology.

Apple Classrooms of Tomorrow --ACOT (Baker, Gearhart, & Herman, 1994; Schachter, 1999)

- The ACOT experience appeared to "result in new learning experiences requiring higher level reasoning and problem solving" (Schachter, 1999),
- ACOT participation positively impacted student attitudes (Schachter, 1999),
- Teacher practices shifted toward more collaborative group work and away from lecturing (Schachter, 1999).
- When comparing correlations between student participation in ACOT and performance on the 1990 Iowa Test of Basic Skills (ITBS) results were mixed (Baker, et al., 1994).

West Virginia Story (Mann, Shakeshaft, Becker, & Kottkamp, 1999)

The Basic Skills/Computer Education program consisted of three components (a) software focusing on basic skills in reading, language arts and mathematics, (b) enough computers to enable easy and

regular student access, and (c) professional development for teachers in the use of the skills software and computers in general.

- 11% of the total variance in test scores was attributable to participation in the BS/CE program.
- Schools that deployed computers to classrooms rather than labs saw their students perform better in math and in overall scores. For students from distributed environments the BS/CE program accounts for 19% of variance in test scores.

Does it Compute? The Relationship between Educational Technology and Student Achievement in Mathematics (Wenglinsky, 1998)

- At the fourth grade level, there was a negative relationships between frequency of home and school computer use, and using computers for drill and practice and mathematics achievement,.
- At the fourth grade level, there were positive effects for teacher professional development on use of learning games and ultimately the use of learning games on academic achievement in mathematics
- At the eighth grade level, the relationship between home use of computers and academic achievement is positive
- At the eighth grade level, there is a positive relationship between student achievement and the use of computers for problem-solving and a negative relationship between student achievement and the use of computers for drill on basic skills.

Effect of Computers on Student Writing: A Meta-Analysis of Studies from 1992 to 2002 (Goldberg, Russell, & Cook, 2003)

- The use of computers in student writing, increased both the quantity and quality of student writing.
- On average, the effects on quantity and quality of student writing were found to be larger at the secondary level than at the elementary level.
- In general, student writing using computers is more of a collaborative process than student writing using pencil and paper technology.

Learning with Technology (Marshall, 2002)

- Watching the television programs such as Blue's Clues, Choices and Consequences, and Sesame Street has been shown to impact viewers' flexible thinking, problem solving, and pro-social behaviors, verbal aggression, and subsequent performance in reading mathematics, school readiness and vocabulary.
- 5-year-old viewers of Sesame Street were subsequently found to have significantly better grades in science, English, and mathematics as 15 to 20-year-olds.
- When students use computers for problem solving in mathematics they demonstrate greater achievement standardized tests.
- When computer reading games were used with remedial reading students, students exhibited “significant knowledge gains and improved attitudes toward reading,” and
- When computer simulations were used with students with learning disabilities, they scored significantly higher than conventionally taught students.

The Digital Disconnect (Levin & Arafeh, 2002)

- Internet-savvy students use the Internet to help complete their homework,
- Internet-savvy students use the Internet for other education-related purposes,
- The most frequently used student metaphor for the Internet was virtual library,; other metaphors included virtual textbook, tutor, study group, locker, and guidance counselor,
- Most student educational use of the Internet occurs outside the school day
- Students identified the greatest barrier to use of the Internet at school as quality of access,
- Students expressed a desire for better coordination of classroom use and out-of-school educational use of the Internet, and
- Students urged schools to make efforts to “ensure that high-quality online information to complete school assignments be freely available.”

Introduction

There may not be a strong positive relationship between the availability of computer technology and student achievement. Alspaugh's 1999 Missouri study of varying student to computer ratios found no significant differences in standardized test scores for reading/language arts, mathematics, science and social studies for matched Missouri schools with (a) less than 4 students per computer, (b) 5-7 students per computer, (c) 8-10 students per computer, and (d) more than 10 students per computer (Alspaugh, 1999).

Despite Alspaugh's findings, there may be evidence that one-to-one computing initiatives can be successful. In a study of a one-to-one computing initiative (Gulek & Demirtas, 2005) involving over 1300 middle school students, Gulek and Demirtas (2005) found that, "laptop students showed significantly higher achievement in nearly all measures after one year in the program" (Gulek & Demirtas, 2005). "Specifically, participation in the laptop program [was] associated with an average gain of 16 points for mathematics scores and 13 points for language scores obtained from the state-mandated standardized NRTs (Gulek & Demirtas, 2005, p. 28)".

In a 2005 study of Henrico County (VA) Public School's laptop initiative (Zucker & McGhee, 2005), Zucker and McGhee found the following impacts:

- Greater access to resources and information for more students and families.
- Increased student motivation, engagement, interest, and self-directed learning.
- More student interaction with teachers.
- Better-organized students.
- Easier access by teachers and students to up-to-date instructional content.
- More flexibility for teachers during instruction.
- Increased professional productivity and greater collaboration among teachers.
- Improved home-school communication.
- An increased need for planning time to make good use of the laptops.
- Added challenges for teachers to manage classrooms and discipline (Zucker & McGhee, 2005, p. iv).

In a June 2005 meta-analysis of 30 one-to-one computing studies sponsored by Apple Computer (Apple Computer, 2005), researchers concluded:

- Effecting change in teaching practice depends on professional development and changing some teachers' beliefs about the role of technology and students' capabilities.
- Available research-based evidence is generally positive, especially with respect to laptop programs' effects on technology use, technology proficiency, and writing skills.
- Overall, however, there is limited research-based evidence from rigorously designed experimental or quasi-experimental studies of laptop programs' effectiveness.
- More quasi-experimental and experimental research is needed that examines both outcomes and implementation if further major investments in 1 to 1 initiatives are to be warranted by the research base. (Apple Computer, 2005, pp. 12-13)

A second Apple Computer sponsored summary of 1 to 1 initiatives published in 2007 noted that evidence was beginning accumulate that 1 to 1 programs could have a positive impact on student achievement (Apple Computer, 2007, p. 3). In addition to increases in student achievement as measured by standardized assessments, the Apple study revealed a number of other benefits, including:

- Improved writing skills and depth of student research
- Increased student interest in learning and ownership of the learning process
- Improvement in student and staff attendance

- Reductions in student behavior problems
- Increased parental interest in school activities
- Improved student and staff morale
- A reduction in lecture/presentation instruction and increase in project-based learning activities (Apple Computer, 2007, p. 5)

In short, some technology use impacts student learning while others makes no difference (Butzin, 2001; Dwyer, 1994). A summary of research cited by Barnett in the October 2001 *ERIC Digest* indicates that in regard to learning with computers (i.e., using computers as tutors) and learning from computers (i.e., using the computer as a tool in learning process for communication, collaboration, research or publishing) is effective when students have easy access to the technology; technology is in the classroom (as opposed to the lab); ongoing teacher professional development is provided; reform of teaching practices is evident with a balance between traditional instruction (e.g., teacher as expert) and that of constructivism (teacher as facilitator); the software meets student needs and instructional objectives. The effective student use of technology is realized when students "deepen their understanding of academic content and advance their knowledge of the world around them" (Barnett, 2001).

4. Authentic Inquiry / Problem-based Learning Units

For purposes of this discussion, authentic inquiry is defined as the process of using questioning in connection with real-world variables to promote understanding. In "Five Standards of Authentic Instruction," Newmann and Wehlage (1993) suggest that five variables control the degree to which authentic instruction is said to take place. Those variables are (a) higher-order thinking, (b) depth of knowledge, (c) connectedness to the world beyond the classroom, (d) substantive conversation and (e) social support for student achievement (Newmann & Wehlage, 1993, p. 10).

The use of technology has tremendous implications for the degree to which schools can make authentic inquiry available to students. Technology can be used by students to acquire and manipulate data, to produce authentic final products, and to assess their own work and the work of others. There is evidence that when computers are used in tasks related to higher-order thinking, they are associated with significant achievement and learning gains (Kimble, 1999).

A marketing program in Career and Technical Education provides a best practice example of using technology for authentic inquiry and problem-solving. Juniors at Mansfield Ohio's Madison Comprehensive High School marketing program create their own Internet businesses and marketing plans. Student business designs range from specialized clothing to compact discs to web design services. The project improves English, mathematics and science skills and reinforces students' knowledge of business and economics. In addition, students interact with business leaders. Each student is required to use Microsoft Word, Excel for financial spreadsheets, PowerPoint for presentations, Publisher for advertising and Project for an implementation time line. FrontPage software is used for web site design and students also use advanced web software including Dreamweaver, Freehand and Flash. Photoshop, PageMaker and Illustrator are also used (Bottoms, 2002, pp. 46-47).

5. Staff Adoption and Effective Use of Technology During Teaching Practices

Most of the research involving staff adoption and effective use of technology is anecdotal in nature. Many of the policy statements, or sets of recommendations, follow similar patterns. In *Technology in American Schools*, focus is placed on the importance, of (a) learners, (b) the learning environment, (c) professional competency, (d) system capacity, (e) community connections, (f) technology capacity and (g) accountability (Lemke & Coughlin, 1998). Ringstaff and Kelley (2002) place emphasis on the importance of "changing teacher beliefs about teaching and learning" (Ringstaff & Kelley, 2002, p. 16).

Sivin-Kachala's and Bialo's (2000) research into the effective use of technology during the learning experience suggests that:

- The teacher's role is critical in "creating an effective, technology-based environment" Teacher involvement in decisions about how computers are used may be more important than what technology is used.
- Collaborative learning practices have been found to be more effective, especially for under performing, or female students, than students working individually on computers
- "Learner as multimedia designer" activities have been shown to positively influence student attitudes.
- Writing activities involving the use of a computer have been shown to more accurately assess a student's performance, than assessments relying solely on writing by hand (Sivin-Kachala & Bialo, 2000, p. 11).

In *The Impact of Technology on Learning*, Kimble (1999) suggests technology is implemented most effectively when (a) educators make decisions about the best way to use technology based on context and content and then (b) seek professional development specifically addressing intended use.

6. Recent Research

Since the date of the last *MMSD Information & Communications Technology Plan* (Peebles, Kiefer, Lea, Pochop, & Evans, 2006), a significant amount of additional research in the area of best practices in technology use in the classroom and the importance of library media programs on student achievement have been reported.

All of the recent research discussing the impact of school library media programs on student achievement, as measured by standardized tests, indicate positive correlations between achievement scores and (a) materials collection size, (b) staffing levels, and (c) expenditures (Scholastic Library Publishing, 2008).

The Wisconsin Department of Public Instruction maintains a webpage with links to recent research on the impact of technology and school library media programs on student achievement at http://dpi.wi.gov/imt/relevres.html

7. Subject Area Technology Use

a. Fine Arts

A review of recent research concerning the impact of technology in fine arts content areas suggests the following concepts (a) technology tools can deepen learner knowledge through immediate feedback, (b) technology tools can inspire creativity, (c) technology tools when linked with traditional instructional tools and practices expands and deepens skills and artistic knowledge for learners of all abilities and levels, and (d) professional development and support in technology is essential in helping staff gain skills and knowledge to effectively integrate technology in the arts classroom. The research summaries share either one or a mix of these concepts in support of a thoughtful use of technology in the fine arts classroom. The research overall supports a balance of traditional instructional arts strategies and tools with technology. In addition, several articles warned that prior to the integration of technology, is a need to carefully review tools and strategies in order to determine what resources will best meet the needs of students, staff abilities in implementation, facility and environment in place, and the curriculum. Abstracts of many of the articles focusing on the effective use of technology in the fine arts classroom, reviewed in preparation for Madison Metropolitan School District 2009-2012 Information Technology Plan, can be found below:

Music

"Technology Strikes a Chord in Music Education" (Ascione, 2005) focuses on the benefits for students from elementary school to higher education in learning about the process of music composition. Schools mentioned that utilize technology to support student skills and knowledge in music include: Berklee College, a set of South Carolina schools, and a school in southern California. Composition software is highlighted. Active learning with technology allows students to learn more effectively harmonic progressions and in hearing immediately what they and their classmates compose. Students produce the sound combinations to create music rather than the teacher playing examples at the piano.

Podcasting expands educational ways of sharing concepts beyond simple teacher-to-teacher communication. This tool allows teachers to use student-created podcasts as an immersive strategy in their classrooms, as well as an assessment tool and way to enhance existing lesson units (Criswell, 2008b).

Notation strictly by pencil and paper is now expanded through the use of technology, opening many doors for musicians. The use of the computer in creating music provides immediate results for a student to hear, see, playback, and publish their own work (Chappell, 2008).

Audacity is a free online program available under a special public license. This tool allows the user to record live audio, convert audio recordings into digital recordings or CDs, mix sounds together, and alter pitch or speed of a recording to name a few uses. The tool has continued to motivate learners to listen to pre-recorded material and expand ideas through musical improvisation (Sichivitsa, 2007).

Real world connections are made when students are able to utilize tools similar to what exists in the real world. A music computer lab can not only strengthen music theory knowledge, but also allow students to exercise basic recording concepts, music composition, audio editing, and music production. Estimated Equipment Costs are outlined in the article for ES/MS and HS levels utilizing a variety of tools such as: computers, MIDI keyboards, various software packages, speakers, lab projectors (Criswell, 2008a).

Visual Arts

Traditional media originally thought of as no longer being viable uses for the visual arts classroom is working along side the newer technological tools. Arts educators describe this harmony of the two within this article, sharing that certain software programs and emerging web-based collaborations are helping establish a strong base of conceptual understanding--regardless of raw manual or technical talent. The integration of both the "old" and "new" media choices is expanding the opportunities for more students to tap into. These connections to multiple media/instructional approaches encourages and facilitates the acquisition of more advanced, traditional techniques and skills by far more talented beginners (Devaney, 2008).

Digital examples of artwork are created in connection with traditional methods. Sections showcase examples with looms, photography, and art metals created through the creativity of staff at the University of Washington (Joseph, 2003).

Digital storytelling is an expressive medium that can be integrated into any content area. If provides an opportunity for students to share ideas and stories through visual, auditory, interactive means. Examples online are provided within the article (Roland, 2007).

Fine Arts Examples

A dance teacher explains how students can mimic, create, sequence dances utilizing a computerized software program called Poser. Additional technology uses for fine arts examples are also provided. Through technology students learn how to apply music theory and even make music before he or she

learns how to play an instrument. Fine Arts teachers must have adequate equipment and access. They need time to teach students to use the programs and have technical support. Professional development is needed for staff to find the best ways to use computers and other equipment in their lessons. An additional caution shared within the article reminds educators not to become so enamored of the bells and whistles of the technology. The focus needs to first be on the creation of real art or music and that the technological tools should be chosen to help in providing a quality experience (Manzo & Davis, 2005).

General Instruction utilizing Technology Examples

Examples of schools in Arizona, Florida, Maine, Michigan, New Jersey, Pennsylvania, and Utah--along with individual school districts, museums, and other educational institutions are utilizing iTunes U to share resources for K-12 educators in their own states and around the world. iTunes U is a new K-12 service that creates a place where professional development, curriculum resources, best practices, and samples of student work are easily accessible from a single location. The new site engages staff and students through technology-based resources in the core curriculum areas ("Free K-12 content available through iTunes U," 2008).

The changes in demographics occurring in our schools is challenging educational institutions to use more individualized instructional methods, according to researcher, Arthur Levine. He continues to suggest that materials will not be book-based but will include every medium-visual, audio, and interactive. Education will be available through online classes and virtual field trips. New technology will need to be integrated into curricular products to teach individual learners with various learning styles (Stansbury, 2008).

New approaches in learning will need to include the integration of classroom technologies and leaving ineffective strategies of the past behind in order to help students succeed in the information economy (Murray, 2005).

This series is designed to be a resource for educators and administrators. It provides information on how to integrate collaborative technologies into K-12 education. The report summarizes the implications, technologies, costs, and some examples of digital tool implementations that make collaboration, regardless of location and time, possible for educators and students ("CoSN releases new report for educators exploring the use of collaborative technologies to enhance education," 2006).

This article shares a shift in the new workforce's technological experiences and in how staff expectations to help learners through technology will need to be reviewed. Additional examples of how a district can foster a successful technological environment not only for students, but also the staff who teach them in integrating technology (Richardson, 2008).

This article stresses the need for educators to engage students in learning the joys of learning through a variety of methods. Students need to be involved in learning through action, creativity, and not solely passive activities. Balancing student learning with authentic, traditional, and technological means will help learners through multiple tools (March, 2005 / 2006).

Schools need to prepare students for both the high tech world as well as the life experiences requiring knowledge and skills with the human side of life. This article shares pre-steps to integrating technology for elementary students which include strengthening students' inner resources- self-discipline, moral judgment, and empathy. Once students have a stronger sense of these areas, they can build their community knowledge through technological experiences (Monke, 2005 / 2006).

b. Language Arts

Introduction

In a society where technology touches every aspect of our lives, from the grocery store to the boardroom, from the doctor's office to the bank, it is the responsibility of education to guarantee that all students have the opportunity to experience and learn with a wide variety of technology tools throughout the formal educational process. In Language Arts, specifically, technology has dramatically changed the core processes of learning. We must, therefore, embed technology into our daily learning experiences in order for students to develop the skills that will be required of them in our 21st century world.

The uses of technology are apparent at the high school level. The Wisconsin Model Academic Standards expect that students will delve into research, write to communicate thinking, and stay connected to current and past historical events in the world. It is hard to imagine any of these processes occurring without access to a wide range of technology. Every project or learning experience is enhanced by access to immediate information from a variety of sources – author studies, preparation for a debate, research projects and presentations – all are completed with greater understanding and facility if immediate access to technology is a possibility.

Early adolescents, as well, have learning standards that are greatly enhanced by immediate access to technology. The writing process alone is impacted so dramatically by technology that it is essentially changed from a laborious task of rewrites to a reflective and recursive process that enhances understanding. Early adolescents are so technology driven, that denying them access seems barbaric. The level of motivation and engagement that comes with increased access to technology is apparent when entering a *Read 180* classroom. The technology component is what initially hooks these, our most reluctant adolescent readers, into entering the classroom. Once they are in the room and engaged in the reading process the teacher is able to begin the instruction necessary to build reading skills.

Access to technology for young children is the most hotly debated question. How much technology use? Which technology? What is appropriate? The National Association for the Education of Young Children weighs in on this debate. They cite research that contends that professional judgment must be used in evaluating and using technology as a learning tool with children aged 3 to 8. Developmentally appropriate software includes collaborative play, learning and creation opportunities (National Association for the Education of Young Children, 2008). As young children work together around technology they learn to navigate relationships, negotiate, compromise and collaboratively accomplish required tasks. When technology provides a model of fluent reading students have quick, easy access to high quality texts that engage, motivate, build vocabulary and allow access to print materials that may be otherwise unavailable in classrooms. When developmentally appropriate, technology supports mastery learning and problem solving skills even with our youngest learners.

Across all classrooms and ages technology supports differentiation. Quick and easy pre-assessment in reading allows teachers to select learning materials within a students Zone of Proximal Development (Vygotski & Cole, 1978). Technology provides access to a much wider range of materials at a variety of reading levels. Web-based programs like Achieve3000 provide text with similar content at a variety of levels and in a variety of languages. This throws the doors of learning wide open for students who in the past might have had little or no access to reading materials at an appropriate level for learning. Summative assessments that communicate growth over time add an additional layer of feedback to students, teachers and parents that provides reward for effort, a motivational aspect of learning that has been sorely missing in education due to collection difficulties prior to the use of technology. Easy access to a wide variety of materials that engage and stimulate thinking along with assessment tools that provide feedback for effort, could change the face of school and learning for many of our most disenfranchised learners.

c. Mathematics
Recommendations from three mathematical or government organizations regarding the use of technology in the K-12 classroom:

Wisconsin Department of Instruction - Wisconsin Model Academic Standards for Mathematics Introduction includes the following statement:
Technology
Calculators, computers, spreadsheets, graphing utilities and other forms of electronic information technology are now standard tools for mathematical problem solving in science, engineering, business, medicine, government, and finance. Thus, the use of technology must be an integral part of teaching and learning mathematics. Such use should aim at enhancing conceptual understanding and problem solving skills. However, the tools of technology are not a substitute for proficiency in basic computational skills.
Source: http://dpi.wi.gov/standards/matintro.html

The National Council of Teachers of Mathematics Principles and Standards for School Mathematics Technology Principle:
Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning.

Electronic technologies—calculators and computers—are essential tools for teaching, learning, and doing mathematics. They furnish visual images of mathematical ideas, they facilitate organizing and analyzing data, and they compute efficiently and accurately. They can support investigation by students in every area of mathematics, including geometry, statistics, algebra, measurement, and number. When technological tools are available, students can focus on decision-making, reflection, reasoning, and problem solving.

Students can learn more mathematics more deeply with the appropriate use of technology (Boers-van Oosterum, 1990; Dunham & Dick, 1994; Groves, 1994; Rojano, 1996; Sheets, 1993). Technology should not be used as a replacement for basic understandings and intuitions; rather, it can and should be used to foster those understandings and intuitions. In mathematics-instruction programs, technology should be used widely and responsibly, with the goal of enriching students' learning of mathematics.

The existence, versatility, and power of technology make it possible and necessary to reexamine what mathematics students should learn as well as how they can best learn it. In the mathematics classrooms envisioned in Principles and Standards, every student has access to technology to facilitate his or her mathematics learning under the guidance of a skillful teacher.

Technology enhances mathematics learning.
Technology can help students learn mathematics. For example, with calculators and computers students can examine more examples or representational forms than are feasible by hand, so they can make and explore conjectures easily. The graphic power of technological tools affords access to visual models that are powerful but that many students are unable or unwilling to generate independently. The computational capacity of technological tools extends the range of problems accessible to students and also enables them to execute routine procedures quickly and accurately, thus allowing more time for conceptualizing and modeling.

Students' engagement with, and ownership of, abstract mathematical ideas can be fostered through technology. Technology enriches the range and quality of investigations by providing a means of viewing mathematical ideas from multiple perspectives. Students' learning is assisted by feedback, which technology can supply: drag a node in a Dynamic Geometry® environment, and the shape on the screen

changes; change the defining rules for a spreadsheet, and watch as dependent values are modified. Technology also provides a focus as students discuss with one another and with their teacher the objects on the screen and the effects of the various dynamic transformations that technology allows.

Technology offers teachers options for adapting instruction for a wide range of student needs. Students who are easily distracted may focus more intently on computer tasks, and those who have organizational difficulties may benefit from the constraints imposed by a computer environment. Students who have trouble with basic procedures can develop and demonstrate other mathematical understandings, which in turn can eventually help them learn the procedures. The possibilities for engaging students with physical challenges in mathematics are dramatically increased with special technologies. Technology also makes it possible for all students to learn mathematics with their peers in the classroom instead of going to separate rooms for instruction.

Technology supports effective mathematics teaching.
The effective use of technology in the mathematics classroom depends on the teacher. Technology is not a panacea. As with any teaching tool, it can be used well or poorly. Teachers should use technology to » enhance their students' learning opportunities by selecting or creating mathematical tasks that take advantage of what technology can do efficiently and well—graphing, visualizing, and computing. For example, teachers can use simulations to give students experience with problem situations that are difficult to create without technology, or they can use data and resources from the Internet and the World Wide Web to design student tasks. Spreadsheets, dynamic geometry software, and computer microworlds are also useful tools for posing worthwhile problems.

Technology does not replace the mathematics teacher. When students are using technological tools, they often spend time working in ways that appear somewhat independent of the teacher, but this impression is misleading. The teacher plays several important roles in a technology-rich classroom, making decisions that affect students' learning in important ways. Initially, the teacher must decide if, when, and how technology will be used. As students use calculators or computers in the classroom, the teacher has an opportunity to observe the students and to focus on their thinking. As students work with technology, they may show ways of thinking about mathematics that are otherwise often difficult to observe. Thus, technology aids in assessment, allowing teachers to examine the processes used by students in their mathematical investigations as well as the results, thus enriching the information available for teachers to use in making instructional decisions.

Technology influences what mathematics is taught.
Technology not only influences how mathematics is taught and learned but also affects what is taught and when a topic appears in the curriculum. With technology at hand, young children can explore and solve problems involving large numbers, or they can investigate characteristics of shapes using dynamic geometry software. Elementary school students can organize and analyze large sets of data. Middle-grades students can study linear relationships and the ideas of slope and uniform change with computer representations and by performing physical experiments with calculator-based-laboratory systems. High school students can use simulations to study sample distributions, and they can work with computer algebra systems that efficiently perform most of the symbolic manipulation that was the focus of traditional high school mathematics programs. The study of algebra need not be limited to simple situations in which symbolic manipulation is relatively straightforward. Using technological tools, students can reason about more-general issues, such as parameter changes, and they can model and solve complex problems that were heretofore inaccessible to them. Technology also blurs some of the artificial separations among topics in algebra, geometry, and data analysis by allowing students to use ideas from one area of mathematics to better understand another area of mathematics.

Technology can help teachers connect the development of skills and procedures to the more general development of mathematical understanding. As some skills that were once considered essential are rendered less necessary by technological tools, students can be asked to work at higher levels of generalization or abstraction. Work with virtual manipulatives (computer simulations of physical manipulatives) or with Logo can allow young children to extend physical experience and to develop an initial understanding of sophisticated ideas like the use of algorithms. Dynamic geometry software can allow experimentation with families of geometric objects, with an explicit focus on geometric transformations. Similarly, graphing utilities facilitate the exploration of characteristics of classes of functions. Because of technology, many topics in discrete mathematics take on new importance in the contemporary mathematics classroom; the boundaries of the mathematical landscape are being transformed.

Source: http://my.nctm.org/standards/document/chapter2/techn.htm (password required)

d. Career and Technical Education Technology

Career and Technical Education (CTE) consists of six diverse sub-categories, including agriculture education, business education, marketing education, family and consumer education, health science education, and technology education. Career guidance is a thread woven throughout all areas. The following section describes the impact of technology within CTE as a whole and particular to each sub-category.

The 2000 *High Schools That Work* Assessment showed a strong correlation between career-oriented students and use of technology. These students had increases in reading, mathematics and science in direct proportion to growth in the use of computers to complete academic and career/technical assignments (Bottoms, 2002, p. 4).

A summary of findings of research and evaluation studies concluded that the impact of technology on student learning outcomes varies as a function of the curriculum and instructional strategies (Cradler, 1994). When content and strategies meet accepted standards, Cradler's research showed that technology increases mastery of technical and workplace skills. Cradler stated that technology helps prepare students for work when emphasized as a problem-solving tool.

Students in career and technical education programs are expected to attain high levels of competency in mathematics, reading, and written and verbal communications. According to Willard Daggett's research at the International Center for Leadership in Education, "The academic skills demanded by many entry-level jobs today are at a higher level than the academic skills required for postsecondary education" (Daggett, n.d., p. 1).

Thus, research supporting the positive relationship between technology and student writing skills (Goldberg, et al., 2003; Sivin-Kachala & Bialo, 2000) discussed in this report is equally relevant for career and technical education (CTE). Similarly, the positive relationship between educational technology and mathematical problem-solving at the 8th grade level (Wenglinsky, 1998) and the one-to-one computing initiatives in the Gulek & Demirtas (2005) study is equally important for CTE.

In addition to the academic competencies that must be integrated with CTE, these programs have additional and specialized technology requirements. Technology that meets industry-standards is expected and frequently required. Funds provided to MMSD from the federal Carl D. Perkins Career and Technical Education Improvement Act of 2006 (Perkins IV) funding for technology are expressly to be used in part to **"**initiate, improve, expand, and modernize quality career and technical education programs, including

relevant technology" ("Carl D. Perkins Career and Technical Education Improvement Act of 2006,") (Sec. 135(b)).

Most states emphasize technology use within CTE as a critical program component. For example, North Dakota's "Standards of Quality" for CTE program evaluation includes the following requirement: "Equipment and supplies support the instructional plan at a level to assure quality education. Equipment is representative of the grade and type used by business and industry and meets or exceeds all appropriate safety standards." (North Dakota Department of Career and Technical Education, n.d.).

Following are discussions about technology impacts and best practices in the CTE programmatic areas represented in our district.

Business Education

De Leon & Borchers' 1998 study of large manufacturing companies (500 or more employees) in Texas showed that the majority, 63%, of the employers categorically considered the ability for a graduate to manipulate a keyboard an absolute requirement to finding employment. Keyboarding is foundational to most jobs today and the earlier it is taught, the better (De Leon & Borchers, 1998). All Madison middle school students take a required computer technology class by the end of 8th grade to assure keyboarding and other computer application proficiency. LaFollette High School also requires student to complete one-half credit of computer literacy in high school ("LaFollette High School 2009-2010 curriculum guide," 2009).

Keyboarding and computer applications serve as the beginning course for the advanced Business Education courses taught in Madison High Schools. Courses such as Desktop Publishing and Graphic Design, Web Page Design, Accounting, and Sports and Entertainment Marketing provide students opportunities to use business and industry software in project-based learning. Because of the graphic-intensive nature of the applications and the capacity for computers to run multiple sophisticated programs, Business Education classroom computers are on a four-year replacement cycle.

Computers and software are the foundation, but not the only technology requirements for the contemporary business setting. As described earlier, Madison Comprehensive High School in Mansfield, Ohio offers a capstone Business Education project in which students are assessed on their skill demonstration, providing an example of authentic assessment and problem-based learning. That high school has a cutting-edge computer lab with 24 computer stations. Students make use of the color printers, scanners for custom graphics and photos, and clip art from professional software. In their presentations, they use state-of-the-art video and digital camera equipment to incorporate actual and virtual pictures and videos of real people and situations. Students learn market research, financial planning and advertising/promotional design in addition to the technology skills they acquire. Students are able to improve their planning and management skills using flow charts and other business planning tools in designing their enterprises. Students are assessed on their accounting, entrepreneurship, marketing and business law skills as they demonstrate applications of business foundations and economics.

English and mathematics teachers are available to guide the marketing students in developing and writing financial plans. They teach students to create spreadsheets of start-up costs, balance sheets, cash-flow statements and income statements. They help students proofread and revise written plans. Students even conduct a market research survey to learn the basics of scientific sampling. "This project really challenges students," said David Logan, interactive media instructor. "They feel some of the pressures that actual businesses face" (Bottoms, 2002, pp. 46-47).

Information Technology

Eva Atkinson's best practices prepare business and computer technology students at Sussex Technical High School in Delaware for independent learning. "All of my classes are based on making students responsible for their learning," she said. "Technology is changing so rapidly that workers need to be resourceful in learning new applications and solving tough problems." Atkinson's instructional approach is evident in student small group projects where teams launch simulated businesses and innovative new products. Students use personal computers, up-to-date software, color printers and electronic scanners to produce reports, correspondence, business cards, financial reports and brochures to conduct a mock "Small-Business Expo." Students are evaluated on all aspects of the project including technical and workplace skills (Bottoms, 2002, pp. 25-26)

Another best practice in high school information technology programs is found in Hawaii. The web site for Hawaii's Waianae High School is created by students in the school's multimedia production program. "People are amazed to find that students operate out of two small classrooms and edit videos in a closet," says Candy Suiso, coordinator of the school's multimedia production program. The school's mass-media communications and journalism program — called Searider Productions — received state, national and international awards and prepared many students for college and/or high-paying jobs. Searider Productions is the state's largest high school mass-media program and the only one that combines hands-on television production, radio broadcasting, web publishing, print media, virtual reality, 3-D animation and music recording. More than 300 of the school's 2,250 students are enrolled in at least one communications class. Suiso says, "We see technology as a tool for teaching and learning" (Bottoms, 2002, pp. 22-23).

Technology Education

De Leon & Borchers' study of manufacturing employers' requirements showed that half of the employers said the ability to operate computer-aided drafting software and equipment was an absolute necessity for employment while the other half indicated that it was a "desired" skill. As a parallel to industry in secondary education and to address employers' need for workers who can use sophisticated software, many high schools implement the program Project Lead The Way® (PLTW).

Project Lead the Way® is a national pre-engineering program offered in Madison's East, LaFollette, Memorial, and West high schools. The *"Gateway to Technology"* program is the middle school program at Hamilton, Toki, and Whitehorse that serves as the pipeline to high school classes. Students in PLTW classes experience learning activities that integrate science, technology education, engineering, and math (STEM) concepts. The PLTW program is a "hands-on, project and problem-based approach to learning that adds rigor to traditional technical programs and relevance to traditional academics. Studies have shown that PLTW students become the prepared, competent high-tech employees U.S. industries need to succeed" (Project Lead The Way, 2009). Bottoms & Uhn (2007) have documented the academic achievements of PLTW students (Bottums & Uhn, 2007).

PLTW requires professional Autodesk software used in industries such aerospace engineering (AE), biotechnology, civil engineering and architecture, Computer Integrated Manufacturing (CIM), and robotics. Because of this sophisticated and graphic-intense software, more powerful computers are necessary than the district's standard model to run the Autodesk program. Further, as software and hardware rapidly advance, computers must be updated at least every four years to accommodate the "latest leading edge engineering software selected by PLTW to be used exclusively by all high schools" (Madison Metropolitan School District (Madison WI), 2004).

Examples from other states also substantiate the need for industry-standard software and hardware in high school Technology Education classrooms. Students at Daniel Morgan Vocational Center in Spartanburg, South Carolina, used space-age technology to build a prize-winning solar car. Students communicated via the Internet with engineers to locate parts and equipment worldwide. To design and operate the car's electronic system, students used many software applications such as AutoCAD 2000, Microsoft Office 97 for correspondence, Microsoft Publisher 97 to produce graphics, and Microsoft FrontPage 98 to design and manage their web page.

Family & Consumer Education

MMSD is partnering with the Wisconsin Restaurant Association in offering the ProStart® program, a two-year curriculum designed to prepare high school students for leadership positions in the restaurant and foodservice industry. In addition to the requirement to follow the professional curriculum, MMSD has made the commitment to provide culinary equipment that meets industry standards. Using the proper equipment and passing the state ProStart exam gives students state certification recognized by employers and fulfilling one of the goals of CTE, which is to adequately prepare students for the labor market.

CTE Summary

Internationally known educator and researcher Willard Daggett said in *Jobs and the Skill Gap*, "The base of the U.S. economy has changed over time from agricultural to industrial to information and now, at lightning speed, to infotech, biotech, and nanotech. New skill sets and high-level academics are required for the new technological workplace" (Daggett, n.d., p. 4). Career and Technical Education (CTE) is focused on delivering these.

e. Science Technology

Science and technology have a historically deep relationship. The desire to know more about the world around us had led to the development of the tools necessary to answer our questions. Galileo used the newly developed telescope to investigate the moons of Jupiter. As instrumentation progressed and the universe opened to our eyes, astronomers asked more questions and built better tools. The public's attention has been recently cast skyward with the successful operation of the Hubble Space Telescope. This work continues today as we see that, in science, the answer to one question often leads to many new questions.

Technology is the tool and instrument of science; technology provides an extension of the senses into worlds and environments that humans cannot venture. These tools of science provide the connection between the natural world and the designed world.

The *National Science Education Standards* (NSES), published in 1996 by the National Research Council, provides insight into the roll of technology in science education. Technology in science classrooms should not be confused with technology education; instead the relationship between science as an enterprise and the use of technology to solve problems is emphasized (NetLibrary Inc., 1996).

The NSES focus on (a) science's use of technology as *design*, and (b) an understanding of the relationship between science and technology. The process of using technology as design means that we look at how technology is used to create a solution to a scientific problem with the needs of people as the critical element.

How does this translate into practice in classrooms?

In lower elementary grades, it may be that students will use a process to analyze the effectiveness of a solution to a problem (zippers, Velcro, buttons as fasteners). Students will be involved in experiences that provide opportunities to experience a sequence of stages of design that is aligned extremely well with the Inquiry Cycle (Center for Science Mathematics and Engineering Education. Committee on Development of an Addendum to the National Science Education Standards on Scientific Inquiry., 2000) that MMSD Science has been using since the inception of the SCALE project in the early 2000's.

In the middle grades, students are developing the ability to differentiate between science and technology as they deepen their understanding of both. Students come to learn that technology and technological design involve more than just scientific issues (costs vs. benefits, resource use, etc.) and that the complexity of issues increases as they ask deeper questions.

In high school, students grow to understand that the relationship between science and technology is so close that, any discussion of science *without* technology is an inaccurate portrayal of science (NetLibrary Inc., 1996, p. 190). Students continue to grow in their understanding that creativity, imagination, and a strong knowledge base are requirements in the work of science and engineering.

Another document that highlights the structure of a classroom is *How Students Learn: Science in the Classroom* from the National Research Council. In describing effective classroom learning environments, it is emphasized that students are to be *engaged* in understanding science, not just kept busy memorizing factoids and formulas. Students are to be engaged in understanding science as we know it, working with the tools of science, and developing a deeper connection to the world as explained by science (National Research Council (U.S.). Committee on How People Learn A Targeted Report for Teachers., Donovan, & Bransford, 2005).

In an effort to create more scientifically literate students, we must change the way in which we teach science. In this book, Bransford and Donovan write "…simply asking students to follow the steps of "the scientific method" is not sufficient to help them develop the knowledge, skills, and attitudes that will enable them to understand what it means to "do science" and participate in a larger scientific community." (National Research Council (U.S.). Committee on How People Learn A Targeted Report for Teachers., et al., 2005, p. 398)

The tools of science provide students the opportunity to focus on the question, the data, the analysis, the conclusion, and the communication of an investigation rather than on the procedural steps of how the investigation is conducted. Technological tools, such as lab probes, allows for rapid collection of data. Since time is always a key component of science classrooms, a procedural mistake often results in a student not getting the fullest experience possible provided by the investigation. Lab probes and related software can decrease the time needed to collect data, thus allowing the opportunity to repeat an investigation within the same class period. Collaboration, sharing of information between students groups and presenting conclusions to peers provide realistic examples of how science is actually done.

In *Powerful Practices in Mathematics & Science*, Carpenter and Romberg identify modeling as central to the work of mathematicians and scientists. Modeling engages students in the authentic practice and work of scientists. While some concepts can certainly be modeled using common objects, other concepts cannot. Computer software can provide a powerful tool for modeling those difficult concepts. The tools to create "models and generalizations provide a context and focus for classroom discussion (Carpenter, et al., 2004, p. 32)."

Classroom practices are shifting from the traditional sharing (or imparting) of knowledge to a more constructivist view that student learning is personal, reflective and transformative process where ideas,

experiences, and points of view are combined to create knowledge (Sandholtz, Ringstaff, & Dwyer, 1997, p. 12). Multiple forms of technology used to support students engaging in the work of learning are what schools need to improve the level of science literacy among *all* students. Examples of these tools may include, but are not limited to:

- Projection systems as well as interactive white boards provide increased opportunities for more students to actively participate in their own learning. This may include classroom "voting" tools to provide instant feedback to students and teachers.

- Access to digital cameras, the ability to take short "flash" movies and edit those movies can provide creative methods to engage students in their own learning.

- Students are able to share their data, become involved in focused conversations, and critically look at conclusions, and make persuasive presentations to peers who are in another location through the use of wikis and educational "social" networks. The barriers of time and location are dropping!

Finally, the skills that we believe are critical for success in this century are amplified through the use of technology in science. Students need to be able to work collaboratively, cross cultural boundaries with understanding and compassion, act (and react) ethically, creatively find solutions to problems and engage in effective communication of ideas. While science is just one of the content platforms possible for creating this type of learning environment, it has arguably the deepest and most historical connection with technology and innovation.

f. Social Studies Instruction and the Digital Environment

The National Council for the Social Studies (NCSS) makes the following recommendations for using technology in the social studies classroom:

- Technology should be used to extend learning beyond what could be done without technology.
- Technology should be introduced in context with technology extending content and skills.
- Students should have the opportunity to study the relationships among science, technology, and society.
- Technology should be used to foster the development of the skills, knowledge, and participation as good citizens in a democratic society.
- Students should have the opportunity to contribute to the research and evaluation of social studies and technology (Mason, et al., 2000).

In addition to these recommendations, NCSS states that technology should be used to expand and extend what is possible in a social studies classroom and should be evaluated based on its impact on teaching and learning (Bennett, et al., 2006). NCSS's belief that technology is in itself not a benefit to instruction in social studies, but is instead valuable in its application, is supported by research summarized by Sivin-Kachala and Bialo (2000). They found the teacher's role was critical in creating an effective technology-based learning environment.

Although research in the application of technology in a social studies setting is limited, available research in other areas support the idea that technology, when applied in a rigorous way to support higher order thinking, can improve the quality and quantity of writing (Goldberg, Russell, & Cook, 2003; Sivin-Kachala & Bialo, 2000) and can improve achievement and learning gains (Kimble, 1999). These research findings support the value of integrating digital technology into the learning environment of the social studies classroom.

Introduction

The shift to a digital environment in the classroom, where digital products in a variety of formats can be readily created, shared, distributed, modified and stored, has the potential to improve instruction by expanding and extending the way social studies is taught and the way students learn. The expansion and extension of activities in the classroom can enhance what Newmann and Wehlage (1993) called authentic instruction (cited earlier in this paper). As discussed earlier, authentic instruction varies in degree according to the following variables: (a) higher-order thinking, (b) depth of knowledge, (c) connectedness to the world beyond the classroom, (d) substantive conversation and (e) social support for student achievement (Newmann & Wehlage, 1993, p. 10). A digital environment influences these variables by increasing access to resources, encouraging student engagement, and improving classroom organization.

A digital environment allows student and teachers access to a wide variety of resources and tools that can directly impact social studies instruction. Students and teachers can now access large databases like the Library of Congress to find a wide variety of primary documents. The internet makes connecting to experts, other students, and people from other cultures easier than ever. Resources that were only available to academic scholars are now readily available on the internet. As a result, students no longer have to rely on second hand accounts or the interpretation of experts to do their own research and draw their own conclusions. Ready access to high quality sources makes conducting historical inquiry projects that encourage higher order thinking easier. As a result, the role of the student shifts from the passive recipient of information to a collector of evidence in a wide variety of formats from a wide range of perspectives.

Access to digital resources and tools encourages student engagement in the learning process. Student production of digital media products (videos, wikis, blogs, websites, PowerPoints), in addition to improving student's attitude toward school (Sivin-Kachala & Bialo, 2000, p. 11), can also engage students in authentic learning activities like problem solving and inquiry. Access to data collection and evaluation tools enable students to create graphs and tables; to collect and analyze data sets; and create interactive maps using Geographic Information Systems. A digital environment in the classroom expands and extends the potential of students to engage in real world projects where the student collects information and constructs knowledge and shares his/her discoveries with the class or the world. A digital environment can facilitate in-depth and substantive conversation that can occur synchronously and asynchronously with fellow classmates or people from around the world.

Digital technology has the ability to change how teachers organize their instruction to increase efficiency and improve instruction. Like their students, teachers can benefit from the ease in which digital media can be created, stored and distributed. Lesson plans can be easily modified and shared with others. Lessons activities in a digital format are easier to organize and to differentiate and may be more engaging for students. Digital media allows for students to be exposed to material in multiple formats that may better meet the individual learning needs of students. Student work can be collected, evaluated and organized using a single computer. Teachers can provide both feedback and support to students within the digital environment as they complete their work. Student assessment results can be stored in electronic portfolios or databases to track progress overtime. Digital interactions with others can be recorded or saved and evaluated later by the teacher. The digital environment has the potential to assist teachers in organizing what they teach, how they assess and in documenting student progress.

Technology should be evaluated, as stated in NCSS guidelines, based on how it can improve and transform teaching and learning. The digital classroom environment, made possible using up-to-date technology, extends and expands the potential for students to engage in a rigorous curriculum that requires them to use quality resources to ask questions, gather evidence, and construct knowledge in creative and academically challenging ways. Such an environment matches well with (Newmann &

Wehlage, 1993) characteristics of authentic instruction. A digital environment, however, is not a substitute for a quality teacher and the necessity of creating engaging, authentic and rigorous learning activities for all students. It just makes it easier.

8. Summary of Technology Research

Some of the many implications of recent research in the area of information technology for educators attempting to design long-range plans are:

- A robust school library media program is an important ingredient in improving or maintaining student achievement.
- Collaborative use of technology may be more effective than individual use.
- Teachers need to be involved in decisions about how technology is implemented, if that implementation is to be effective.
- Computers may be more effective when placed in classrooms, as opposed to labs.

The use of technology in instruction can have a positive impact on student achievement and motivation, but the impact depends on the specific use of the technology and the content area.

B. Vision and Mission Statements:

At the time of this writing, the Madison Metropolitan School District is engaged in the process of updating its strategic plan.

As of January 30, 2009, before formal Board of Education adoption, the Madison Metropolitan School District **Mission Statement** reads:

Our mission is to cultivate the potential in every student to thrive as a global citizen by inspiring a love of learning and civic engagement, by challenging and supporting every student to achieve academic excellence, and by the full richness and diversity of our community. The latest draft (March 10, 2009) of the District's **Beliefs** read:

1. We believe that excellent public education is necessary for ensuring a democratic society.
2. We believe in the abilities of every individual in our community and the value of their life experiences.
3. We believe in an inclusive community in which all have the right to contribute.
4. We believe we have a collective responsibility to create and sustain a safe environment that is respectful, engaging, vibrant and culturally responsive.
5. We believe that every individual can learn and will grow as a learner.
6. We believe in continuous improvement informed by critical evaluation and reflection.
7. We believe that resources are critical to education and we are responsible for their equitable and effective use.
8. We believe that academic achievement is not predicated on race, socio-economic status, disability, sexual orientation, gender or language.
9. We believe in culturally relevant education that provides the knowledge and skills to meet the global challenges and opportunities of the 21st century.

The purpose of creating parameters is to place self-imposed ground rules and limitations on the district. As such, they sharpen the district's mission. Parameters are not board policy nor are they intended to be the routine operational rules and procedures that exist in our district. Parameters are limits we place on ourselves for good reasons; they are the boundaries in which we will operate. The latest draft (March 17, 2009) of the District's **Parameters** read:

1. The District's highest priority is to _____ (develop, encourage, nurture, advance, strive for) each individual's potential through successful learning experiences.
   Alt: The district's highest priority is to provide successful learning experiences toward reaching the potential of each individual.
2. All individuals are treated with dignity and respect.
3. Expectations are high and clear for all.
4. Community input is actively sought and valued.
5. Families, schools, and communities work as partners.
6. Communication is timely and accessible.
7. Data informs decisions.
8. Decision-making processes are transparent.
9. Accountability is expected throughout our organization's culture.
   Alt: Everyone is accountable for their work.

10. Our approach is individual by individual.
11. Research-based practices guide instruction.
12. A culture of creativity and innovation is nurtured.
13. Leadership and collaboration are fostered at all levels.

MMSD Strategic Priorities (February 9, 2009)

1. Students:
We will eliminate the achievement gap by ensuring that all students reach their highest potential. To do this, we will prepare every student for kindergarten, create meaningful student-adult relationships, and provide student-centered programs and supports that lead to prepared graduates. (see also student outcomes)

2. Resource/Capacity:
We will rigorously evaluate programs, services and personnel through a collaborative, data-driven process to prioritize and allocate resources effectively and equitably, and vigorously pursue the resources necessary to achieve our mission.

3. Staff :
We will implement a formal system to support and inspire continuous development of effective teaching and leadership skills of all staff who serve to engage our diverse student body while furthering development of programs that target the recruitment and retention of staff members who reflect the cultural composition of our student body.

4. Curriculum:
We will revolutionize the educational model to engage and support all students in a comprehensive participatory educational experience defined by rigorous, culturally relevant and accelerated learning opportunities where authentic assessment is paired with flexible instruction.

5. Organization/Systems:
We will proudly leverage our rich diversity as our greatest strength and provide a learning environment in which all our children experience what we want for each of our children. We will:

- Provide a safe, welcoming learning environment
- Coordinate and cooperate across the district
- Build and sustain meaningful partnerships throughout our community
- Invite and incorporate (require) inclusive decision-making
- Remain accountable to all stakeholders
- Engage community in dialogue around diversity—confront fears and misunderstandings

The District's Information and technology vision and mission support the District's Mission, Beliefs, Parameters.

Thus, the District's Information and Technology vision:
To use technology strategically to facilitate successful learning, child-by-child.

And the District's Information and Technology mission:
To empower staff and student learning through technology to assure that every student has the knowledge and skills needed for academic achievement and a successful life which includes

accessing manipulating and communicating information effectively as a productive citizens in a global society.

Additional information concerning the District's Vision, Mission, Beliefs and Framework can be found at http://drupal.madison.k12.wi.us/node/2246

A. Overview of the District

The Madison Metropolitan School District serves about 25,000 students in 47 schools, including 32 elementary schools (grades K-5), 11 middle schools (6-8), four comprehensive high schools and one alternative high school plus several alternative programs at non-school building locations. The district also has early childhood programs and alternative programs at the secondary level (6-12). There are nearly 7,000 staff employed by the MMSD including both full- and part-time employees. The 2008-09 fiscal year budget is nearly $368 million. The geographic area comprising the MMSD is fairly large. The district covers approximately 65 square miles, including all or part of the cities of Madison and Fitchburg, the villages of Maple Bluff and Shorewood Hills, and the towns of Blooming Grove, Burke and Madison.

B. Demographics

Madison Metropolitan School District (MMSD) Demographic Profile

Over the past 15 years the Madison Metropolitan School District (MMSD) total student enrollment has remained relatively constant at around 25,000. This consistent enrollment has occurred in large part because of the attachment of areas within the metropolitan area to the District which has experienced new housing growth. Had these attachments not occurred during the 1990's the District total enrollment would most likely have declined.

There is, however, another chief reason for consistent student enrollment within the District. Namely, the rise in certain subgroups of students – and their associated households – also increased during this same period of time. There has been a dramatic shift in regard to students – and households – of color. And because there is a high correlation between ethnicity/race and income status within our community, the proportion of lower income students among the total population of students in the District has also increased. Many of these households reside in multi-family residential housing located within the MMSD attendance area, again following the correlation between income status and housing options.

Together the newly developing portions of the District and the increase in ethnic/racial minority households have combined to keep the total District student enrollment fairly constant over the past 15 years. However, the proportion of ethnic/racial minority and lower income students as a percentage of total enrollment has increased significantly during that time. Since 1992-93, minority student enrollment has increased from 24 to 46 percent of total enrollment.

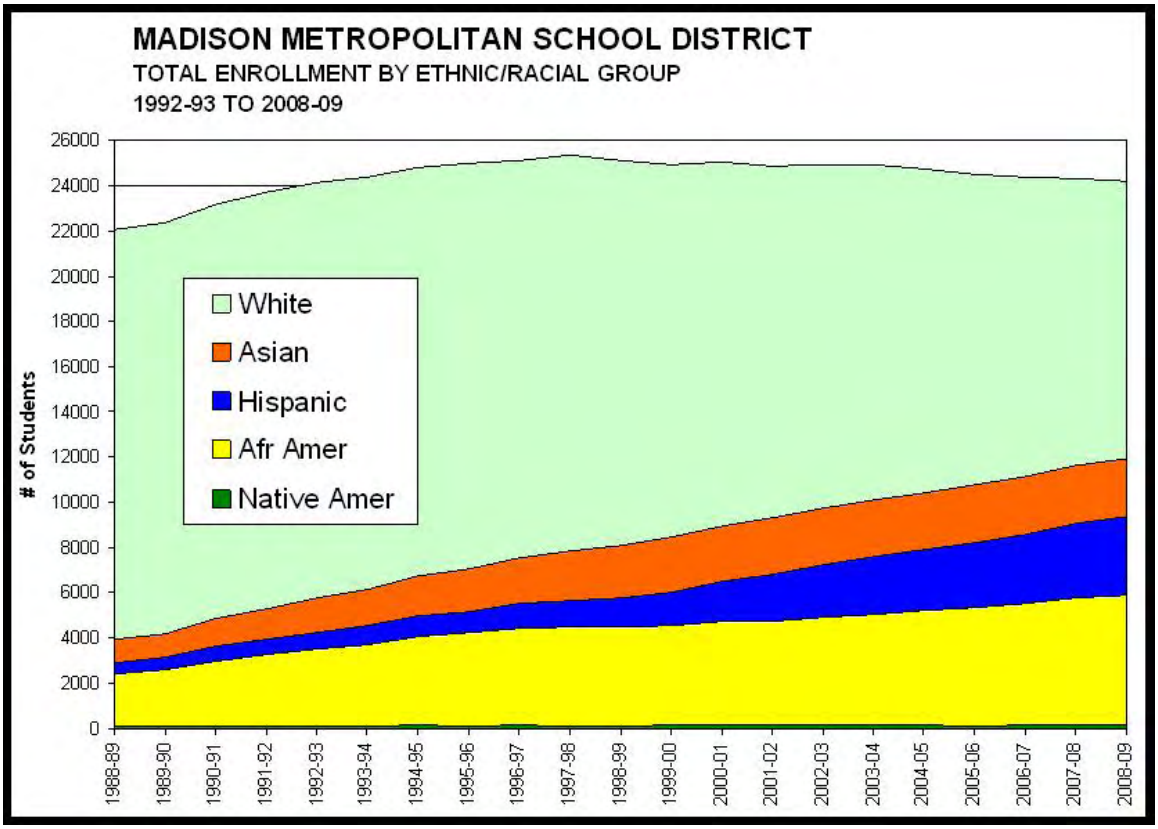


Figure 1 – Total Enrollment by Ethnic/Racial Group

Hispanic student enrollment has by far been the fastest growing segment of the student population, although much more slowly over the most recent five-year period.
Asian enrollment growth has slowed significantly in the past five years and is about constant now. These changes have further effects on curriculum and instruction programs and services such as English as a Second Language (ESL), bilingual and dual immersion instruction.

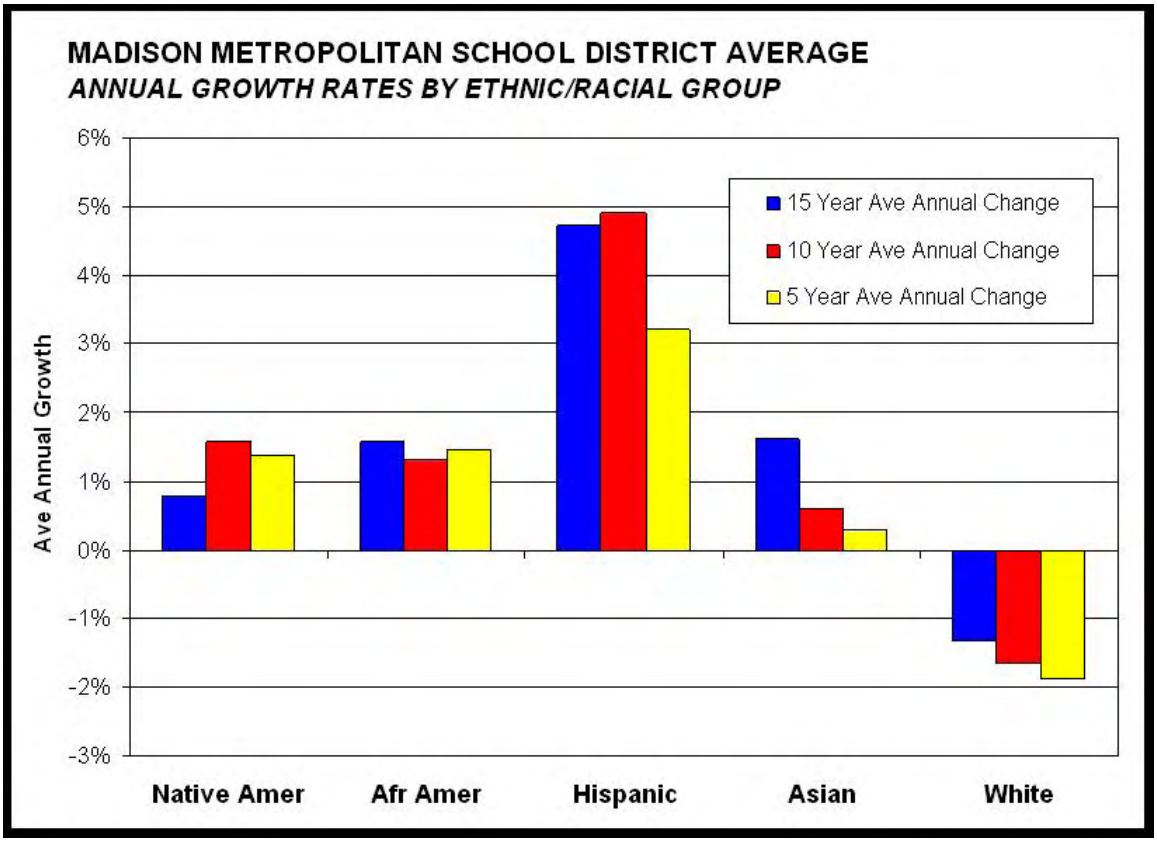


Figure 2 – Annual Growth Rates by Ethnic/Racial Group

The change in the percentage of low-income students within the District during the past 15 years has mirrored the change in ethnicity and race, underscoring the relationship between these factors in our community. In the 1992-93 school year the low-income percentage in the District was just over 20 percent. In September 2008, the low-income proportion increased to around 45 percent. The nearly doubling in low-income percentage during this period has been relatively uniform across each school level. At the high school level, the District increase in percentage of low-income students has been somewhat larger than at the elementary and middle school levels. The increase is due, in part, to a decrease in student dropout rates.

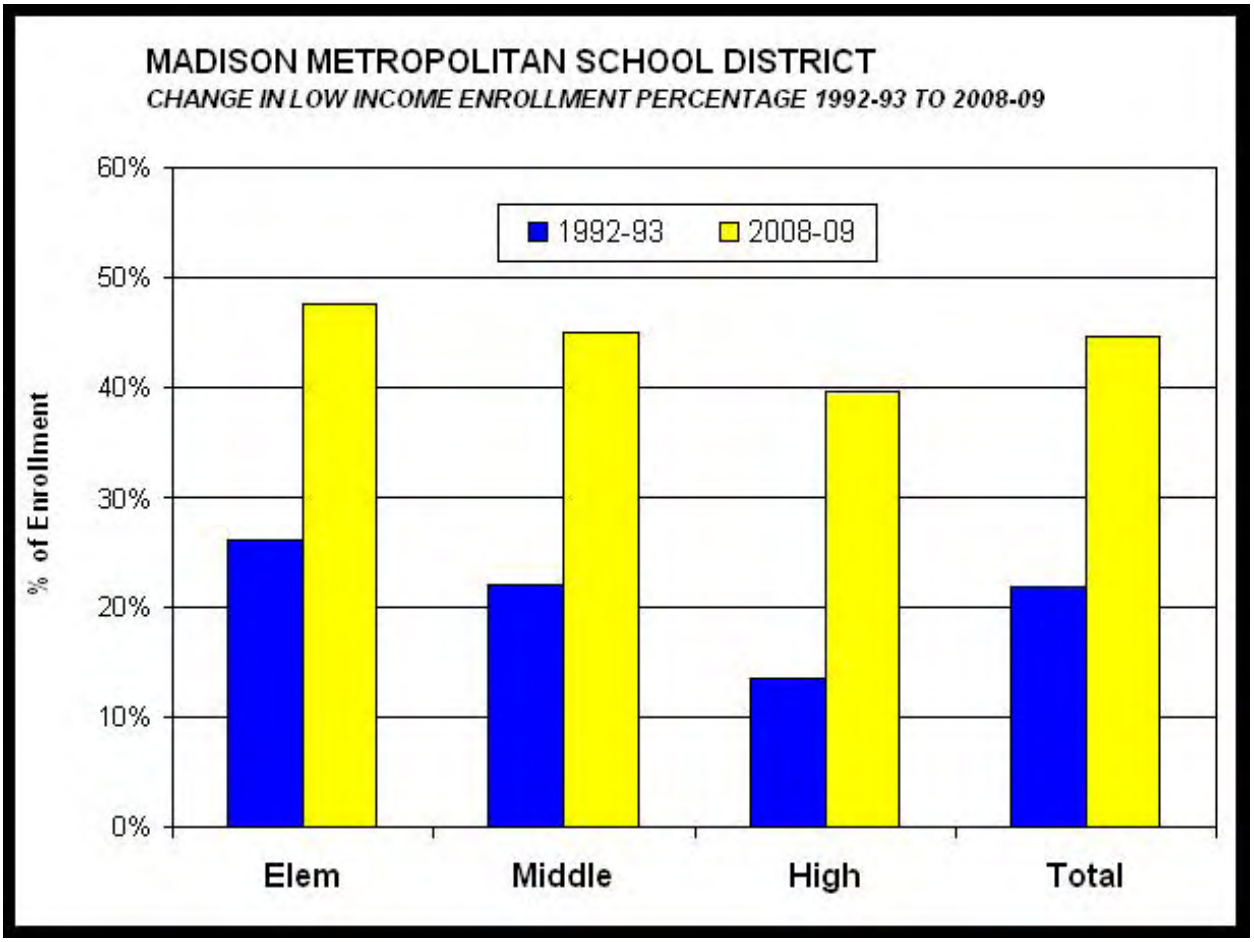


Figure 3 – Change in Low-Income Enrollment Percentage

Another very interesting change in student enrollment within the district is found upon examining these changes in ethnicity/race and income status across the school attendance areas, i.e., where students within the K-12 age levels reside. The change has not been consistent across all areas of the District. For example, neighborhoods closer to the center of the city of Madison have seen little change in the percentage of ethnic/racial minority and low-income students within their overall student populations since 1992-93. On the contrary, nearly every other school area – with the exception of newly developed neighborhoods on the edge of the metropolitan area – has experienced a significant increase in the percentage of ethnic/racial minority and low-income students in their total school population.

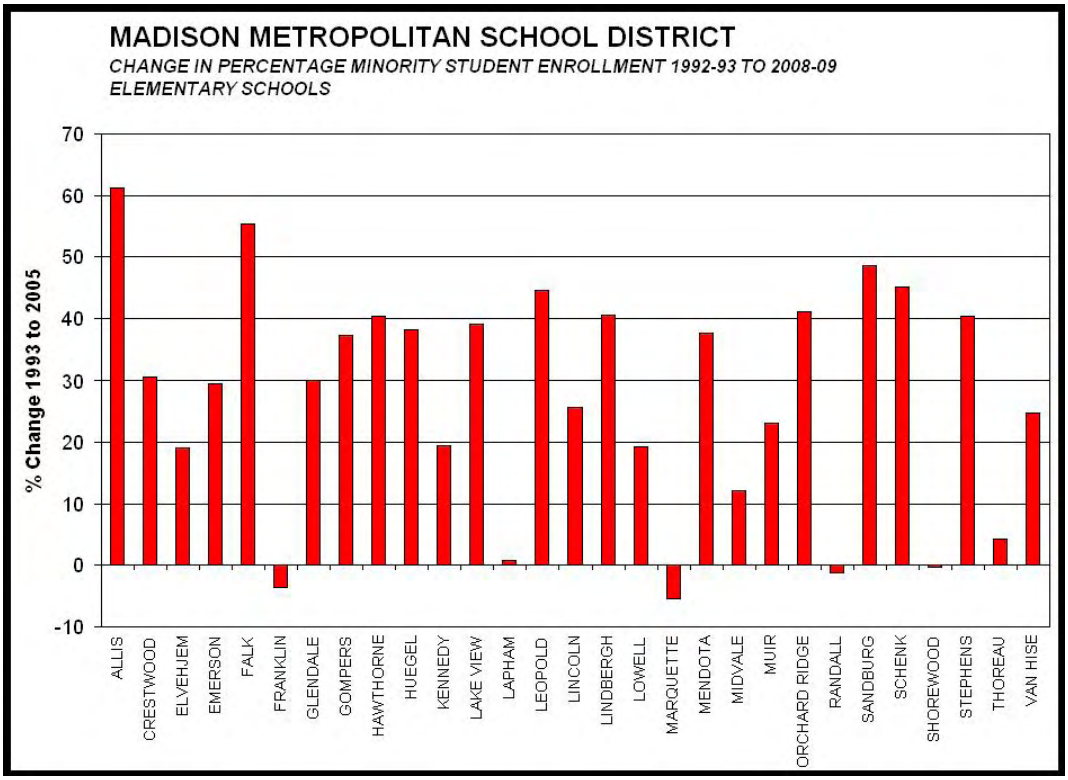


Figure 4 – Change in Elementary Minority Student Enrollment Percentage

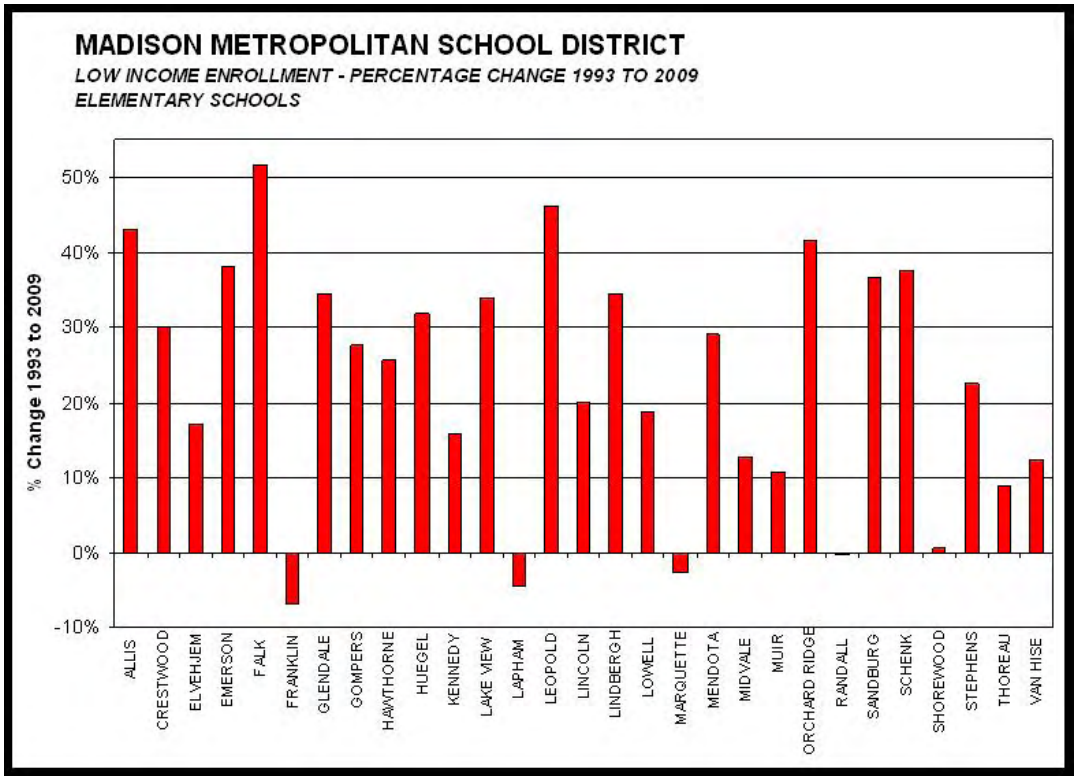


Figure 5 – Change in Elementary Low-Income Student Enrollment Percentage

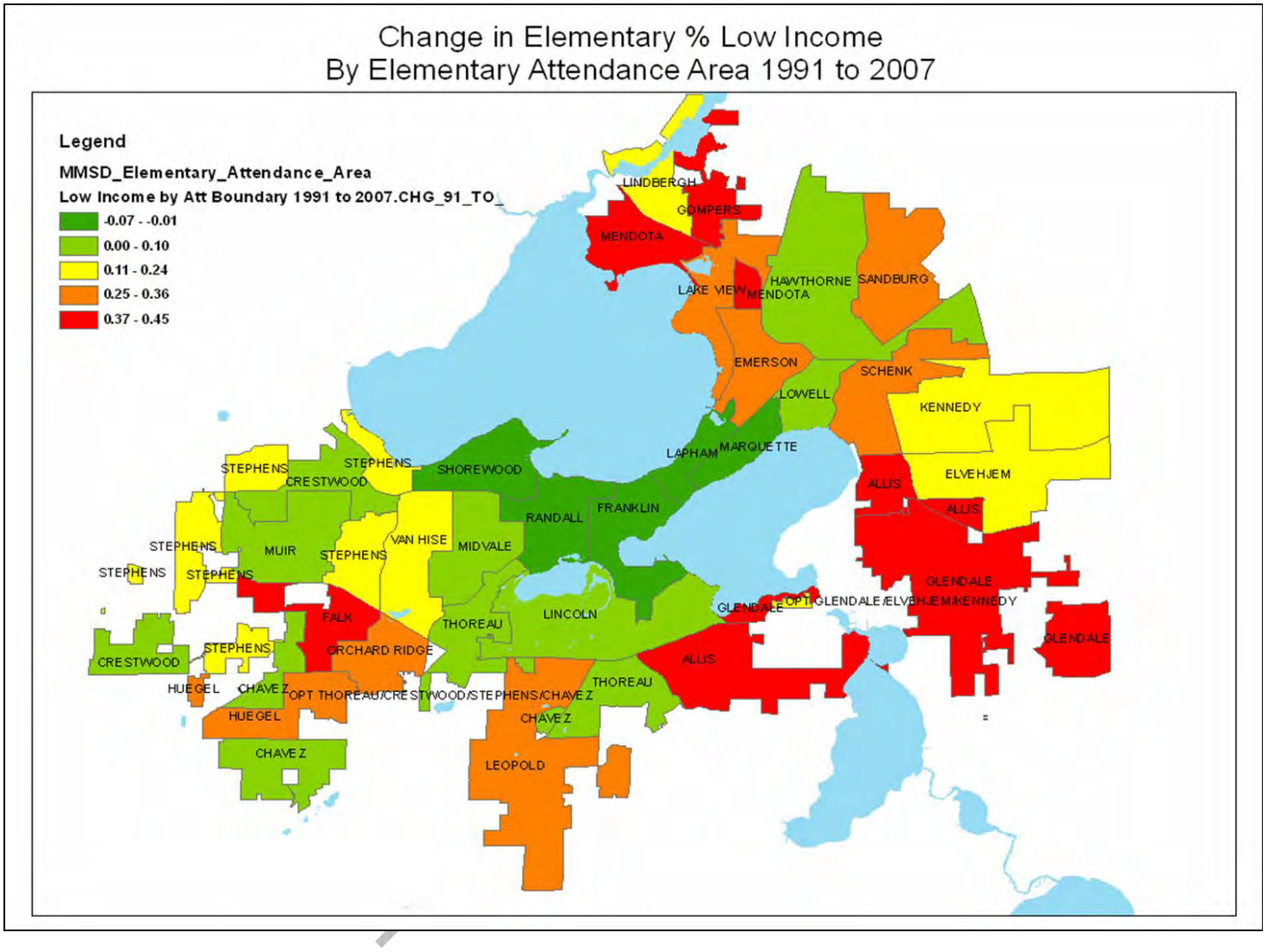


Figure 6 – Change in Percentage of Low-Income Elementary Enrollment by Attendance Area

The changing demographics and the inconsistent shift across geographic areas within the city reflect housing pattern changes. Areas with larger amounts of multi-family rental housing units, particularly those that are aging, are areas where housing costs have declined to levels more affordable to families with school age children. Schools have reacted to these changes by adjusting programming and services accordingly. The same approach is warranted for technology. National data describe the "digital divide" that exists between household income and access to technology resources such as household computers with Internet broadband access. This is true in MMSD as well. Because of this it is important to implement policies and actions that attempt to mitigate the disadvantages of limited technology access in the learning environment in order to address the achievement gap.

Students with disabilities also have disproportionate access to technology and often rely on technology to help level the playing field and close the gap in access to the regular education curriculum. IDEA 2004 mandates that school districts ensure that textbooks and related core instructional materials are provided to students with print disabilities at the same time as students without disabilities. Publishers are in the process of providing materials using publishing standards that are more easily converted (National Instructional Materials Standards - NIMAS). We are in the process of determining how we are going to meet this federal mandate here at MMSD.

We as a school district will need to acquire these alternative formatted materials, and have updated technology that will allow students to easily access and use the materials. Alternative formats include audio text, digital text, braille and large print. We need to include a plan (and budget) for the tools (hardware and software) needed to ensure access for these students. This could potentially involve a large number of our 4,000+ students with special education needs (approximately 17% of our schools population). Access to assistive technology for students also enhances teachers' ability to differentiate instruction and provide universal access to learning.

Our public schools should be the place where equity in technology access is assured for all students. This can be done without disadvantaging other student subgroups. The action steps within this plan describe several approaches recommended to meet these goals.

C. Program History & Description

History of Library Media Program

The history of school libraries in Madison public schools, begins in 1902 when books from the public library were placed on reserve in a reading room for high school students and the public librarian began visiting the schools. During the time that school libraries were managed by Madison Public Library, 1902-1952, a number of landmark events occurred. In 1912, the first formally organized library was established at Central High School. In 1921, the first junior high library was established. In 1925, the first elementary library was established. In 1952, the school board assumed control of libraries in the public schools. An emphasis was placed on centralizing building collections and the District established a central materials ordering and processing system.

The 1960's were characterized by the transition of Madison school libraries from libraries to Instructional Materials Centers (IMCs). As funding increased, a movement toward resource-based education with the IMC at the center of learning became a reality. In 1968, Madison Public Schools became one of the first systems in the nation to computerize ordering and processing.

Background

The 1970's began auspiciously, for Madison school libraries, with an award from the Wisconsin Library Association (WLA) as outstanding library of the year. During the 1974-75 school year, the Program Materials Selection (PMS) process for selecting new instructional materials was implemented, supported by an extensive preview process coordinated by the Textbook Library (later known as the Instructional Materials Selection Center or IMSC). In 1976, a centralized audiovisual collection was established and the first school in the district (Orchard Ridge) was wired for cable television.

By 1980, all of the schools are wired for cable television and local educational access is started on Channel 27. 1980 also saw the beginning of the electronic repair program as a revenue source for the District, when the District began selling its services to local school districts and public libraries.

Redesigning Library Services: A Manifesto (Buckland, 1992), provides us with a model for the change that has taken place in Madison school libraries over the span of the last twenty years. In *Redesigning Library Services*, Buckland suggests that library technology has recently undergone two major transitions. The first transition in library technology occurs when libraries move from the paper library, to the automated library. The second transition in library technology occurs when libraries move from the automated library to the electronic library (Buckland, 1992, p. 6).

According to Buckland, the paper library is distinguished by storing information in paper form, by providing access through paper indices and by conducting its operations on paper. In the paper library materials are (a) owned by the library, and (b) acquired in anticipation of use. The automated library still stores information, for the most part, in paper form, but in contrast to the paper library, provides access to its collection and conducts its operations by computer. Finally, the electronic library is characterized by (a) storing information, (b) indexing that information and (c) conducting its operations by computer. In the electronic library, library patrons typically access information at the time of use, but libraries may not permanently acquire and/or store the information.

Madison schools began the transition from the paper library to the automated library in 1983, when an LSCA grant made it possible for MMSD libraries to begin adding their records to the statewide bibliographic database (WISCAT). In 1983, members of the District IMC Supervisory Committee (DISC) began discussions with the instructional computing coordinator focusing on a long-range computing plan. In 1986, reflecting national trends, MMSD school libraries underwent another name change from IMC to Library Media Center (LMC). In 1986, a *Long Range Plan for Cable/Video Services* was developed and regular evening programming on Cable Channel 27 started. In 1986, CD-ROMs began to appear in MMSD libraries. In 1987, the Department of Media, Information & Communication was formed, the first locally-produced programs aired on MMSD's cable channels, and automation of LMC catalogs, using Follett's Circ+ program, began with pilot projects at Shorewood & La Follette. In 1988, bar coding of La Follette and Shorewood collections began; Shorewood's circ system was operational by the end of the school year. Database searching instruction began for selected high-school students. MMSD's manual and video, *Copyright and You*, were completed and distributed to schools. In 1989, a satellite dish was installed, and secured through a fund raising campaign by parents with matching funds from school board. In 1989-90 school year, bar coding of more school collections, plus the Educational Reference Library (ERL), continued and the *Long-Range Plan for Technology* was adopted by the BOE.

During the 1990's many technology initiatives were begun, including (a) implementation of the *Long Range Plan for Library Media Technology*, (b) the introduction of the REACH program (1990-91), and (c) the installation of security gates at most middle and high schools (1991-92). In the early 1990's most of MMSD's libraries installed their first library automation systems.

Background

The third library technology paradigm Buckland describes is the transition from the automated to the electronic library. That transition for Madison schools arguably begins with the introduction of Gopher, and e-mail services. At least three factors seem to be driving the current transition from the automated library to the electronic library (a) increased serial costs, (b) increased access to the Internet, and (c) the increasing availability of information stored in digital form. Increasing serials costs have been problematic for collection developers at least since 1984 (Miller, 2000, p. p. 648). Many libraries have dealt with the crisis by reducing the number of journal titles to which they subscribed. The loss of subscribers has caused journal publishers to further increase subscription costs in an attempt to recoup lost revenues. When faced with a choice between access and ownership; raising journal costs have provided yet another incentive for libraries to move toward the electronic model. The choice between ownership and access is not necessarily an exclusive one. According to Genevieve Owens, the point is "not to replace ownership with access but to incorporate access into our collecting efforts to maximize our purchasing power and best serve our patrons" (Owens, 1994, p. 62)

The mid-1990's finds MMSD, like many other school districts, still in the process of attempting to finalize the transition to an automated library, while at the same time beginning the transition to the electronic library model. In 1994, Gyneth Slygh heads a committee attempting to establish a union catalog. In 1995, MMSD launched its first formal web presence in the form of the *Electronic Library*, a collection of pre-selected Internet sites. In 1996, DRA union cat/purchasing software was acquired and installed. The DRA-based union catalog did not include a circulation module. Full implementation of the DRA-based integrated library system (ILS) was halted due to widespread dissatisfaction with the quality of the software.

Between the years 2003 and 2006, changes in district accounting and budgeting practices and software (Lawson) allowed for the replacement of the obsolescent DRA union catalog with a centralized bibliographic database and circulation system (Sagebrush Accent) accessible from any Internet location. As of April 2006, the central bibliographic database included approximately 375,000 unique bibliographic records and included the holdings of all LMC collections, the Video Library and the Madison School & Community Education Library (MSCEL).

In the 2004-2005 school year the Educational Reference Library (ERL) and the Instructional Materials Selection Center (IMSC) were merged, due to a change in the distribution of budget funds, and became the Madison School and Community Education Library. The MSCEL opened its learning materials collection to the greater MMSD community as a community service.

By the end of the 2005-06 school year, district-wide spending on library materials had increased substantially and the number of databases accessible to students and staff both within the District and remotely had expanded from a single title in 2003 (i.e. *World Book online*) to over 8 titles including, *Culturegrams, Webster's Unabridged Dictionary, Encyclopaedia Britannica, Compton's, Enciclopedia Universal en Español, netTrekker*, and *Unitedstreaming*.

During the 2003 – 2006 time period, the District library media program faced challenges similar to many other departments. Reduced staffing levels for both support personnel and library media specialists negatively impacted the quality of service provision at many schools and have been particularly acute at the secondary level were Affiliated Alternatives was forced to eliminate its program and Black Hawk Middle School and Jefferson Middle School reduced their professional staff to .5 FTE.

On July 26, 2006, Sagebrush Corporation's library automation division was purchased by its main competitor, Follett Library Software (Pace, 2006). Discussions with Sagebrush and Follett representatives in the fall of 2006 indicated that Follett planned no further development of their Sagebrush Accent

product. Support for Accent was predicted to continue for no more than three years. An offer to upgrade from Accent to Destiny for roughly twice the cost of the annual support agreement was proffered. On January 31, 2007, after a competitive process involving proposals from COMPanion, SIRSI/Dynix and Follett, the BOE authorized the purchase of, the recommended solution, Follett's Destiny browser-based Library Manager. Transition from Sagebrush Accent to Destiny occurred on April 10, 2007.

As of December 2008, Madison Metropolitan School District LMCs now contain over 962,000 items listed in a single centralized bibliographic database; including 6,000 titles listed in the Video Library; and approximately 21,000 items listed in the MSCEL. Annual circulation for the 12-month period ending in December 2008 exceeded 340,000 items. Each LMC, with the exception of Shabazz HS, Black Hawk MS, Mendota Elementary, Jefferson MS, Wright MS and Spring Harbor MS is staffed by at least one full-time media specialist. The District has access to the online databases provided by BadgerLink and spends over $150,000 per year for the additional online information resources listed earlier.

History of Instructional Technology Program

An Instructional Computing coordinator position was established in the 1980s as part of the Curriculum and Instruction Department. The position was vacant for a year and a half period in the early nineties and the position was filled again in August 1992 with the hiring of Joan Peebles. The focus at that time was working with school representatives to discuss and decide upon computer purchases (hardware platform, peripherals and software.) Standards were established, purchases were made (with a multi-year phasing-in plan for schools), school computer committees were active and excitement (for those that received computers) and frustration (for those waiting for subsequent years) were prevalent. Neither staff development nor technical assistance were widely available from the district during this period, and schools struggled to do everything from unpack computer boxes to load software during their planning periods.

In 1993 a "teacher in residence" position was added to assist the Instructional Computing Coordinator as school purchases and needs continued to expand. The summer of 1994 brought the first widespread staff development offerings in the form of the "June Potpourri", a series of 25 classes, a joint initiative between Instructional Computing and Title 1. In response to the growth of technology within MMSD, the district's organization structure changed with the creation of the department of Instructional Technologies during the 1994-95 school year. Joan Peebles assumed responsibility for the new department, which also employed three tech integration support staff.

The formation of the Instructional Technologies Department changed the focus of the coordinator's work from instructional purchasing/electrical capacities/software standards teams to District Wide Technology Professional Development for all staff. Between 1995 and 2000, Instructional Technologies staff ranged between 4-7 positions. The mission of the Instructional Technologies Department was to "ensure student/staff success in an evolving technological society by supporting the school community in integrating technology into teaching, learning and productivity." Professional Development opportunities were regularly offered to all MMSD staff in the areas of productivity, integration and data. In addition to hundreds of courses offered each year, resource teachers were embedded at the elementary level to coach, model, meet with teams and write curriculum. During this period, a model Elementary Technology Guide was published, a District Keyboarding plan implemented, elementary and middle school standards were written as well as an elementary tech assessment. Regular meetings were held with representatives from middle, elementary and high schools and at least a dozen grants were written, funded and implemented. A technology professional development center, the "SPOT", was established at Hoyt School and continuously scheduled with classes ranging from data academies, web publishing, productivity and professional development on curricular packages such as Nova Net. During this period,

Staff Technology Goals were established for all instructional and non-instructional staff, though never formalized, and as a result technology staff development continued to be "optional" (as it is today.)

As budget cutbacks plagued the district in 2000, the Instructional Technologies Department was integrated into the Teaching and Learning Department and four of the remaining staff transferred into new roles. The tech integration specialists supported specific curricular area initiatives and the coordinator position evolved as the Coordinator of Technology and Learning. Her role took its third iteration, that of addressing the K-12 Workforce Preparedness: 21st Century Skills as well as looking at technology options to support educational equity, options and opportunity. The online learning initiative establishing new high school curricular options was a major outgrowth of this work. By the 2002-03 school year, budget cuts had slashed the remaining tech integration positions, and the Coordinator of Technology and Learning remained as the only district instructional technology support for MMSD. This position played a key role in both the writing and implementation of all aspects of the 2006-09 Information Technology Plan, heading the Online Learning Consortium and being the primary contact for all issues dealing with the instructional applications of technology.
With continued budget and human resource cutbacks between 2003-2006, the focus for the coordinator was limited to the following areas:

- Virtual Learning: A robust infrastructure has been built to deliver online options for both staff and students.
- High School Information Technology Pathways: A five-year plan was developed and approved by the Department of Public Instruction for funding.
- Emerging digital tools for communication/course delivery/collaboration: An array of digital tools have been evaluated and piloted to assist staff in: web-based instructional delivery, collaboration, communication and data collection. The tools lay the groundwork for the next generation delivery of student and staff courses.
- Assessment and Reporting: A Grade 8 Assessment was developed and piloted (to meet NCLB requirements) and changes were made/planned in both the elementary and middle level report cards for reporting technology growth.
- InfoTech Standards: After a committee review of the MMSD Technology Standards and MMSD Library Media Standards, the Wisconsin Model Academic Standards for Information & Technology Literacy were officially accepted for MMSD.

History of Information Services Program

The first information services support staff were hired in the early 1980's. The first technology initiatives included installation of a Commodore lab at Memorial High School and an Atari lab at West High School. Keypunch machines were used for payroll, accounting and for the library database. A Honeywell mainframe was the first enterprise computing platform followed by a migration in 1987 to an IBM midframe, the AS400. The AS400 environment remained the backbone of most enterprise applications such as the student, human resources, and financial information systems into the mid-2000's.

The first personal computing deployments in the Madison Metropolitan School District began in 1985, with the installation of computers in high schools. The multi-year goal was to install two computers into every school. This was completed in 1988. Each PC had two floppy drives and used OfficeWriter and emulation software, first to access the District's mainframe and when that was decommissioned in 1988, to access the first IBM AS/400. Several programmers and systems analysts were hired during this period to develop and manage the enterprise applications that ran on the AS400. Internal staff wrote a program in Lotus to do District bookkeeping. At that time, the Word Processing Center was using IBM 5520 dumb terminals and a single PC. Over time several staff from the Word Processing Center transitioned into the Management Information Systems Department.

Background

In 1992, the first Novell server was deployed by technical staff in the Doyle Administration Building and staff began networking PCs and sharing student data. High schools already had Novell servers in use in some areas, installed and managed by staff hired by each school, although there was no standard configuration or support system in place. A systems operations "sysops" bulletin board service was developed by MIS staff for internal communications and First Class became the initial email application. Lapham Elementary became the first building to implement the new computer networking plan and they were given two PCs per classroom. Jefferson Middle School and Memorial High School followed shortly after.

About 1994, additional AS/400s were purchased and one was installed in each high school to help manage student data, although all data was centralized back to the main AS/400 in the Doyle building. By 1995, cabling of schools began using shared 10 MB hubs to network computers in labs and libraries. Eudora for email was deployed for all who requested access. Berbee staff helped enable Internet access for district work locations and consulted on the installation of the first district Web server. A interdepartmental committee was convened to help define Web publishing criteria and set standards. In 1997, GroupWise was first adopted as the email application for use by some administrators.

Efforts to purchase and deploy person al computers remained challenging, but the first Wisconsin TEACH block grant in 1998 provided needed funding to support desktop deployments. Also in 1998, many MIS staff had their focus redirected to prepare for Y2K, which was a significant issue due to the volume of accounting, human resource, food service and student data applications that existed at that time. Their efforts were extremely well managed and tasks completed very effectively such that when 2000 arrived all applications worked flawlessly.

By June 2000, the District had nearly 6,000 desktop computers and over 75 file servers. Additional TEACH block grants of $450,000 to $530,000 each year through 2003 permitted the purchase of additional and replacement computers. Collaboration between MIS and Building Services enabled telecommunications funding reimbursements through the eRate program of over $50,000 per year.

Despite reassignments and staff reductions during the 2000's, many software applications have been adopted, implemented, and supported, increasing the technical responsibilities of division staff. GroupWise was expanded from serving fewer than 500 staff to providing all 5,500 staff with accounts in December 2003. In 2004-05, the district moved away from the financial and human resources information systems to new applications including Lawson and the Kronos time management and reporting system. A Honeywell energy management system was installed across the enterprise. The IBM Tivoli tape backup system was deployed to manage archives of all primary enterprise application data. In 2006, the AS400 based student information was replaced by the implementation of a student information system (Infinite Campus), which greatly expanded the access of student data to instructional staff and parents for the first time. Electronic attendance, grading, and report card creation have been very large systems deployment projects since then. The special education student information system continues to be hosted on an IBM platform, now an iSeries (which replaced the AS400 in 2007). This system – commonly referred to as the GUI system (for graphical user interface, a Windows-like appearance – continues to be effectively updated and managed as rules and regulations change in special education. The GWArchive software was implemented as the archive tool for the exponentially expanding email database. Human Resources deployed the FingerPrint system for all new hires – required by law – in 2007. An employee identification card system was also deployed at that time. In an effort to minimize paper documents and make process flows more efficient the Westbrook-Fortis electronic document management system was implemented in 2008 beginning with the transition of all special education students' individual education plans (IEPs). These are a sample of technologies and applications that have been deployed within the ever-expanding technology operations of the district.

Beginning in 2003, 10 MB shared hubs were replaced with 100 MB dedicated switches. Work was completed in 2006 at a total cost of over $1.2 million. Network administration staff initiated the VMware virtual server environment in 2006. As a model for IT collaboration, the district partnered with City of Madison and Dane County information systems staff in creating a disaster recovery required redundant network operations center (NOC-2). Another model collaboration completed in 2008 was the use of City of Madison fiber to provide primary and redundant secondary access to the Internet at much reduced costs for the district. Electrical power, uninterruptible power supplies (UPS) and server racks were upgraded within the district primary network operations center (NOC-1) were completed in 2007 and 2008. The district's wide area network (WAN) across all school sites was upgraded to 50 – 100 MB data speeds between 2007 and 2008. The WAN between the Doyle Administration Building and the MMSD Pflaum Road location which houses Building Services, Administrative Services, and Food Services staff, was upgraded to 1 GB speeds. A pilot wireless deployment was begun in the Doyle Administration Building in 2008. Desktop computer inventory has grown to 9,100 and printers to 800. Two new elementary schools (Chavez in 2002 and Olson in 2008) were successfully opened with extensive use of technology applications and tools. Instructional technology initiatives requiring additional support include such things as the Scholastic Read180 and Project Lead the Way (PLTW) curricular programs, library upgrades, and deployment of digital projectors, document cameras and interactive whiteboards.

In June 2000, several veteran MIS managers retired and were replaced by only one director. At that time, MIS included three administrative managers one each for the areas of network operations, applications development, and micro-computing support. In addition MIS staff included a secretary, 12 micro-computing technicians, four operations staff, four electronic repair staff, six programmers and specialists, for a total division of 43 staff. Following a functional analysis of MIS in 2002, the Division was renamed the Division of Technical Services and the software application development and systems management and staff were reassigned to different district departments and divisions; student information systems to Planning/Research and Evaluation, financial systems to Accounting & Finance, and human resources systems to the Human Resources. During the period from 2002 to 2004 several additional MIS staff retired and replacements were generally not hired to fill vacancies due to the severe budget cuts facing the district. The electronic repair unit was also eliminated. By 2007, Technical Services had a 22 staff. In 2008, the Technical Services Division was reintegrated with the Planning/Research & Evaluation Division and the applications development and systems support staff from the Accounting & Finance Division and Human Resources Department . This new Information Services Department has 35 staff headed by a newly created Chief Information Officer position which was filled by the R&E Director.

With the additions of Chavez and Olson Elementary Schools, the district's total square footage has increased by almost five percent. During this same interval, the desktop computer inventory has grown from around 5,500 to 9,100, an increase of 65%. The district's server environment has grown from 75 physical servers to over 150 physical and virtual servers. Additional instructional and operational technologies continue to proliferate. Access to information for data-based decision making continues to grow year after year at all levels of the organization – classroom, school, department, administration, Board of Education – and within the community. All of these changes have occurred while staffing levels have been reduced. Within the Technical Services Division alone, district budget reduction pressures (primarily since 2002) have reduced technical specialist/enterprise staff by 25 percent and micro-computing technicians support staff – persons who provide direct face-to-face support for teachers, staff, and administrators - has increased only slightly from 12 to 14 full-time equivalent employees (FTEs).

History of Technology use in the Educational Services Department

Starting in the early 1990's, through agreements with MTI and the MMSD concerning the need to computerize IEPs, the Department of Educational Services, Division of Special Education furnished

schools with a limited number of computers to support special education and student services staff (teachers, clinicians, therapists, psychologists, social workers and nurses). Beginning with the 1997-98 school year, in anticipation of an electronic IEP program, an increase in the number of computer workstations was begun with the culmination of that plan during the 2000-01 school year. During the 1999-2000 school year, the GUI400/eIDEA computerized IEP system was first created to facilitate the completion of IEP programming forms and was expanded the following year to include all forms needed for the entire IEP process (evaluation, programming, placement and miscellaneous forms). Subsequent years continue to build on this system providing features for staff to review and manage paperwork completion and to inform staff of unique information about their students (e.g. WKCE test scores, students at risk of retention, transportation information, etc.) at both the teacher and administrative levels. Today, that system is the core of our many reporting systems for students with disabilities. To support this program, all elementary, middle and high schools are at a 1:1 ratio of FTE staff to computers, which represent 550 computer workstations in place in our schools and alternative sites, with every computer being less than 4 years old. These computers are dedicated to staff productivity and the completion of IDEA paperwork.

Beginning with the 2003-04 school year, the Department of Educational Services, Division of ESL and Bilingual Education, began the process of placing computer workstations dedicated to staff productivity. That process is ongoing.

Names and Titles of District Information and Technology Team

Name	Title	School/Department	FTE
Kurt Kiefer	Chief Information Officer	Information Services	1.0
Bill Thompson	Systems Programmer	Application Development and Support	1.0
Marcia Melotte	Programmer Analyst	Application Development and Support	1.0
Chris Burch	Data Analyst/Web Programmer	Planning/Research & Evaluation	1.0
Joshua Roy	Data Analyst/Network Specialist	Planning/Research & Evaluation	1.0
Tina Roehl	Data Specialist	Planning/Research & Evaluation	1.0
Tim Potter	Research/GIS Analyst	Planning/Research & Evaluation	1.0
Tom Larsen	Systems Support Specialist	Application Development and Support	1.0
Travis Grover	Systems Support Specialist	Application Development and Support	1.0
Jill Brown	Research & Testing Specialist	Planning/Research & Evaluation	1.0
Jeannie Retelle	Enrollment Specialist/User Support Specialist	Planning/Research & Evaluation	1.0
Judith Castro-Romaker	User Support Specialist	Planning/Research & Evaluation	1.0
Rick Johnson	User Support Assistant	Planning/Research & Evaluation	1.0

Teaching & Learning

Name	Title	School/Department	FTE
Lisa Wachtel	Executive Director of Teaching & Learning	Teaching & Learning	1.0
Paula Srite	Web Design and Desktop Application Specialist	Teaching & Learning	1.0
Kelly Pochop	Online Learning Facilitator	Teaching & Learning	1.0
Tina Krouth	Instructional Technology Specialist	Teaching & Learning / Educational Services	1.0

Educational Services

Name	Title	School/Department	FTE
Ann Yehle	Executive Director of Educational Services	Educational Services	1.0
Terri Regner	Program Support Teacher, Technology	Educational Services	1.0

Technical Services

Name	Title	School/Department	FTE
Mark H. Evans	Director of Technical Services	Technical Services	1.0
Vicky Woider	Technology & Library Support Technician	Technical Services	1.0
Richard Noble	Senior Programmer	Technical Services	1.0
Alex Blohowiak	Micro Computing Specialist	Technical Services	1.0
Dennie Jeanquart	Micro Computing Specialist	Technical Services	1.0
Dan Pruski	Micro Computing Specialist	Technical Services	1.0
Lynda Chen	Micro Computing Supervisor	Technical Services	1.0
Chris Stoner	Micro Computing Supervisor	Technical Services	1.0
Jeff Benzchawel	Micro Computing Technician	Technical Services	1.0
Kevin Blackmore	Micro Computing Technician	Technical Services	1.0
Brad Dins	Micro Computing Technician	Technical Services	1.0
Sam Espich	Micro Computing Technician	Technical Services	1.0
Garret Hagenbucher	Micro Computing Technician	Technical Services	1.0
Moses Her	Micro Computing Technician	Technical Services	1.0
Pascal Kampman	Micro Computing Technician	Technical Services	1.0
Brett Kinney	Micro Computing Technician	Technical Services	1.0
Paula Martin	Micro Computing Technician	Technical Services	1.0
Randy Otis	Micro Computing Technician	Technical Services	1.0
Kristopher Schlitz	Micro Computing Technician	Technical Services	1.0
Kelly Schuppener	Micro Computing Technician	Technical Services	1.0
Daryl Tessmann	Micro Computing Technician	Technical Services	1.0

Library Media Services

Name	Title	School/Department	FTE
Mark Lea	Coordinator of Information & Communications Technology	Teaching & Learning	1.0
Carol Kaufman	MSCEL Reference Librarian	Teaching & Learning	.50
Jill Linck	MSCEL Materials Clerk	Teaching & Learning	.80
Colleen Olmsted	MSCEL Selection Librarian	Teaching & Learning	1.0
Jan Opelt	LMS Program Assistant - Senior	Teaching & Learning	1.0
Anita Staats	MSCEL Circulation Clerk	Teaching & Learning	1.0
JoAnn Tiedemann	Cataloger	Teaching & Learning	1.0
Vacant	Video Library Clerk	Teaching & Learning	.50

Media Production & Distribution

Name	Title	School/Department	FTE
Marcia Standiford	Manager	Media Production & Distribution	1.0

Name	Title	School/Department	FTE
Deb Spaith	Production Coordinator	Media Production & Distribution	1.0
Mike Wetzel	Producer/Director	Media Production & Distribution	1.0
Lindy Anderson	Producer/Director	Media Production & Distribution	.50
Shelby Floyd	Producer/Director	Media Production & Distribution	.50
Bradley Mackey	Operations Technician	Media Production & Distribution	1.0

Library Media Specialists

Name	Title	School/Department	FTE
Nancy Engle	Library Media Specialist	Allis / Nuestro Mundo Elementary	1.0
Teri Gregory	Library Media Specialist	Chavez Elementary	1.0
Nancy Gloe	Library Media Specialist	Crestwood Elementary	1.0
Rose Ann Ableidinger	Library Media Specialist	Elvehjem Elementary	1.0
Tina Enemuoh	Library Media Specialist	Emerson Elementary	1.0
Kim Dahl	Library Media Specialist	Falk Elementary	1.0
Shannon Dolan	Library Media Specialist	Franklin Elementary	1.0
Nancy Kieraldo	Library Media Specialist	Glendale Elementary	1.0
Nicole Colburn	Library Media Specialist	Gompers Elementary	1.0
John Charles Roberts	Library Media Specialist	Hawthorne Elementary	1.0
William "Bill" Rettig	Library Media Specialist	Huegel Elementary	1.0
Pat Maniaci	Library Media Specialist	Kennedy Elementary	1.0
Gail Borchers	Library Media Specialist	Lake View Elementary	1.0
Jean Dunn	Library Media Specialist	Lapham Elementary	1.0
Mary I Connor	Library Media Specialist	Leopold Elementary	1.0
Patty Schultz	Library Media Specialist	Lincoln Elementary	1.0
Shirley Raymakers	Library Media Specialist	Lindbergh Elementary	1.0
Reeves "Pete" Smith	Library Media Specialist	Lowell Elementary	1.0
Mary C Clark	Library Media Specialist	Marquette Elementary	1.0
Amy Wilcox-Owens	Library Media Specialist	Mendota Elementary	0.5
Laureen Yoshino	Library Media Specialist	Midvale Elementary	1.0
Maureen Ellsworth	Library Media Specialist	Muir Elementary	1.0
Sheri Boser	Library Media Specialist	Olson Elementary	1.0
Andrea Schmitz	Library Media Specialist	Orchard Ridge Elementary	1.0
Michelle Olsen	Library Media Specialist	Randall Elementary	1.0
Judy Bremer	Library Media Specialist	Sandburg Elementary	1.0
Jamie Klubertanz	Library Media Specialist	Schenk Elementary	1.0
Patricia A. Hill	Library Media Specialist	Shorewood Elementary	1.0
Pete Dally-Steele	Library Media Specialist	Stephens Elementary	1.0
Marcia Thieling	Library Media Specialist	Thoreau Elementary	1.0
Mare Batchelor	Library Media Specialist	Van Hise Elementary	1.0
Pam Metzger	Library Media Specialist	East High	1.0
Peggy Ellerkamp	Library Media Specialist	La Follette High	1.0

Name	Title	School/Department	FTE
Lynn Glueck	Library Media Specialist	Memorial High	0.5
Kris Brown	Library Media Specialist	Memorial High	1.0
Anna Moss	Library Media Specialist	Shabazz City High	0.5
Ellen Pryor	Library Media Specialist	West High School	1.0
Anna Moss	Library Media Specialist	Black Hawk Middle	0.5
Laura Holt	Library Media Specialist	Cherokee Middle	1.0
Julie Weis	Library Media Specialist	Hamilton Middle	1.0
Eileen McGlynn	Library Media Specialist	Jefferson Middle	0.5
Elizabeth A. "Betsy" Weber	Library Media Specialist	O'Keeffe Middle	1.0
Alexandra Phelps	Library Media Specialist	Sennett Middle	1.0
Maureen Conklin	Library Media Specialist	Sherman Middle	1.0
Eileen McGlynn	Library Media Specialist	Spring Harbor Middle	0.5
Pam Hoadley	Library Media Specialist	Toki Middle	1.0
Kelli Ballwahn	Library Media Specialist	Whitehorse Middle	1.0
Amy Wilcox-Owens	Library Media Specialist	Wright Middle	0.5

Planning Committee Names, Titles and Representation

Members of the **Oversight Committee** and Madison Metropolitan School District Information & Communications Technology **Planning Committee** are:

Oversight Committee

Kurt Kiefer	Chief Information Officer
Lisa Wachtel	Executive Director, Teaching & Learning
Ann Yehle	Executive Director, Educational Services

MMSD Technology Plan Committee

Freddi Adelson	Coordinator – Health Services and ADA
Gabrielle Banick	Coordinator – Career and Technical Education
Lynda Chen	Micro Computing Supervisor, Technical Services
Mark Evans	Director, Technical Services
Mark Lea	Coordinator - Information and Communications Technology
Colleen Olmsted	Materials Selection Librarian
Julie Palkowski	Coordinator – Fine Arts
Tim Peterson	Coordinator – Science & Environmental Education
Kelly Pochop	Online Learning Facilitator (Madison Virtual Campus)
Terri Regner	Educational Services
Brian Sniff	Coordinator – Mathematics
Paula Srite	T&L Web Designer and Madison Virtual Campus Support
Marcia Standiford	Media Production Manager
Chris Stoner	Micro Computing Supervisor, Technical Services
Patty Weynand	Educational Services
Gretchen Wolfe	Coordinator – Talented and Gifted
Marcy Worzala	Educational Services
Mary Jo Ziegler	Coordinator – Language Arts/Reading

Overview / Description of the Planning Process

Insert Overview / Description of the Planning Process here

Adult Literacy

The primary focus of the Madison Metropolitan School District's adult literacy activities is a cooperative effort between the Literacy Network and the Madison Metropolitan School District. Some of this year's activities are described below:

Literacy Network and MMSD Partnership Programming

English in the Schools: English in the Schools (EIS) provides adult ESL instruction to the parents of children attending MMSD elementary schools. The overarching goals of EIS courses is to help parents

become more connected with their child's school and to become active partners in their child's education. In our partnership, Literacy Network hires experienced ESL teachers, provides curricula, and tracks student attendance and goals achieved. MMSD recruits ESL parents, provides onsite childcare during EIS classes, and provides classroom space.

Length of Course: 7-9 weeks
Time: Usually 6:00 – 7:30 pm or 6:00 - 8:00 pm
Days: Either T/Th or M/W
Dates: Usually mid-October to mid-December and from mid-February to mid-April
Place: Schools that provide EIS courses change from semester to semester.

Participating EIS sites in Fall 2008:

- Sherman Middle School (October 6 to December 10)
  MMSD Contacts: Sue Gorud
  Literacy Network Contact: Jen Sell
- Sandburg Elementary School (October 6 to November 19)
  MMSD Contact: Lisa Hepburn
  Literacy Network Contact: Jen Sell

Community Literacy: Community Literacy is designed to serve the parents of Glendale Elementary School students. Volunteer tutors work from lesson plans written by an intern employed and supervised by Literacy Network. Lesson plans are targeted to not only help parents better communicate within the school but to improve overall language ability as well. Michelle Borkevec, Glendale's Recreational Specialist, assists in the supervision of the program. Childcare is provided by Glendale Elementary School.

Length of Course: Weeks of October 13 through December 8 (9 weeks)
Time: 5:30 to 7:30 pm
Days: TBD
Place: Glendale Elementary School
MMSD Contact: Michelle Borkevec, Glendale's Recreational Specialist
Literacy Network Contact: Bailey Smolarek

A. Progress Towards Previous Plan Goals

The *2003-2006 Madison Metropolitan School District Information and Technology Plan* used NCREL's *enGauge Framework for Effective Technology Use in Schools* to organize its goals for the 2003-06 school years. The *2006-2009 Information and Communications Technology Plan* begins the transition from the enGauge model to the *Framework for 21st Century Learning* as recommended by the Partnership for 21st Century Skills (Kosma, 2008).

The four Goals and Objectives of the *2006-2009 Information and Communications Technology Plan* can be found described below:

Goal 1: Student Achievement
All students will experience a quality, standards-based, technology-infused education that maximizes learning and encourages connectivity, productivity and efficiency.

Goal 2: Staff Effectiveness
All staff will have immediate access to the technology needed to develop the skills necessary to effectively and efficiently enhance student learning as well as their own personal and professional growth.

Goal 3: Information Resources and Learning Tools
All staff and students will have access to the learning tools and information resources necessary to search, evaluate, analyze, manage, manipulate, communicate and construct information and knowledge in the teaching and learning environment.

Goal 4: Support Systems and Leadership
The District will put in place the necessary shared vision, staffing, policies, procedures, communications systems, infrastructure and resources to ensure that all students reach high standards.

A description of our progress to the achievement of the 2006 - 2009 goals can be found embedded in the following tables. Column one contains the goal or objective. Column two contains a description of some of the activities undertaken in an attempt to reach the goal in question. Column two also contains a recommendation concerning the necessity of continued pursuit of the goal. Column three contains a graphic describing the current estimated percentage of goal completion.

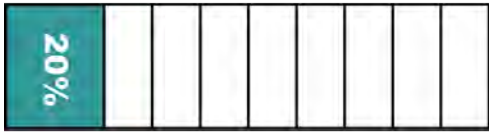
Goal 1: Student Achievement

All students will experience a quality, standards-based, technology-infused education that maximizes learning and encourages connectivity, productivity and efficiency.

Objectives are organized by the three fundamental educational issues they address

Acquisition of Essential Knowledge and Skills

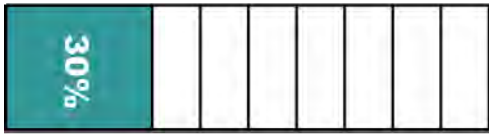
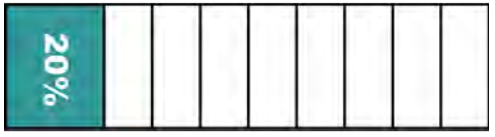
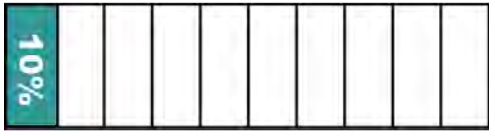
(The use of technology to support student achievement of Wisconsin Model Academic Standards)

Goal / Objective	Description	Objective Progress Status
1.1 Review, revise, or design content-area curriculum and assessment which leverage the use of up-to-date hardware and digital content. Focus professional development and technology resource investments to be able to integrate technology with classroom learning for enhanced student achievement.	In progress – Continued in next plan. Beginning implementation of Eclipse software, SRI Assessments, Read 180. Naglierie Assessments. Madison Virtual Campus online courses. LMC Computer purchases from CSF. Interactive whiteboard pilot. E2T2 competitive grant for READ 180,SRI and Lexile professional development.	
1.2 Design, implement and support project-based and inquiry-based instruction that engages students in real-world problems using the tools of technology. Design new ways of assessing the outcomes of such instructional approaches.	In progress – Continued in next plan. Flash animation course designed and offered. 8th Grade NCLB Technology Literacy portfolio project. Staff online communication and professional devolopment. Interactive whiteboard pilot.	

Workforce Preparedness: 21st Century Skills

(The use of technology by students to acquire: Technology & Information Skills, Higher Order Thinking & Problem Solving Skills, Teamwork and Communication Skills)

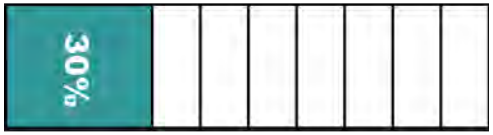
Goal / Objective	Description	Objective Progress Status

Goal / Objective	Description	Objective Progress Status
1.3 Integrate and implement a set of K12 ICT Literacy skills that includes managing complexity, problem solving, and thinking critically, creatively and systematically.	In progress – Continued in next plan. *Project Lead the Way* engineering courses. Grant funded Building Informed Citizens project.	
1.4 Integrate and implement a set of communication, information and research tools that allow users to access, manage, integrate, evaluate, create and communicate information.	In progress – Continued in next plan. Implementation of Moodle Learning Management System (LMS). IRTs introduced. Laptops for Principals, data retreats. Added Technology Integrator position. Infinite Campus. Introduction of Student Intervention Monitoring System (SIMS)	
1.5 Develop and implement the Information Technology options that should be a part of curriculum at elementary, middle and high school levels.	In progress – Continued in next plan. Identification and partial implementation of 21st Century skills model. Participation in WI eSchool Network. Career and Technical Education Pathways. Project Lead the Way expands into middle schools.	
1.6 Recommend and support personal development and productivity tools to enhance interpersonal and collaborative skills including self-direction, accountability, adaptability and social responsibility.	In progress – Continued in next plan. Electronic personal development plans (PDP) implemented. Project ReAL Grant awarded.	

Educational Equity, Options and Opportunity

(The use of technology to address the issues of: Time, learning style, individual and special needs, language, access, economic status, gender equity, geography, and educational options)

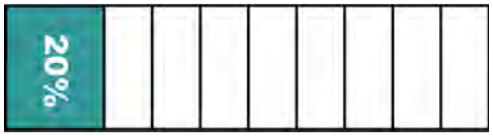
Goal / Objective	Description	Objective Progress Status

Goal / Objective	Description	Objective Progress Status
1.7 Expand the "virtual options" for students as a method of addressing the issues of equity, opportunity and individual needs.	Ongoing – Continued in next plan. Launch of Madison Virtual Campus (2007). Implementation of Moodle Learning Management System (LMS).	
1.8 Expand and support learning technologies for all students that address learning styles and unique needs. (Student categories include: language minority, special education, migrant, intervention programs, digital divide, at-risk, etc.)	In progress – Continued in next plan. Introduced online communication tools to underserved populations. Use of SRI, Read 180, and BrowseAloud software. Hardware upgrades at Alternative Program sites.	

Goal 2: Staff Effectiveness

All staff will have immediate access to the technology needed to develop the skills necessary to effectively and efficiently enhance student learning as well as their own personal and professional growth.

Goal / Objective	Description	Objective Progress Status
2.1 Design a set of online professional development options* that supports the needs of staff in the "early" stages of technology use so that they can: • acquire content knowledge, • learn administrative processes, • access professional development through technology.	In progress – Continued in next plan. Professional Development (PD) Options designed: Online awareness course, Elluminate professional development module, and introduction to Moodle course.	
2.2 Design a set of online professional development options* that addresses the needs of staff in the "transitional" stages of technology use so that they can: • integrate the application of technology skills into teaching strategies, • work on advanced certifications or credentialing	In progress – Continued in next plan. Professional Development (PD) Options designed: Online facilitation course.	

Goal / Objective	Description	Objective Progress Status
2.3 Design a set of online professional development options* that addresses the needs of staff who have attained the "21st Century Skills" stage so that they can: • act as facilitators, resources, partners and role models in the application and use of ICT literacy skills, • access professional development through ICT Literacy Tools when applicable.	In progress – Continued in next plan. Designed but not completely implemented. Drupal and Infinite Campus Student Information System (SIS) online professional development tutorials developed.	

* Professional Development Options address the use of technology for student success, educational management, and enhanced productivity and efficiency. This includes: content, delivery format, skill sets, assessment, teaching strategies, research & best practices, compensation, etc. (Design School and District Collaborative Models that utilize technology to nurture professional communities characterized by shared purpose and collective responsibility for student achievement.

** Staff includes all MMSD staff including instructional, administrative, clerical and support staff.

Goal 3: Information Resources and Learning Tools

All staff and students will have access to the learning tools and information resources necessary to search, evaluate, analyze, manage, manipulate, communicate and construct information and knowledge in the teaching and learning environment.

Ubiquitous Access:

Goal / Objective	Description	Objective Progress Status
3.1 Insure the availability, range, ease of access, quality and robustness of: • technology tools (equipment, infrastructure, etc.) relating to learning and working needs, with adequate ratios and speed for "anytime, anywhere" and collaborative learning. • information resources that are adequate to meet performance needs for knowledge construction, collaboration, assessment, information production and complex thinking for "anytime, anywhere" learning (collections, web resources, software, data, etc.).	Ongoing – Continued in next plan Improved infrastructure and Internet connectivity levels. An abundance of online database subscriptions.	

Data Management:

Goal / Objective	Description	Objective Progress Status
3.2 Improve the ability of staff to manage data and make data-driven decisions regarding curriculum, instruction, professional development, student needs, etc. by exploring advanced technologies which allow for the efficient and cost-effective collection, analysis, and use of data.	In progress – Continued in next plan. Implementation of Infinite Campus SIS, Eclipse and Student Intervention Management System (SIMS).	

Goal / Objective	Description	Objective Progress Status
3.3 Implement the new student information system to allow for: • extended data access • "process efficiency" improvements • alignment of lessons, assignments, and assessments by academic standard • reporting of student progress by academic standards.	Ongoing – Continued in next plan. Implementation of Infinite Campus SIS, Eclipse and Student Intervention Management System (SIMS).	

Asset Management & Procurement:

Goal / Objective	Description	Objective Progress Status
3.4 Refine the electronic-media evaluation process that seeks out high quality, standards-based digital curriculum for productivity and instructional support that is customer-friendly, efficient, and standardized.	In progress – Continued in next plan. Revision of Evaluation of Learning Materials (ELM) process begins in 2008 school year.	

Goal 4: Support Systems and Leadership

The District will put in place the necessary shared vision, staffing, policies, procedures, communications systems, infrastructure and resources to ensure that all students reach high standards.

Leading and Managing:

Goal / Objective	Description	Objective Progress Status
4.1 Develop and implement an integrated DISTRICT ICT SYSTEM with services and operations that are connected with seamless integration to departments. This includes periodic reviewing/updating and monitoring of: • Technology standards for computers, peripherals, AV equipment, network infrastructure, etc. • Adequate and reliable structural, electrical, telecommunications, and network capacities • Technology allocation and deployment • Technology policies • Communication plan regarding ICT initiatives/resources/progress • Technology funding strategy • Technology support system (technical and curricular) • School-level technology leadership • Progress toward Technology Plan implementation	Ongoing – Continued in next plan. Position of Chief Information Officer (CIO) created to oversee Information and Technology services and operations.	

Partnering:

Goal / Objective	Description	Objective Progress Status

Goal / Objective	Description	Objective Progress Status
4.2 Expand, extend, enhance, collaborate, strengthen, and participate in a parent/community digital communication system that supports information sharing (online assignments, email, weblogs, podcasting, etc.).	In progress – Continued in next plan. Implementation of Infinite Campus (IC) SIS. Parent Portal at middle and high schools. Moodle parental portal in development stage. IC Campus Messenger implementation.	
4.3 Continue to increase the number of partnerships and the quality of dialogue between school, community and post-secondary institutions to insure that school learning goals are aligned and coordinated with community/state goals and adult literacy opportunities.	Ongoing – Continued in next plan. An abundance of partnerships with higher education institutions community groups, and literacy providers (e.g., Literacy Network, Early Childhood initiative). System-Wide Change for All Learners and Educators (SCALEnet) participation. Private sector cooperative relationships.	
4.4 Continue to increase the amount and quality of work with community agencies to ensure that students have convenient access to equipment and the digital resources necessary to take advantage of learning opportunities outside of the school day.	Ongoing – Continued in next plan. Partenership with Lussier Community Education Center. Cooperative arrangements with other neighborhood centers.	

B. Assessment of Current User Needs

Feedback Summary - Overview

A technology survey was sent to staff, administrators, parents, and students between November 2008 and January 2009. The survey was sent as both an online survey as well as in paper form upon request. Several groups of parents were targeted to receive paper versions due to their lack of Internet accessible computers. Parent surveys were translated into Spanish and Hmong. Responses were quite high.

Instructional staff – 973
Instructional Administrators – 64
Parents – 1,138
Students (grades 6-12) – 552

In addition to the surveys several focus group listening sessions were held between November 2008 and March 2009. All together over 300 persons participated in these sessions. The groups that participated included:

- Technical Services staff
- Principals – Elementary and Secondary
- Teachers – Computer contacts, Infinite Campus teacher contacts, business education and computing course teachers, REACH Teachers, alternative program staff
- Library Media Specialists
- Student Services – Guidance Counselors, Psychologists, Social Workers, Nurses
- Students – Student Senate, Southeast Asian Student Leadership Group, Minority Student Achievement Network Student Leadership Group
- High School Department Chairs
- Middle School Learning Coordinators
- Parents – Four sessions held at each high school, Hmong parent empowerment group (Bayview)
- Business Partners – Powered Up, Business Education Partnership, Wisconsin Technology Council
- Building Services
- UW researchers and faculty
- MATC faculty and staff
- Minority Community – Business Diversity Roundtable, LaSup, Superintendents Human Relations Advisory Committee

The key points provided from the spectrum of stakeholders included:

- More funding dedicated to technology acquisition, integration, and support than is currently provided is critical

- Access for all, recognizing that access is not equal inside or outside of schools and that schools should be a place where equity can be addressed

- Professional development for teachers to integrate technology into their curriculum and instruction

- Create a core technology infrastructure in all schools that includes such things as wireless in high schools, middle schools, and elementary schools – at least in common areas such as LMCs and study hall locations; ensure the network architecture remains up-to-date and able to manage capacity growth

- Teachers and instructional staff should have access to basic computing technology such as a wireless laptop with remote access and display tools, e.g., data projectors

- Promote the use of handheld mobile Internet accessible devices and web-based software for instruction and operations (rather than prohibit their use)

- Encourage web 2.0 tools including wikis, blogs, social networking, and cloud computing especially as it relates to student engagement, enhanced self-assessment and self-directed learning, differentiation of learning, student-teacher-parent communication, and productivity

- Integrate digital curriculum in all areas including such things as video, audio, podcasts, simulations, animations, etc., and make these resources retrievable by all staff in an easily accessible repository

- Promote the use of a learning management system such as Moodle across all instructional staff

- Open the schools to the community for purposes of increasing technology access, create partnerships for service delivery with community agencies, higher education, and businesses

- Create structures within the district to research technology purposefully and constantly, using all stakeholders including administrators, instructional staff, support staff, students, parents, and community partners

- Dedicate more support to teaching staff how to use basic technology tools such as keyboards, email, calendars, word processing, and spreadsheets

- Constantly review process efficiencies that can be gained from the use of technology in all functions of the district saving time, energy, money

Feedback Summary – Instructional Staff

Nearly all instructional staff regularly check email, nearly ninety percent use a desktop computer, and over sixty percent use a laptop. More than one of every three MMSD instructional staff reported they use technology for grading, attendance, and/or doing research. Similar percentages use an MP3 player or iPod. Almost one third of instructional staff reported having taken an online class. One out of five instructional staff use wikis, blogs, or maintain social network profiles. Instructional staff report that their most significant barriers to using technology in their work are access to up-to-date technology, both in terms of computers and Internet speeds. Site blocking and filtering as well as the quality of software resources are considered barriers to instructional effectiveness.

Not surprisingly, instructional staff indicated that the most important 21st century skills for students to master were information based including an ability to conduct research, evaluate relevance of resources, identify/locate information sources, and to organize information. Over half cited the ability of students to evaluate their own work as critical to their learning, and yet less than one third of the instructional staff considered a student's ability to create a blog as critical. This is interesting to note because blogging has been identified as a means of leveraging technology specifically to facilitate self-assessment and reflection. Similarly, when asked what value mobile learning devices such as smart phones, MP3 players, and PDA's have to students, few surveyed instructional staff reported any value.

The most prominent technology tool uses in Madison classrooms, all of which are used by less than half of the instructional staff, are for lesson and assignment organization and supplemental skill development. The most commonly desired technology tools were basic things such as classroom computers and display projectors. Less than one in six, and in many cases less than one in ten, MMSD instructional staff report using any of the following tools in their classrooms: game-based environments, podcasts/video (iTunes, YouTube, etc.), real-time data (e.g., weather, NASA, etc.), simulations, online textbooks, animations, and virtual labs. The digital resources instructional staff do use today are things they found on their own rather than being suggestions provided by district support staff. Barriers instructional staff cite to integrating technology in their classrooms are primarily focused on funding for technology acquisition, student access to the technology outside of school, and class sizes. Outside of funding, instructional staff cited student access to the technology outside of school, their own professional development, and the district's ability to provide on-going technical support as the key factors in creating an effective technology-embedded learning environment.

These findings point out some key issues to be addressed in this plan. First, the feedback from staff directly supports the contention that we "don't know what we don't know." The perceptions exists that teachers may not be aware of new technologies or how technology directly benefits student learning because teachers believe that acquiring new technology is not possible in MMSD. It underscores the need to build familiarity with emerging technology tools via professional development in the context of the learning environment in order to maximize their utility. Hope is not lost either. Over one quarter of the teacher respondents indicated an interest in learning more about learning management systems like the open source Moodle software application. They want to use emerging technology tools to better themselves in their profession. Roughly half of all respondents indicated they wanted to collaborate online with each other using the tools, preferably in partnership with a graduate level course. Our challenge is to create a means to do so and also on a job-embedded, daily basis.

There must be attention paid to providing access to a sufficient quantity of computers for students on reasonable turnover rate to assure they are contemporary and useful. Teachers should have access to a newer model of computer, preferably a laptop which allows remote access into their network files, and on a relatively frequent turnover rate. In general, basic classrooms should be equipped with or have very ready access to data projectors, speakers, a microphone, document cameras, digital still and video cameras, and video and editing software. Teachers should also have access to a flash drive and an iPod. Interactive white boards and student response systems should also be explored.

Students need to be taught and allowed to be self-directed learners particularly in light of technology tools. Student can figure technology tools out as fast as or faster than teachers. Consideration should be given to moving most computers into classrooms as opposed to labs. More importantly, emphasis should be placed on providing wireless access in the most effective manner possible within each school. Wireless mobile carts provide a potentially useful solution. A cart might be shared across a few classrooms. Handheld mobile wireless devices such as iTouches and netbooks are another potential alternative to desktops and labs. One-to-one student to computer ratios may not be needed, but wireless access and mobile devices are needed for everyone.

Certain instructional support areas also feel the need to update their technology environments from the current state. Each high school's Career Resource Center should be equipped with enough computer workstations to accommodate at least one full classroom of students (i.e., 30 computers), one high-lumens data projector, and a student-response system. Counselors should have access to a wireless laptop with remote access, and possibly handheld wireless mobile devices. Productivity tools are essential to these staff including the professional development and use of software including word processing and spreadsheets, calendar and scheduling tools, the new web content management system, and use of merge form document and ad hoc reporting tools with the student information system. Counselors also place a

premium on continuing to improve and update decision support systems that provide access to the data needed to make school and student instructional improvement decisions. They also feel that multi-function workstations be created and held within common meeting spaces for collaborative purposes such as building teams. Counselors also advocate for the focus on student learning in the 21st century through such vehicles as the National Career Clusters Model. Counselors also made a point of aggressively collecting email addresses from parents as a means of enhancing that option for improving home-school communication.

Other student services support staff reported specific needs of their own relative to technology. These staff include the social workers, psychologists, and nurses. One specific technology they would like to use for an organization/productivity stand point as well as an emergency response purpose are smart phones with access to the student information system, email, and calendar scheduling. Specifically as it relates to health records, there is interest in eliminating all paper and moving solely to electronic records, and eliminating redundancies where they exist in data management and forms. This group would also support the need for multi-function workstation/presentation tools to use in team meetings. These staff also cited the need for professional development locations that have access to computer labs as well as for remote conferencing so staff would not need to leave their work locations in order to meet with each other. They also indicated a need for cordless handset for their office phones so they may walk away from the base unit and still take a call. This group also called for maintaining up-to-date productivity software so file sharing is easily accomplished across agencies, e.g., upgrading Microsoft Office more frequently. Like counselors, these student services staff also emphasized the need for up-to-date decision support tools. Student services staff also stressed the need to be able to document interventions being deployed with students in a useful yet efficient manner.

Teachers need support when learning technology tools. Professional development needs to be self-paced learning in a collaborative environment built around the individual needs of each teacher within the context of what they teach. A technology coach should be considered at each school to serve as a facilitator of their learning, a person with deeper technology skills but also sound teaching skills. Students should also be brought into the professional development process to help teachers learn the tools while teachers simultaneously observe how the students engage with the tools. Topics should include both instructional and productivity tools, and should range from beginner to advanced skill levels. School year sessions are needed, but should be augmented by summer sessions and perhaps a showcase conference where new ideas are shared. Access to technology tools should be used as an incentive as should a program established with a university or college for credit. Emerging technologies should be identified as professional development priorities through a collaborative research and development process between the instructional and technical staff. A professional development plan should be multi-year and model growth in skill development over time.

Instructional staff require that technology tools be available and working when they need them for instruction. They currently believe that support is inadequate to address the growing amount of technology within schools, e.g., desktops, laptops, data projectors, document cameras, interactive white boards, video cameras, audio tools, a growing amount of software applications, etc. Students serving in support roles should be explored to some extent within appropriate situations.

The technology provided through schools should be available to everyone in the community through expanded school day and school year efforts. This is particularly critical to create equity in access to technology for families and households – with and without school-age children – in our community. Adult technology literacy courses should be taught in our schools.

Funding must be sustainable for technology in order to plan for the future. Multiple sources should be used including operating budget funds, grants for one-time projects, the foundation fund, local and

national business project partnerships, and a technology fee much like the textbook fee. The District should examine how we can create the most efficient technology acquisitions including leasing, collaborative purchases across multiple districts, and buying the technology option that best matches the learning need without spending for more than is needed. Certain technologies can help reduce support costs and should be identified as priorities such as web-based software applications (rather than client-based software) and thin client virtual computers.

Feedback Summary - Instructional Administrators

Instructional administrators use technology routinely in their work. Cell phones and smart phones are common among them. Computer use, and in particular laptops, are used by almost all. Over half report using other digital devices, e.g., MP3 players and iPods. Instructional administrators are less likely than instructional staff to have used web 2.0 tools like wikis, blogs, and social networking.

An administrator's key focus issue is how best to serve a diverse student body. The critical technology challenges facing the district in the eyes of Instructional administrators is technology tool and infrastructure funding and staff professional development. According to instructional administrators, access to affordable mobile technologies and the Internet are the most significant barriers to providing 21st century technology to all students. Over 90 percent of Instructional administrators responded that effective implementation of instructional technology is core to our district's mission.

According to our instructional administrators, mobile devices hold significant potential for creating more engaged students within the learning environment. Students should be encouraged to use web 2.0 tools to collaborate and communicate, create new work, and publish their work for others to review including their teachers, peers, and parents. A majority of instructional administrators responding to the survey reported that we are not currently doing a good job preparing our students for jobs of the 21st century.

Instructional administrators consider the most critical technologies to deploy within our schools to be wireless access, access to mobile computers for both students and teachers, digital display tools like interactive white boards. Instructional administrators believe that interactive simulations, digital media tools, and animation are the tools teachers could most effectively incorporate into instruction and to promote student learning. They also strongly support using open source tools when they are available and appropriate. Teachers must be provided opportunities to learn about these new tools and how to embed them into their curriculum to augment best instructional practices.

Principals strongly emphasize the need for professional development in the area of technology. Staff should be taught what technology is available and what the instructional possibilities are so they can dream about how to improve their instructional program using technology. If they don't know the possibilities staff can certainly never implement them. According to instructional administrators, beyond an introduction to ideas, professional development must be job-embedded, e.g., within literacy, within math, within science, etc. Time must be created for this either during the school day, after it, and/or beyond the school year. The experiences must be shared among the entire district both digitally as well as face-to-face via showcase conferences. Instructional administrators insisted that whatever technology-related professional development occurs that it be job-embedded and on-going (i.e., not "single shot" sessions). For example, introduction and use of a new technology should relate directly to and complement instruction in a specific discipline, e.g., literacy, math, science, etc. The professional development must also assure that every staff member meets a minimum level of technology proficiency, e.g., email, word processing, Internet navigation, etc., be knowledgeable about how to work efficiently using technology, and how to keep students safe using the Internet.

According to the instructional administrators we should encourage ground breaking on the part of staff that are inclined to research and adopt leading edge technologies. These leaders should then be allowed to showcase what they have learned with other teachers so that the technology can be distributed more broadly across all schools and classrooms. An annual conference concept connected to the professional development opportunities would be one model. Principals also stated that shared repositories of instructional resources must be used, grown, and enhanced. Resources include lessons, units, assessments, and instructional materials. Teachers must be afforded opportunities and time to contribute to the repository as well as to learn how to extract from the repository and integrate the resource effectively in a standards-based manner.

Instructional administrators report there is the need to have a base level of technology in each classroom for teacher and student use. Principals felt that staff should have access to up-to-date computers, preferably wireless laptops with remote access into work files stored within the district network. Elementary principals feel that a base level of technology would include having access to an up-to-date desktop or a laptop for each teacher. The base technology would be augmented by more technology that could be deployed on an as needed basis depending on instructional needs. Wireless laptop carts were an example of an “as needed” technology solution. A school might have one, two, or three such resources that can be shared across classrooms. The type of laptop suggested by the elementary principals could be the newer mini-laptop models (also known as netbooks) being produced more and more by a variety of manufacturers. These models are robust, sturdy, and surprisingly powerful for their size. It would be best to have the cart outfitted with other needed resources for the instructional lesson including a display tool (e.g., data projector or document camera) and a printer. The wireless mini-laptops might also be useful on a check-out basis for students to encourage use beyond the school day. Another idea generated was to have wireless access points in one or more locations within each school such that the laptops could be used outside classrooms for specific project purposes.

Middle and high school principals indicated that while a laudable goal would be to have a laptop for each student, the minimum should be five laptops and one printer per classroom. This provides a sufficient amount of computers to perform the most basic technology-based instructional tasks. They felt that wireless access was important to provide the maximum flexibility for the instructional program, and that one portable wireless lab per grade level would begin to accommodate this goal. Wireless computer labs are needed to augment the base number of computers for other instructional efforts that require all students within a classroom section to be utilizing the computers simultaneously. Middle and high school principals expressed a desire to have engaging presentation and display tools in every classroom via at least technology format including interactive white boards, data projectors, document cameras, and flat panels. They also felt that more printers are needed along with the funding for materials, i.e., toner, ink, etc. Technologies that improve presentation and engagement such as interactive white boards, e.g., Smart boards, student response systems, i.e., “clickers,” document cameras, e.g., Elmo, and data projectors were a high priority of the elementary principals. These technologies, or some combination of them, should be accessible to every classroom according to the principals.

Elementary principals also shared that they need to continue to develop their technology skills, both in terms of instructional tools as well as administrative productivity tools. They expressed a desire for on-going professional development for GroupWise, Excel, PowerPoint, importing data, and "beyond the basics" word processing. The principals felt that a variety of options should be created for this professional development including Monday afternoon early release time, after school, and online courses and tutorials. They felt that as principals they needed laptops and smart phones in order to provide maximum flexibility and productivity.

Instructional administrators felt that we needed to continue to rely on software that helps us track and understand students in our schools, and how best to serve them. Examples included Infinite Campus and

SIMS. However, the software must continue to evolve to not only improve the quality and usefulness of the information, but also in terms of the efficiency in using it.

Attention must be given to curriculum specific technology tools such as Venier weather sensors in science and geographic information systems (GIS) in social studies. Special education needs would be better met with more assistive technology software, e.g., Dragon Naturally Speaking or voice activation tools. Schools should also be encouraged to create electronic portfolio tools for all students and request that the software and electronic file spaced be established for this initiative.

Each school needs at least one space to serve as an interactive computer conference room for holding Individualized Education Program (IEP) meetings and professional development sessions with distance network access that includes web cameras. In addition, it was recommended that a welcome center be created at each school with sufficient digital tools to meet the needs of families doing business with the school. The security system would also be updated and integrated with these technology-based physical plant improvements.

In order to address the technical support needs of additional technology, each high school must have a dedicated technician. Middle schools would require one half-time technician, with some allowance for school size. Each school should also have staff dedicated to instructional technology integration, coordinating the project-based professional development of their colleagues implementing new technology solutions in their instructional programs.

Feedback Summary - Parents

In general, parents responding to the survey found that in most areas the current use of technology in district schools was not acceptable. A large proportion (over one third of respondents) is not even familiar with the technology resources available to their children in school. The highest level of acceptability was in the area of Internet safety and information privacy. Over 90 percent of parents responded that effective integration of technology into instruction was important to their child's success. Parents responding to the survey firmly believe that the successful use of technology in their child's instruction relies on having teachers who understand the technologies and how to integrate these into daily work. They go on to report that the most effective means of delivering the technology instruction to their children is having it embedded on a daily basis within the regular instructional practice, rather than teaching it as an "add on" outside traditional subject areas.

When asked what technology investments they would make in schools, parents responded most frequently with tools that help students organize their work, school web portals, and computer projection devices (e.g., data projectors). They also reported several other technologies as high investment priorities including high tech instruments for science, online textbooks, interactive white boards, laptops for each teacher, and digital media and tools such as databases and animations.

Nearly half of all parents responding to the survey feel that allowing use of mobile devices in school would benefit by engaging students in their learning. Yet even parents are unfamiliar with the evolving technology tool set. When asked what skills would be most important to master for the 21st century only one fourth of parents reported the ability to produce blogs, podcasts, and videos. This is most likely because few parents are yet familiar with how these tools can be leveraged to enhance best instructional and learning practices. The technologies are simply still very new.

Parents' chief concern about Internet use is their child's safety and security. Nearly two thirds report this as their greatest concern. Over 60 percent of parents reported that affordable, high-speed Internet access

to homes, schools, and businesses should be a national priority. When access is not available in the home, it is primarily due to the lack of financial resources to make the upfront purchase of a computer and then the on-going cost of Internet access fees.

One of the primary points made in the parent feedback sessions is that if we teach good teachers how to effectively use technology, then it will make them even better by enhancing and extending their careers . Parents encourage spending generously on teacher professional development – as much as the expense of the technology itself. Teachers must have access to the time and tools needed to make technology come to life in classrooms. Teachers need to understand the basics of technology and how they work. From that basic understanding, teachers can be prompted with the possibilities for how they might apply a given technology to enhance their current instructional methods. Teachers should be helped to integrate the technology with staff that are expert and create opportunities for them to showcase their work to their peers. Simple sessions could be provided to teachers that explain what technologies are and how students use them. The sessions might even be led by the students! We should teach teachers about what students like to do with technology rather than to expect teachers to learn a specific set of steps or procedures, e.g., What is Google spread-sheeting? How does it work? Why would students use this? Support for teachers using technology should be extensive and accessible when they need it (i.e., 24/7).

Parents stated that technology use should be embedded within teaching content, e.g., literacy, math, science, arts, and not outside of that as a separate course, unit, or lesson. Technology should enhance learning and not replace it. The initial step is to declare the learning goals and objectives and then determine how technology can support and complement the process by which students meet those goals and objectives. For example, podcasts could be used to supplement reading experiences and not replace learning to read, i.e., literacy must be the key and not the technology.

In the listening sessions, parents want schools and classrooms to be provided a core level of sound hardware for equity reasons and to provide a baseline set of tools for 21st century learning, regardless of what students bring/not bring with them. Many students from middle and upper income households have this access while some students from lower socio-economic incomes do not. Public schools should be considered a primary source for technology access for all students. Every student should have a mobile device for browser access. Equal access is essential for equity reasons. However, do not assume that students from lower income households do not have access to technology at all. For example, such students send text messages by phone as often as other students. Schools and classrooms need basic, up-to-date technology tools such as laptops for teachers, display tools like data projectors and document cameras, and a reasonable number of classroom computers for students. Teacher access should be a higher priority than students, followed by students who do not have access other than that which could be provided by the schools. The physical setting would include limited wireless access in common areas (e.g., LMC's, study halls) and/or on wireless carts that travel to classrooms. While the ideal would be a laptop for every teacher and a laptop/netbook for every student, access, efficiency, and equity might be initially achieved among the student population using a hardware checkout program within each school.

Key technologies to incorporate are those that engage students, e.g., games, simulations, video streams, and audio podcasts, student response systems, efficient tools like netbooks, those that provide access where its needed like wireless hubs and labs on carts. The district should prepare to utilize/incorporate student-owned devices like iPods/MP3 devices and smart phones because this extends the technology capacity of the schools and serves to engage the students as learners. Students should be encouraged to use technology, not discouraged. A review of cell phone and Internet mobile access technologies and policies is needed.

Parents in feedback sessions reported that the students will drive technology tool choices by their interest. We should trust students to help lead us in these decisions. Parents recommend also using students to

support some of the technology tasks required of schools. For example, allow students to learn to use content management systems and wikis to update school web pages as part of their coursework, e.g., high school students maintain elementary school web sites. This would create a win-win situation where schools have their content updated and students learn important skills. Similarly, students should be provided enhanced opportunities to have work experiences within contemporary careers to build familiarity with how technology is integrated into all occupations. Students should be leading our decisions regarding "which technologies." It is inevitable that they are the ones who will make these decisions for themselves anyway. Schools should follow their decisions in order to leverage the students' interests to accomplish learning goals and objectives. We should trust the students on these matters. The district should create formal venues or forums where students can give this feedback to administrators, teachers, and parents.

Parents encouraged constructive student use of social networking and communication tools. Many students have access to mobile digital resources such as cell phones and iPods, including students from low-income households. Many students also access web 2.0 resources such as social networking sites and use electronic games outside the school setting. To the extent instruction can leverage these tools, students become much more engaged as learners and achievement can be positively impacted. We should not run from technology tools like social networking because, in the end, students are going to use them. We need to teach students how to use the tools responsibly, and leverage these tools to create authentic learning environments. We should not let fear drive decisions regarding the use of the tools, but focus on the potential good that can be created. Parents stated that learning management systems like Moodle can be used to facilitate and organize learning between the teacher, the student, and the parent. Messaging systems that encourage home and school communications are critical to keep parents involved in the learning process, and all parents can access cell phones and text messages.

Many parents stated during the feedback sessions that universal high-speed Internet access is critical for the entire community. The best scenario is a city-wide broadband service that is little or no cost. Schools should have the technology available for those students that do not have access, and allow those who have access to use their own tools. Schools should be "open for business" after 3:30 pm each day until 9:00 or 10:00 pm, and encourage parents and the community to use these resources. Parents strongly advocated that the district provide access to tools and professional development on the tools, perhaps in conjunction with other agencies and organizational partners. Greater emphasis must be placed on creating innovative and engaging practices that draw parents into the schools or bridge schools to the community facilities, e.g., neighborhood centers. Technology efforts can be one vehicle for building such relationships via community learning activities. Courses that students and parents can take together could be offered in the evening or on weekends. After school programs should make use of this robust technology in the schools, too. Involving parents with learning and understanding of technology being used by students should be a key goal. In addition, partnerships must be made much stronger with local corporations and other community organizations in terms of achieving the district's technology goals.

In addition, parents participating in discussions encourage the community to join in the development and deployment of curriculum that exposes students to information technology career pathways. This does not simply mean computer hardware and networking, but also includes graphic design and communications. They felt that the district should allow the professionals to bring the "cool" factor into the curriculum. The skills students need remain the same – internet browsing, email, word processing, spreadsheets, presentation, database manipulation, media manipulation, and publishing. Simultaneously, it is important that we keep students safe in regard to potential risks when using these tools.

Schools staff and students would be more efficient with access to their information anywhere they can access the Internet. Hence, file sharing environments such as Google Docs, Moodle, and Elluminate Live should be explored. Consistency in software both for curriculum and administrative purposes is more

efficient as it relates to support requirements. Students would be more efficient if they had access to laptops or netbooks within a wireless environment in the school, enabling them to accomplish work while in study hall. They same efficiencies are created for staff in wireless environments. Processes that improve the efficiencies of tasks involving parents should be encouraged such as converting to electronic documents and paying fees online as opposed to continuing with paper documents.

Feedback Summary - Students

Technology tools are very common among students in grades 6 through 12. Nearly two thirds of the students responding to the survey indicated they use a cell phone, and another 16 percent use a smart phone. Three quarters use a desktop computer and over half use a laptop. Almost 85 percent use an MP3 player or iPod. Just under three quarters of students have a gaming system, and over half have a handheld game. Most (75 percent) report having high speed Internet access in their homes, while 13 percent have slower dial up access. Only five percent reported having no home access to the Internet.

Most students use technology for schoolwork by completing writing assignments or doing research on the Internet. Over half of the students reported using email and accessing their class information online as other means of school-based technology. Slightly less than half of the students reported using technology to create slide shows, videos or web pages. Between one third and one quarter of students reported using technology to play educational games, take tests or quizzes online, or uploading information for class assignments. The use of blogs, wikis, and podcasts for school is very infrequent, generally less than one in twenty students.

Students reported that the primary reasons for not using technology in schools, beyond having enough time, are teachers' lack of knowledge about the tools, policies, and rules that block access to the Internet and technology tools, and slow Internet access. Less than one in twenty of the students indicated their lack of skills as being a barrier to using technology for educational purposes. Students indicate that they would most likely use mobile web technology tools to conduct research, collaborate with their teachers and classmates, and to keep organized by use of reminders about assignments, tests, and quizzes. When asked what the single most effective strategy would be to encourage students use of technology tools in schools it would be to allow them to use their own technology devices, which was cited by two thirds of students responding to the survey. The second most frequently cited strategy is to allow them to access their schoolwork from any Internet accessible computer, i.e., web-based digital curriculum.

Just over half of the students reported either having taken an online class, researching options, or being interested in taking a course in the future. Their primary reasons for being interested in online classes include possibly receiving college credit, taking courses not currently offered face to face, allowing them to work at their own pace, and to obtain support from others online. They also indicated it would allow them to take control more of their own learning and to ask for help more comfortably.

Students' primary use of web 2.0 tools are email and communication (53%), social networking (40%), participating in online games (39%), and uploading or downloading podcast and video files (37%). Students feel that integrating technology into regular classroom work is the best way to learn it as well as by learning it on their own. A majority of students continue to rely on their teachers, librarians, and their parents to help them determine credibility of digital resources.

Students are still very focused on their basic needs even in a technology emerging culture. When asked in the survey what they would want principals to focus on to ensure all students were successful, they stated students' safety, listening to students' ideas, and treating all students equally and with respect.

When asked what types of technologies they want in their schools, students responding to the survey indicate they want it all. It is quite possible that even the lower rated items are simply low due to a lack a familiarity with the tool as opposed to disinterest.

Laptop for each student 61%
Communication tools (email, IM, text messaging) 58%
High tech instruments for science 57%
Digital media tools (cameras, video, audio) 56%
Wireless in the school 56%
Online textbooks 55%
School portal 54%
Digital resources (databases, videos) 53%
Computer projection devices (data projector) 51%
Laptop for each teacher 51%
Interactive whiteboards 51%
Games or virtual simulations 50%
Online classes 49%
Mobile devices (cell phone, MP3 players) 48%
Handheld student response systems 47%
Tools to help organize my work 47%
Unlimited student access to the Internet 46%
Document camera 44%
Collaboration tools (blogs, wikis, etc.) 40%
Videoconferencing 36%
Tablet PC for each student 34%
Learning management systems (Moodle) 29%

The students participating in feedback sessions referenced many different approaches to create engagement in the classroom. Suggestions included simulations, animations, and video. There were several comments about specific technologies, e.g., interactive white boards, primarily as they represent augmenting the engagement of students. Other specific suggestions focused on science and math technology tools and their application in problem-solving instructional units. The specific environments which the students wanted the teachers to create and manage involved many web 2.0 tools such as social networking sites, learning management systems (LMS), wikis, and blogspots to further writing curricula. Several students were familiar with the Moodle LMS and were very positive about how this would be of benefit to them as they collaborated with the teacher and their peers within their courses.

Several comments revolved around the vintage of the technology in schools and classrooms in relation to performance, i.e., processing speed, login wait times, etc. Other comments focused on how additional computers are needed to keep up with demand and how access would be facilitated by a wireless environment. The suggestion was that use of smaller, Internet accessible mobile devices running basic software functions (e.g., netbooks) would be more efficiently used if they could be moved around the physical plant (i.e., school building) as instructional needs changed.

When asked about teacher knowledge and skill requirements in a contemporary instructional environment, students were adamant that teachers needed opportunities to learn new tools and methods as well as access to these tools. Teacher learning was key in their opinion. Without teachers knowing what the possibilities were for creating engaging learning environments it would inevitably never occur.

The students felt that emphasis needed to be placed on revising, replacing, and modernizing curriculum in order to help them achieve 21st century skills for the workplace. Specific topics they felt were essential

were information technology career pathways, communications, collaborative problem-solving, and financial planning. When asked if all students should have a laptop assigned to them at school, they did not universally agree. In fact, there actually was much more significant agreement on the fact that teachers needed access to laptops before students, and that their education around technology tools was of primary concern.

Several best practices strategies were provided by the students. Again, many suggestions included the use of tools that served to create a more engaging learning environment as well as methods that help students stay organized. Examples included interactive white boards, animations, simulations, and other interactive software. Students described a very positive opinion about the Moodle learning management system (LMS) in that it allowed them to access resources, assignments, grades, teacher formative feedback, and each other beyond the class period. Student expressed the need for teachers to become proficient with a learning management system (LMS) such as Moodle, and to integrate it into their instructional program. The LMS would not replace face to face instruction, i.e., solely online curriculum, but would augment it for engagement and efficiency purposes. Beyond an LMS, the students felt that teachers needed basic proficiency in productivity tool software, i.e., word processing, spreadsheets, presentation. Teachers should also be able to create and upload audio and video files (e.g., podcasts and YouTube), and to disseminate those to students via an LMS. They also praised efforts of teachers who used email and text messaging to communicate with students, again as a way of organizing students and making the instructional process more efficient for everyone. Students want to dialogue with their teachers and support staff digitally.

Students felt that every classroom needed a base number of up-to-date computers for student access. In lieu of dedicated workstations within classrooms, laptops that could be checked out from the school library and operating on a wireless system would be productive. But, once again, students participating in the feedback sessions stressed that before students' access to computing technology is addressed, they felt that teachers needed access first. Initiatives the students felt should be deployed as early as next school year would be the use of audio and video uploads of course curriculum within an LMS. Other features they felt should be prioritized are wireless access, additional online coursework and tutoring support, and the use of an electronic grade book. Every student should have access to a computer or laptop so that we could take notes and organize better and would cut down on the amount of paperwork (i.e., environmentally friendly) and lost assignments. In lieu of computers or laptops, devices which serve as PDAs with no phone features (e.g., iTouch) would facilitate students' organization skills without being distracting or violate any school rules related to cell phone use. Video display technologies (e.g., data projector connected to computers with Internet access, flat panel televisions, etc.) should be in every classroom so that all classrooms are equal in access to information and for convenient use in audiovisual projects.

Students strongly supported instructional staff use of technology as a means of creating efficiencies in teachers' own work, saving them time for more valuable teaching tasks. One student stated, "Teachers complain about the amount of work they have. So maybe they can use technology to manage their work loads better. If they don't want the load, then use technology better." This extended to other support roles such as counselors who have limited time to advise students. Having a way to communicate without personal one-on-one time would be good way to minimize the load on counselors. Students suggested that teachers videotape or audiotape class lectures in the event classes are missed, and them publish these to the teachers' web pages or within the learning management system. Online virtual classrooms for courses should be offered at all schools (e.g., Japanese, American Sign Language, or Chinese) so all students interested could take the course without having to travel across the city.

Feedback Summary – Community, Businesses, Higher Education

The participants stated that our plan should help the community understand why we should make an investment, and how students would specifically benefit. We need to be able to explain this in concrete terms using clear examples.

Access to the Internet and other up-to-date technology tools is a requirement for all students. Participants in feedback sessions all agreed that everyone needs broadband access to the internet. Equity in access is critical to ensure learning opportunities for all students in the 21st century. While some students have the best things at home, others may not and school becomes the key place where they will have access to their best technology tools; public schools could be the common denominator for access to technology for students, e.g., libraries do that now for adults, schools play that role too for some people. Steps should be taken to mitigate the cost of broadband access as well as associated hardware costs. The marginal costs of technology (first cost, monthly charges, maintenance costs) make new digital broadband tools very different than television, i.e., less accessible to families with limited incomes. A base level of core technology is necessary if we have any desire to keep the digital divide from continuing to increase, much less attempt to narrow it. Clearly, schools are a place where all students (and their parents) should be able to access both. Schools should have the quality of technology that we see in typical middle-class homes. The integration of the community and parents in schools needs to be further explored and enhanced. The district should consider offering classes for both the parent and the student. We should focus on combining student and parent learning by opening the schools as community resources around technology instruction and to extend the school day. It was considered essential for equity reasons to allow after school programs to have access to robust technology environments including those utilizing the school buildings themselves. This could be accomplished by extending the school as a community resource. Community partnerships are essential in the mind of these participants.

The core of the District's technology should be the backbone infrastructure and include web-based curriculum and computers to facilitate instruction. All other things can build from here. There was very strong support for web-based digital curriculum rather than client-based. Web-based applications allow for a flexible, mobile and common portal available on any device with internet access that creates greater equity. Web based programs for home work assignments allow for immediate formative responses from teachers and peers. Web applications also require much less support by reducing the need to touch individual computers. Further, as much as possible these applications should be open source, i.e., non-licensed. The higher education researchers who participated in feedback sessions were consistent and very vocal about where specific technologies are headed. Namely, they believe that cell phone wireless will become the dominant venue for access to the Internet over the next 5 to 7 years. And because of this, they firmly believed that handheld mobile devices would become ubiquitous. "Kids will bring the tools with them. Every kid will have a smartphone. Ten years ago no one thought we would have cell phones. Twenty years ago the Internet was a dream. Thirty years ago we had no idea what a personal computer was." When pressed on the idea, each of the participants agreed that all students would have access via personal devices, e.g., smart phones and MP3 players, and policies currently restricting use of these devices must be re-evaluated. In addition, they thought it may be worthwhile to review whether or not students should be allowed to use their own personal computing devices within schools to augment the existing school's technology tools. A strategy considered reasonable would be to deploy a fiber-based wireless infrastructure within the district's high schools and perhaps at the middle schools using as much bandwidth as possible. Elementary schools might also be candidates for wireless especially in centralized locations such as a Library Media Center (LMC). In addition to a single wirless access point, elementary schools could benefit from wireless carts with small Internet accessible devices which could be used on a shared basis within classrooms. Participants understood that our current structure in elementary classrooms was the use of a limited number of hardwired, networked desktop computers. As an alternative, it was recommended these be replaced in elementary school classrooms with mini-laptop Internet machines (i.e., netbooks). This allows the units to be moved easily into a wireless area within

elementary schools, e.g., the LMC, without requiring the complete networking of wireless within elementary schools. This transition to mini-laptops from desktops should be augmented with wireless mobile carts that could be used on a project need basis by individual teachers.

Professional development for staff was emphasized though they stressed that the students could be a part of this, i.e., instructing the teachers on the ever-moving technology trends. It was stated over and over by groups that an investment by the district in the professional development of instructional staff in the use of technology was critical to its overall usefulness in learning. The participants made it clear that we must create knowledge and skill among our staff in how best to integrate a technology environment into their instructional plans in order to maximize student engagement and achievement. If teachers can't conceptualize how to leverage the technology environment, they won't. In order to create a nucleus for change, the participants spoke very favorably around the idea of providing incentives for teachers. One example discussed was to offer a variety of technology hardware and software as the benefit for participating in the professional development experience. The researchers felt that the professional development topics should be articulated to meet the district's priorities but might include the following: utilize a learning management system, curriculum mapping of units of instruction to learner standards, development of common digital assessments, creating digital lessons in a common repository, creating online courses, and/or establishing virtual spaces for collaboration between teachers and students. Teachers would be encouraged to participate in projects as teams, e.g.., regular ed/special ed, grade level, departments, etc., as collaboration is critical in technology integration. Teachers would submit their project ideas for review and would include a delineation of products to be created as a result of the project and a request for specific forms of technology to accomplish their goals. Participants felt such a scenario would create benefits for the teachers, their students, and the district as a whole.

The higher education participants were firm in their belief that open source software applications provide rigorous and meaningful options in many arenas including learning management systems (LMSs) like Moodle. Students access these systems from whatever Internet accessible resource they have available to them including those within school and outside school (e.g., home, neighborhood centers, public libraries). One of the key benefits of an LMS as perceived by the researchers was how it changed the paradigm of time in instruction. The fifty minute class period is no longer a barrier as students can converse with their teachers in a manner that creates flexibility for both parties. The participants also considered Google Docs and the Open Office suite as good ideas for use with teachers and students in learning environments. Google Docs provides the added benefit of managing applications off of the district's own network lowering internal resources required for such tasks. Web 2.0 tools such as wikis and blogs were strongly recommended as self-assessment and reflection tools.

Parents want access to the curriculum and instruction so they know what is going on in classrooms and to be able to determine how they can help. Participants in the feedback sessions felt that the district must facilitate schools and teacher's ability to encourage communication around these matters. Specific examples of this practice would be to post assignments and lessons on line, but use tools to maker it easier for the teacher to do, use a tool that creates the assignment/lesson and then automatically publishes on the web. Another example is to create a way to serve up digital resources on the web which connect to standards, units, lessons, so that parents can see things that explain the information as well as support their children. Wikis and blogs provide an opportunity to serve these purposes. In general, parents truly want to help their children learn in partnership with the teachers and to that end we must find ways to do this digitally.

A specific technology which the higher education participants felt was very functional for elementary schools is the tablet PC. This device works like a digital clipboard. A scenario described by the participants specific to the district was the administration of the Primary Language Arts Assessment (PLAA) running record subtest. Teachers currently record the student's performance, including an error

pattern from which teachers learn the next teaching point for each student, on a paper and pencil recording device. In the model described by the researchers, the teacher would call up a digital version of the running record form, make the appropriate scoring notations, save the file to the student's own record in the student information system, and recall that record as needed, e.g., parent/teacher conference, student support team meetings, etc.

Some technologies are "constant" and have an interruptive nature such as email and text messaging. Currently, students aren't supposed to use phones, send text messages, or send email during class, and yet that may be a problem if it restricts positive learning behaviors, e.g., how to use tools effectively, critically, and analytically. Can we teach students how to maintain focus with technology that "interrupts" constantly? Can we use that realization to guide us in how best to teach behaviors involving these technologies? Perhaps we learn we should turn the machine off for 30 minutes. Every student should not be behind a laptop all the time, but they should have access when it is needed. Can we create the right mix to get to the place where everyone is engaged and not off task and yet have access to tools that offer an entire classroom of students a simultaneous opportunity to be connected into the enormous set of resources the Internet affords?

Technology should facilitate authentic learning for students. Inter-disciplinary, project-based learning opportunities would be very high leverage. Games that allow students to provide evidence of learning in the areas of science knowledge, research, and writing skills are one example. However, games are not currently encouraged as learning tools. Higher education participants in the feedback sessions felt strongly that well constructed games can be not only engaging, but entirely valid in determining students' analytical skills.

We should strive to balance the technical environment with the interpersonal and utilize the value of the Internet to reach across the globe when learning and not dismiss the social aspects of education as critical either. There should be balance in the use of the tools with the social relationships that must sustain our culture. If web 2.0 tools can do this, then use them as a positive force. Technology will facilitate distance learning, but don't allow it to replace face-to-face instruction and the relationships that are essential; there is a temptation that we can "save money" using the tools, but that may exacerbate hidden social "costs." A key question is, "How can we leverage social networking tools effectively and constructively while using time wisely?" If, in some respects, the technologies are eliminating certain tasks that people no longer have to do, what does that imply? Do not allow this to eliminate the opportunity to learn to analyze. Instead, find technology tools that augment and enhance analytical thinking. Data presentation tools, e.g., power point, are also critical to all students as a basic form of communication skills.

Regardless of the technology, an all-inclusive curriculum is key so that all students see themselves reflected in the learning opportunities, even those who are marginalized by the dominant cultures. Resources should be of high quality. However, it is important how the content is delivered, too. Because it is more efficient to use digital curriculum, it's less expensive today to deliver the gay history curriculum online than it is on paper. Also, students are more likely to use the digital content than the old technology content. It is more relevant and engaging for today's student. An example of technology that engages is the Wii video game. Curricular examples of such engagement are simulations; the usage of which should be encouraged. One participant provided an example of how much more learning occurred with a completely online course at the post-secondary level.

The district should be prudent about technology investments because they may become outdated. The planning horizon for new technologies should be no more than 18 months. This implies a need to be constantly reviewing research and development trends in the information and instructional technology arenas. Community partners, staff, administrators, parents, and students can all help participate in this review of emerging technologies.

Students must be prepared for business and higher education settings with a set of basic 21st century skills and these skill sets are expanding to include use of Web 2.0, open source software, and virtualization. The district should continue to build relationships such as job shadowing and other interactions between schools and businesses and higher education. Students also need to have access to online curriculum. It is essential that we continue to teach responsible use as part of the curriculum. It is also important that we ensure that technology is inclusive of disabilities, e.g., people with physical challenges related to hearing, vision, or movement. The feedback group participants suggested the following specific disciplinary curricular tools.

- English Language Arts: blogging and wikis
- Math: interactive white boards, document cameras, and online material
- Social Studies: Google Earth and video streaming
- Pre-engineering (e.g., Project Lead the Way – PLTW): AutoDesk computer assisted design (CAD) software
- Business education: PDAs and email

Feedback Summary – MMSD Business Services Department

Productivity and process efficiency were critical elements of the Business Services' Department technology focus. Saving staff time, eliminating materials costs through digital solutions, and lessening the energy consumption of the district's facilities were all identified in this discussion. The Building Services Division would like to have a solution for completing all work order processing on handheld mobile devices. More useful analysis and reporting tools are needed to identify opportunities for process efficiency improvements. Transportation Services is investigating additional efficiencies in bus routing software.

Business Services also sees the value in moving most software applications to the web, especially open source applications. They reduce support requirements as they eliminate desktop installation tasks and provide wide access wherever an Internet connection is available.

A simple technology enhancement for office productivity is the use of dual monitors. This allows staff to have multiple applications open and viewable as they complete tasks that cross these different applications. With a single monitor they are required to minimize one application while working on another even though information is needed from both applications.

Another productivity enhancement discussed was the use of laptops rather than desktops. This allows some employees to bring their work with them in a more portable manner. Laptop environments could be fitted with docking stations to work more as desktops when in the office. Yet the laptop could be taken away from the office and still provide access to work files using tools such as Virtual Private Network (VPN) at school district meetings and community-based events.

There is a need to continue to develop web-based professional development modules for many different employee groups within Business services. These tools allow staff to learn in a "just in time" model, while also reducing scheduling issues and travel costs associated with face-to-face sessions.

Administrative Services is exploring changes in the print management processes. Again, web-based solutions are a key focus as are the additional movement of paper forms and documents to the electronic document management system (EDMS).

Technology solutions that address security concerns are also a key focus. A security assessment is currently underway and this plan should reflect the recommendations provided from that work.

Another project support enhancement recommended by Building Services is downloading the county's satellite maps into the computer assisted design (CAD) software in which all facilities footprints are housed. This would eliminate several manual tasks that currently must be performed currently when doing site evaluations.

Needs Assessment – Technology

The needs assessment included a systematic collection of data regarding student to computer ratios, average replacement cycles for computers, network support and infrastructure, and other important technology planning factors. Surveys were conducted with the following groups of schools districts as part of the planning process:

1) all Dane County and surrounding school districts participating in the information technology director's listserv,

2) all participating districts in the large Wisconsin school district information technology director's listserv, and

3) Minority Student Achievement Network (MSAN) school districts.

These groups were thought to be similar in specific aspects to the MMSD and would therefore provide useful benchmark comparisons. In addition to these surveys, other national K-12 data sources were used as benchmarks including data from the U.S. Department of Education National Center for Education Statistics (USDOE NCES) and the Consortium for School Networking (CoSN), a national organization devoted to advancing technology within K-12 education and the International Council for Online Learning (iNACOL).

Another aspect of our needs assessment in regard to technology infrastructure and systems is to describe the state of change in technology. There has been a proliferation in the types and amounts of technology utilized with the district over the past fifteen years. Unfortunately, with revenue cap budget restrictions investments in support and systems management tools and staff have not kept pace.

In general, technology has completely permeated our work in schools and the district offices. This includes all aspects of instruction, administration, and communications. Below is a graphic display of these changes within the MMSD. Note that the graph only summarizing some but not all of the changes in tools and systems.

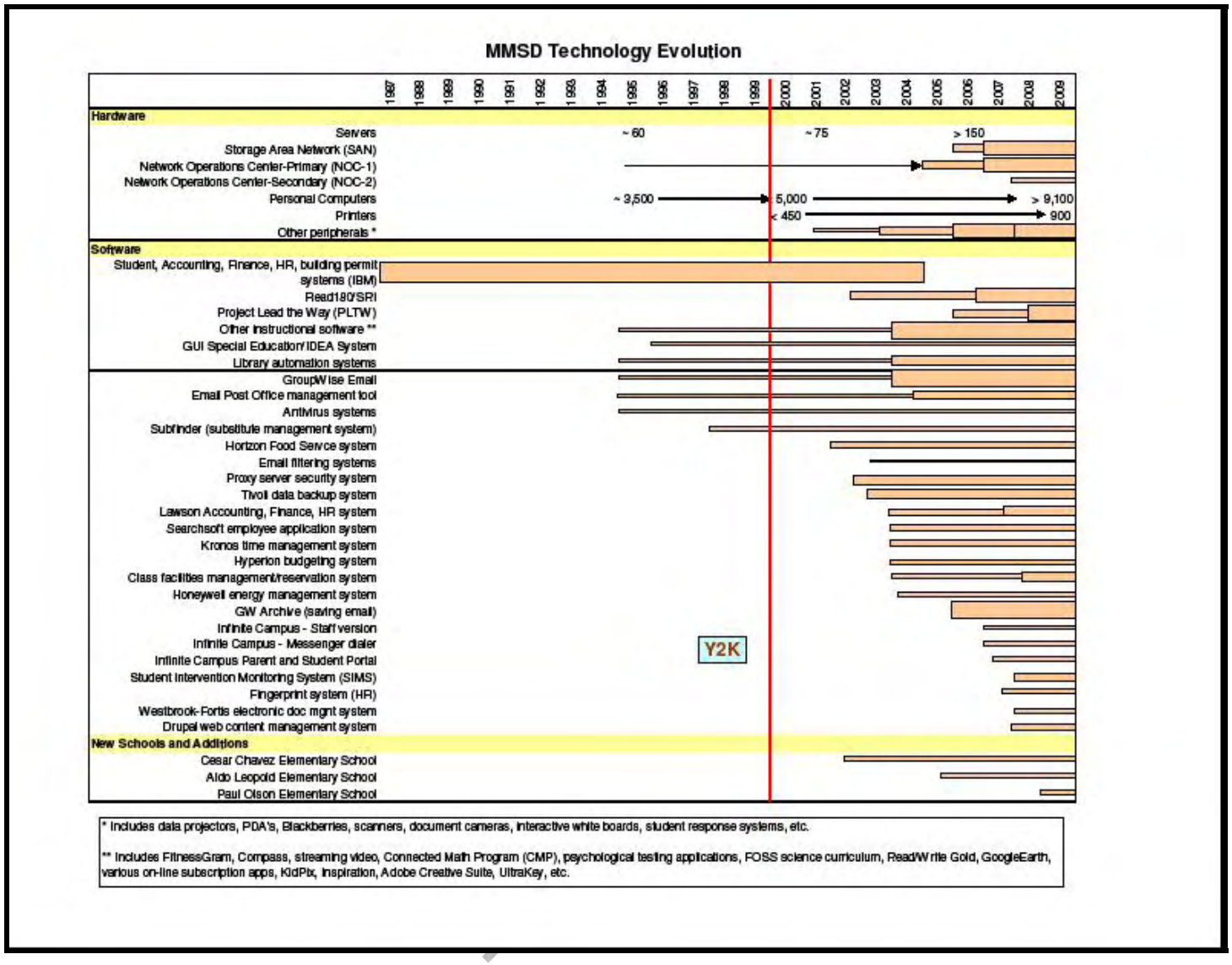


Figure 7 – MMSD Technology Evolution

Student to Computer Ratio

Building staff have frequently expressed concerns regarding the numbers of computers available in classrooms and student to computer ratios. While the current ratio appears to be about average in comparison to other districts the recommendation made in this plan is to achieve a 2 to 1 ratio over the next three years. To accomplish this objective the current computer inventory would need to increase from 9,100 to over 12,800. We recommend that most of these increases be in the wireless mobile computing device category to allow maximum flexibility for instructional applications so that the technology follows the student as opposed to sending the student to the technology.

The MMSD is about on par with other K-12 districts in the amount of computers installed in schools relative to the student enrollment. As the graph below depicts, MMSD ratios are around three computers for every one student. The movement across K-12 is to drive this ratio closer to 2 to 1.

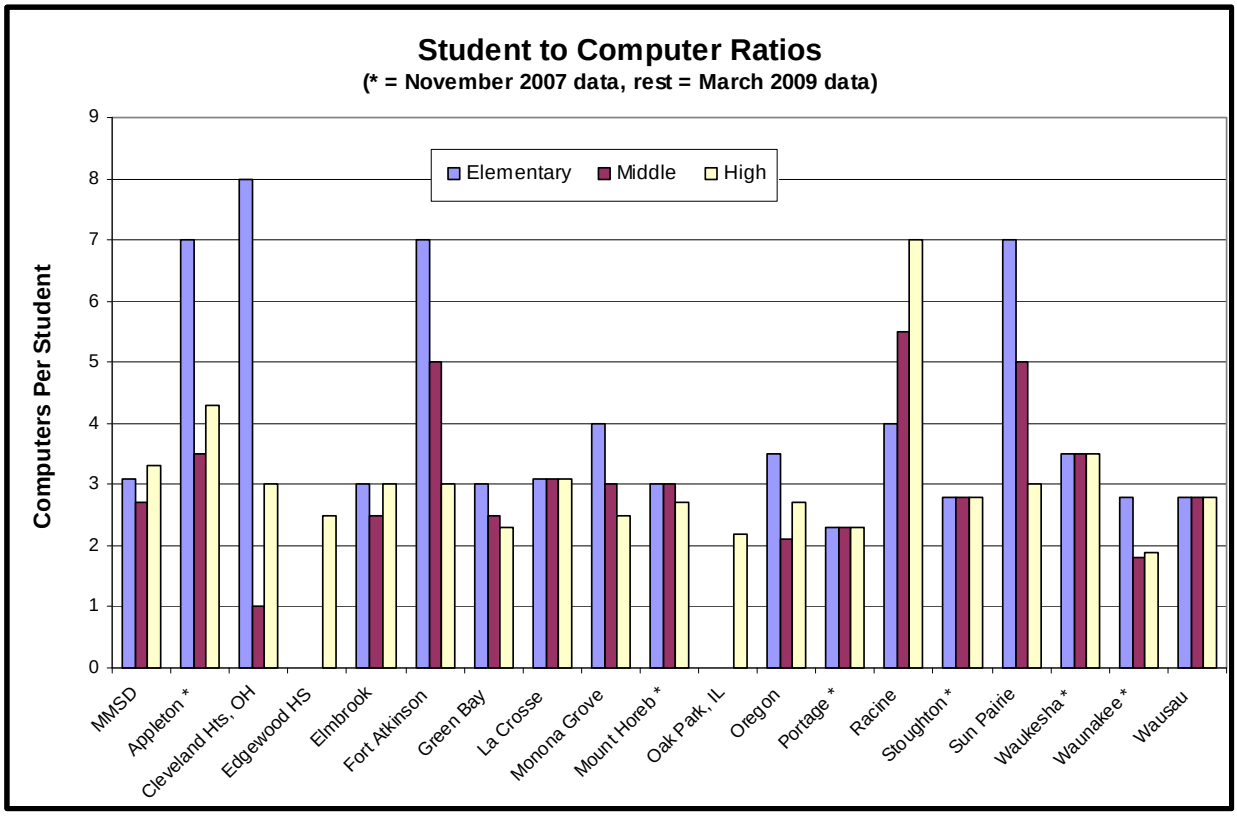


Figure 8 – Student to Computer Ratios

Computer Replacement Cycle

Teachers and staff throughout the district continue to express almost universal concerns about the quality of computers in buildings. More than the volume of computers in schools, the more significant concern for the district is the rate at which computers are being replaced. In relation to this benchmark category, the district falls well short of other districts in Dane County, across Wisconsin, or among regional and national benchmark districts. The district is currently replacing its 9,000+ computers every nine years. Most districts are on a five-year replacement cycle with a goal to reduce that to every four years.

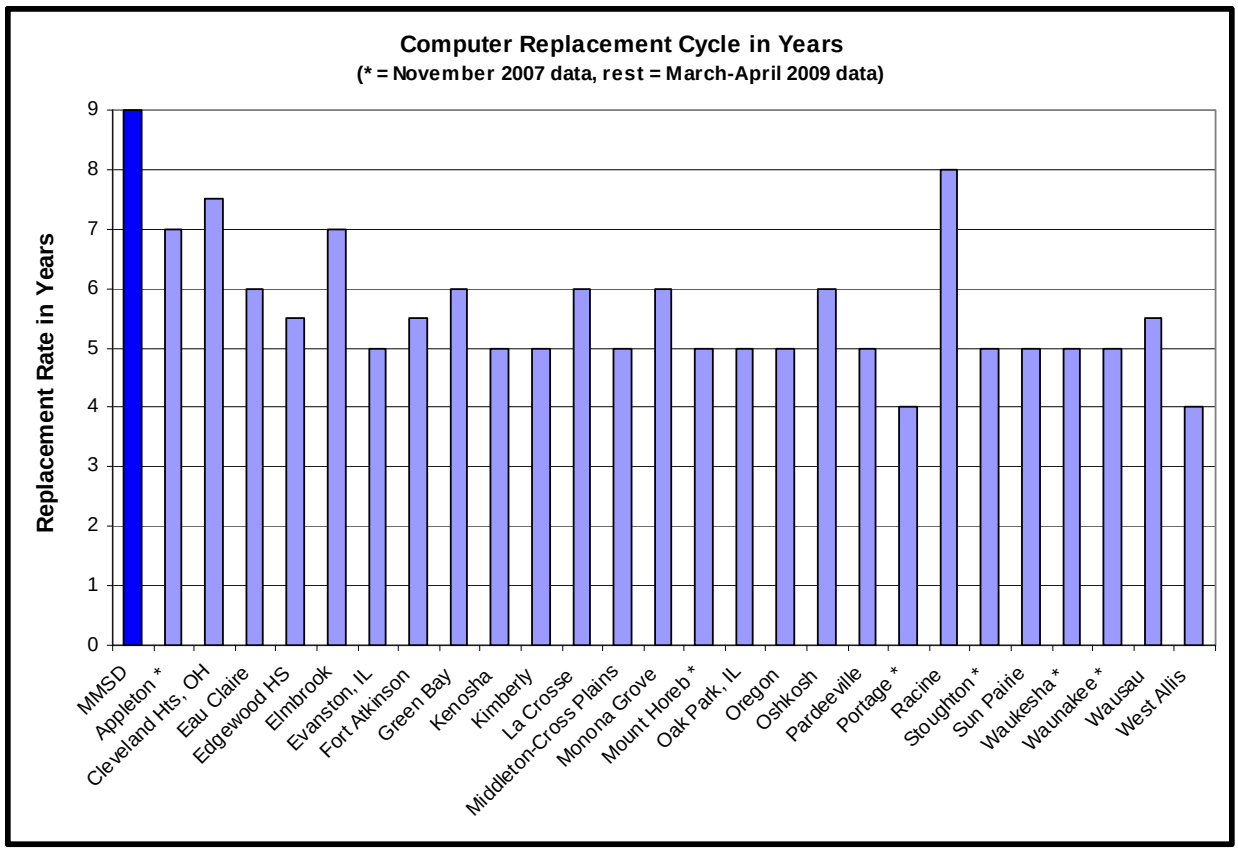


Figure 9 - Computer Replacement Cycle in Years

As personal computers are replaced, we recommend increasing the use of laptops, netbooks, and thin-client server deployments as a means of providing greater flexibility and more efficient technical support – for the purpose of providing better support for students and their teachers. There is the recognition that under normal circumstances, the wide-area and local-area computer networks that allow the personal computing devices to be operated – either in a wired or wireless environment - requires infrastructure improvements including fiber, switches, controllers, servers, and Internet service provider (ISP) and email security filtering systems, and application and data management tools. This would certainly be true if the objective to increase computer inventory were pursued.

The use of personal network-capable devices by students, staff and the public are increasingly seen as a benefit and as a security risk. We recommend investigating models currently adopted by other school districts both in Wisconsin and across the country that allow students to bring their own personal computing devices into the school. If an adequate security model can be deployed that supports this effort, this strategy extends the district's computing device investment value by decreasing that investment in schools where students have the economic wherewithal to provide their own computer and increasing the investment at schools where students cannot provide these tools on their own.

Expanding Technology Systems and Support Requirements

Driven by user needs and process efficiencies, technology systems have grown at a rapid pace in the district and our society as a whole. From the days of mainframe computers in the late 1980's to today's

ubiquitous personal computers, cell and smart phones, and email and messaging systems, computing technology surrounds now us. Systems are needed to plan for, deploy, and maintain these tools and to support their users.

A simple example of this change over time is in the rate of expansion in the number of personal computers deployed across the district. Since 2000, the overall inventory of personal computers installed in district facilities and schools has increased from around 5,000 to over 9,100 in 2008. There are calls for additional personal computing devices to lower the student to computer ratios even more. This, of course, does not account for the expansion of additional technologies that require support as well such as printers, data projectors, document cameras, digital video and still cameras, tablet PCs, student response systems, interactive whiteboards, curricular technologies such as science probes, along with digital curricula and productivity tools. In general, the technical support function of the district has seen nearly a doubling of its workload without additional resources being added to this functional group.

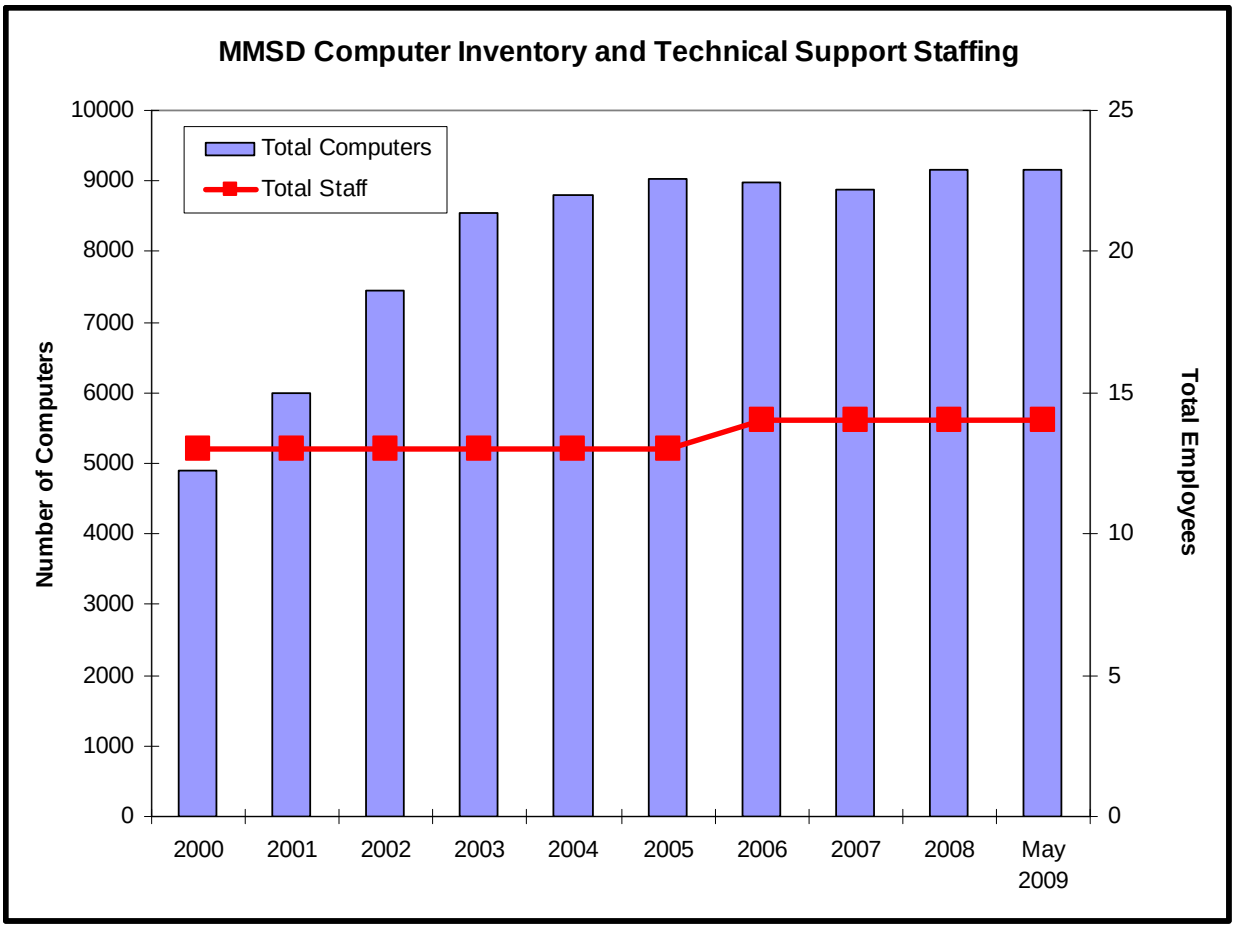


Figure 10 – Computer Inventory and Support Staffing

Another system that exemplifies the amplification of technology use in all aspects of the district's operations is email. Non-existent prior to the early 1990's, email has exploded to the point of requiring dedicated staff and infrastructure to simply manage and maintain operations. Between 2004 and 2009 the volume of inbound email in the GroupWise system has grown from less than 200,000 messages per month to nearly 19,000,000 (in November 2008). The vast majority of these messages are SPAM,

viruses, or other intrusive attempts to interrupt our system. It is rapid growth such as this that leads to more system failures within our email network than with other systems. Adequate resources must continually be devoted to upgrading, maintaining, and managing the system. We must also continue to look at external options that might provide more efficient solutions.

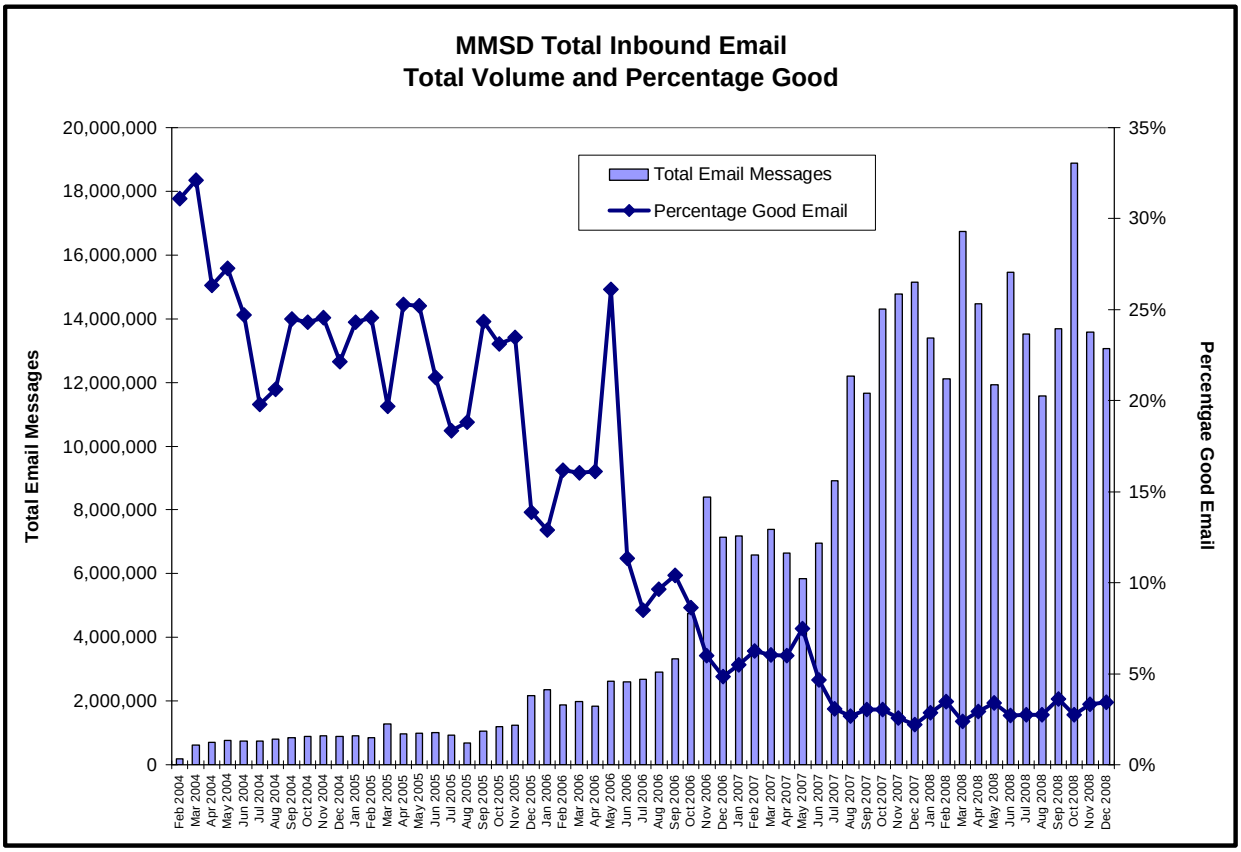


Figure 11 – Inbound E-mail

There is a general agreement from the stakeholders we contacted during the planning process as well as from research of the K-12 market that the use of wireless technologies within classrooms will be more pervasive in the coming three years. Our objective would be to complete wireless installation at all schools and district facilities by September 2010. There would remain the need to install some additional hardwiring infrastructure as well in order to allow for growing use of peripheral devices like data projectors and document cameras in classrooms.

There have been significant concerns regarding the district's aging printer fleet. Several school districts have begun to realize significant cost savings by deploying more energy efficient print management tools. These solutions also rely on deriving value through the use of secure, multi-function printer, scanner, FAX, and copiers devices. We recommend that a study be completed to evaluate the current printing practices across both schools and district central office functions. A request for proposals should be developed to identify a vendor who can implement solutions across the district.

In 2001-2003, the district's objective was to get at least one data projector in every school. Today, the objective is to have one in every classroom. In addition, document cameras are rapidly considered an

asset for every classroom for displaying documents and objects. Although, ideally, every classroom should have these presentation capabilities as part of their continual instructional functions, most currently do not. Therefore, there has been much interest in acquiring mobile presentation units that include these devices along with audio speakers. The teacher laptop would be able to connect to the display units.

There are other emerging technologies which are continually changing the manner of classroom instruction. Recently, personal response systems have rapidly gained wide use in more progressive K-12 districts around the country. These tools allow teachers to conduct formative assessment in real time with their students. The students who were otherwise inhibited from responding to teacher questions can avoid this fear with such response systems. Interactive whiteboards are also seen as a tool to engage students in classroom activities. While somewhat expensive when including the full cost of installation, there are newly emerging "whiteboardless" systems that use tablet PC's as an alternative. Tablets can run the same interactive software, but at about one tenth of the cost of the mounted board. We recommend having shared response units and portable interactive whiteboards across several classrooms and a tablet PC for each classroom.

Technology Related Professional Development

When evaluating any strategy for updating technology in the district it is important that teacher professional development be placed at the top of the priority list. Without an investment in adequate professional development the technology hardware and software goes unused, or significantly underutilized. Based on the researched based best practices regarding professional development, it must be embedded in teachers daily work rather than be an add-on, it must be available just in time, and it must be learned in a collaborative manner among peers. During the past decade technology integration specialists have been cut from the district budget, and a concurrent reduction in teacher technology integration in classroom has been the obvious result. We must put these positions back in the budget and provide time for teachers to learn how to leverage emerging technologies as they engage students in their classrooms. Technology integration also creates efficiency opportunities for teachers, saving them time on administrative tasks they now handle manually.

There is growing concern based on feedback received from the needs assessment conducted for this planning process that teachers are behind in their technology skills. All stakeholders agreed that putting basic technology in teachers' hands should be the priority investment. Our recommendation is that all teachers and instructional support staff have access to a wireless Internet accessible computer, and that the preference be for a laptop, or perhaps the newer generation netbooks as they become available in the marketplace.

Above all, adequate and effective professional development must be provided to staff if any investment in hardware and software is to be pursued.

A. 21st century Learning Skills Context and Content

Goal A.1: Learning skills and 21st century tools are used together to enable students to effectively build content knowledge in a contemporary, culturally relevant context through the incorporation of authentic examples, applications and settings.
Objective A.1.1: Within 3 years, 50% of all high school students will have interactive online services supplementing course work available to them during their instructional day.
21st century Skill Focus: Communications and Collaboration

Activity:	Who:	Measured By:	Timeline:	Budget:
A.1.1.1: Define MMSD learning tools & skills in a manner consistent with recommendations of the Partnership for 21st century Skills (P21).	T & L, Technical Services, Educational Services	Published Evaluation of Learning Materials (ELM) standards	June 2009	
A.1.1.2: Actively write grants to develop and support teacher leadership, skills, and capacity.	T&L, Ed Services, Tech Services	Two successful grants per year	Annually	Grant dependent
A.1.1.3: Embed online components in HS professional development as core practice.	T&L, Ed Services, Tech Services	Analysis of PD plans	Annually	1.0 FTE
A.1.1.4: Job embedded implementation support.	Dept Chairs, Innovation team, Literacy coaches, District support staffing	Survey of students (via climate survey?)	Annually	
A.1.1.5: Professional Learning opportunities 2 sessions, 50 people per year, by content area.	T&L, Ed Services, Tech Services, Dept Chairs, Innovation team, Literacy coaches, District support staffing	Number of teachers attending; number of teachers who implement	Annually	$25,000 over 3 years
A.1.1.6: Will design and administer survey to determine baseline status of student multimedia artifacts in project-based learning.	T&L, Ed Services, R&E	Survey data	June 2010	$2,000

Objective A.1.2: Within 3 years, there will be a 25% increase of all (K-12) students producing one or more multimedia artifacts in a collaborative project-based learning environment.
21st century Skill Focus: Communications and Collaboration

Activity:	Who:	Measured By:	Timeline:	Budget:
A.1.2.1: Define multimedia artifacts and project-based learning.	T&L, Ed Services, R&E	Definition document	Dec 2009	$2,000

Activity:	Who:	Measured By:	Timeline:	Budget:
		complete		
A.1.2.2: Develop instructional capacity for students to access software applications for creating multimedia artifacts in a project-based learning environment. (Web authoring, podcasting, video and other audio tools, etc.).				
A.1.2.3: Develop hardware/software capacity for students to access software applications for creating multimedia artifacts in a project-based learning environment. (Web authoring, podcasting, video and other audio tools, etc.).				
A.1.2.4: Will design and administer survey to determine baseline status of student multimedia artifacts in project-based learning.	T&L, Ed Services, R&E	Survey data	June 2010	$2,000
A.1.2.5: Embed online components in K-12 professional development as core practice.	T&L, Ed Services, Tech Services	Analysis of PD plans	Annually	1.0 FTE
A.1.2.6: Job embedded implementation support.	Dept Chairs, Innovation team, Literacy coaches, District support staffing	Survey of students (via climate survey?)	Annually	
A.1.2.7: Professional Learning opportunities 3 sessions, 75 people per year, by content area.	T&L, Ed Services, Tech Services, Dept Chairs, Innovation team, Literacy coaches, District support staffing	Number of teachers attending; number of teachers who implement	Annually	$37,500 over 3 years

Objective A.1.3: Within 3 years, there will be a 25% increase in the number of 6-12 students who extend classroom experiences virtually with students from other classrooms, schools, districts, or countries in order to gain greater understanding of differing points of view.
21st century Skill Focus: Cross-cultural and social skills.

Activity:	Who:	Measured By:	Timeline:	Budget:
A.1.3.1: Blogs, micro-blogging				

Objective A.1.4: Within 3 years, there will be a 25% increase in the number of students who have the opportunity to use 21st century tools into the classroom to participate in challenging, engaging and authentic activities that facilitate critical thinking and problem-solving skills.
21st century Skill Focus: Critical Thinking & Problem-Solving.

Activity:	Who:	Measured By:	Timeline:	Budget:

Activity:	Who:	Measured By:	Timeline:	Budget:

Objective A.1.5: Within 3 years, there will be a 25% increase in the number of students who have opportunities to showcase creative presentations, publications, portfolios and learning artifacts related to content knowledge.
21st century Skill Focus: Creativity & Innovation.

Activity:	Who:	Measured By:	Timeline:	Budget:

B. Assessments

This goal is focused on reviewing all assessment practices including both formative and summative. Formative assessments are those conducted in an on-going, literally daily, basis by teachers to help them inform their instruction by determining next steps for each student they teach. Summative assessments are focused on broader student outcomes and can support decision making for school improvement, evaluation of program intervention effects including curriculum and professional development, and accountability for the public. An efficient assessment system identifies assessments that can be used to serve multiple purposes at the lowest possible cost in terms of time and expense. Effective assessments are those which closely match the measurement with the learning goals in as authentic and real world manner as possible. Technology can be used to meet both of these ends, i.e., efficiency and effectiveness. The development of assessments should be stored within an electronic "knowledgebase" for all teachers to access and use. The Eclipse curriculum mapping tool could serve as such a repository.

Goal B.1: Create contemporary assessments and practices that address multiple purposes.
Objective B.1.1: Identify and/or create digital and deploy summative assessment resources.
21st century Skill Focus:

Activity:	Who:	Measured By:	Timeline:	Budget:

Activity:	Who:	Measured By:	Timeline:	Budget:
Investigate standards-based benchmark assessments such as **B.1.1.1:** NWEA's MAP. Prepare recommendations during 2009-10 for possible budget action in 2010-11.	Teaching & Learning coordinators, Research & Evaluation staff		Recommendations completed by January 2010 for inclusion in budget review	Estimated 120 person hours, no additional costs as tasks would be embedded in normal tasks for administrative and support staff
B.1.1.2: Participate in DPI's assessment task force activities, and advocate for change at the state level that include digital assessment.	District Assessment coordinator, Teaching & Learning coordinators, Educational services coordinators		On-going	Estimated 80 person hours annually, no additional costs as tasks would be embedded in normal tasks for administrative and support staff
B.1.1.3: Create common assessments aligned to standards-based units and lessons within the Moodle LMS and Eclipse curriculum mapping frameworks. Complete these as components in the on-going professional development program embedded within each subject area's efforts.	Teaching & Learning coordinators, Educational Services coordinators, Research & Evaluation staff, teachers and other instructional support staff		On-going	Estimated 40 person hours per project (on average); if substitutes or extended employment are used the cost would be approximately $600 per

Activity:	Who:	Measured By:	Timeline:	Budget:
				project.
B.1.1.4: Facilitate development of end of course common assessments, especially at the high school level where fewer standards-based assessment now exist, e.g., end of algebra course assessment.	Teaching & Learning coordinators, Educational Services coordinators, Research & Evaluation staff, teachers and other instructional support staff		On-going	Estimated 120 person hours per project; if substitutes or extended employment are used the cost would be approximately $1,800 per project

Objective B.1.2: Identify and/or create digital formative assessment resources
21st century Skill Focus:

Activity:	Who:	Measured By:	Timeline:	Budget:
B.1.2.1: Investigate digital classroom pre-assessment and formative assessments such as handheld mobile and tablet PCs for recording running record and other observational assessment data. Provide recommendation for possible budget implications by January 2010.	Teaching & Learning coordinators, Research & Evaluation staff		Recommendations completed by January 2010	Estimated 120 person hours, embedded tasks for administrative and support staff; 6 pilot participant teachers $6,000, 6 tablets PCs or other handheld devices $2,400; total cost $8,400
B.1.2.2: Research the use of blogs and wikis - within a controlled space such as the Moodle LMS - as a student self-assessment, self-reflection device. Explore existing ideas with	Teaching & Learning coordinators, Educational Services		Begin in summer 2009 with a limited group of	Estimated 40 person hours per project; if

Activity:	Who:	Measured By:	Timeline:	Budget:
teachers and test on a limited scale. Identify a appropriate blog and wiki tools to use as a standard. DrupalEd is one potential source. The blogs and wikis can also serve as a potential "e-portfolio" tool if the blogs were saved over time. They would show growth over time. Integrate as embedded professional development tasks within content area efforts.	coordinators, Research & Evaluation staff, teachers and other instructional support staff		teachers across disciplines and grade levels, On-going thereafter	substitutes or extended employment are used the cost would be approximately $600 per project; 10 projects involving 2 teachers per project during 2009-10 $12,000, teacher laptops $16,000, wireless netbooks $70,000 = $98,000

C. Pedagogy and Professional Development

Goal C.1:

Activity:	Who:	Measured By:	Timeline:	Budget:

D. Planning and Allocating

Goal D.1: All staff will have skills to use appropriate technology to effectively and efficiently enhance student leaning and be effective and efficient in their work.

Objective D.1.1: Design a methodology to define appropriate technology.

Activity:	Who:	Measured By:	Timeline:	Budget:
D. 1.1.1: Assess effectiveness and technical compatibility within MMSD environment of emerging technologies. Utilize revised research and development methodology (see section H).	Technical Services, functional departments, advisory groups	Implementation of methodology	On-going	Reallocation of existing staff time
D.1.1.2: Define updated technical and ELM-based selection standards for software acquisition and use in instruction and/or business.	Technology Services with Teaching and Learning or Business unit	Updated web site pages	On-going	Web site and staff assigned to keep relevant standards current

Objective D.1.2: Define technical skill sets expected of staff to use technologies.

Activity:	Who:	Measured By:	Timeline:	Budget:
D.1.2.1 Use Help Desk/work order system to anticipate needs for professional development and recommend most effective instructional solutions.	Technology Services	Deployment of product	Spring 2009	$12,000 + $3,000 annual maintenance

Objective: D.1.3: Provide professional development opportunities, funding and a time allocation to achieve defined technical skill sets.

Activity:	Who:	Measured By:	Timeline:	Budget:
D.1.3.1: Provide multiple methodologies available to staff depending on skill needed.	Technology Services with Teaching and Learning or Business Unit	Implementation of a technical professional development plan	Fall 2010	Technical Services staff to support professional development environment, plus professional development

Activity:	Who:	Measured By:	Timeline:	Budget:
				environment
D.1.3.2: Provide professional development allocation for business tool and/or instructional skill.	Management Team	Hiring staff person, establishing professional development sites	Fall 2010	One FTE $70,000 per year, professional development site retrofit costs $250,000 one time

Goal D.2: All staff and students will have access to tools, information resources and supporting infrastructure necessary to search, evaluate, construct and communicate knowledge.

Objective D.2.1: Provide local area network (LAN), wide area network (WAN), and Internet access data through-put capacity required to support business and instructional technology needs.

Activity:	Who:	Measured By:	Timeline:	Budget:
D.2.1.1: Monitor LAN, WAN and Internet data transport capacity achieved by November 2008; upgrade as needed.	Technology Services	Reports on system performance	On-going	LAN switched environment ~ $75,000 / yr in maintenance and switch replacements WAN capacity: $130,000 per year after eRate reimbursement current Internet capacity: $14,000 per year after eRate reimbursement; may rise significantly by

Activity:	Who:	Measured By:	Timeline:	Budget:
				2011
D.2.1.2: Continue discussions with City of Madison, County, public agencies, and private sector partners regarding options for redundant and/or improved WAN and Internet access.	Technology Services	Reports to BOE	On-going	Possible savings

Objective D.2.2: Provide appropriate end-user hardware computing environment.

Activity:	Who:	Measured By:	Timeline:	Budget:
D.2.2.1: Allocate sufficient funding to implement and maintain a four year replacement cycle of desktop computers.	Technology Services	Deployment reports of annual inventory	On-going	Current 3 to 1 student to computer ratio would cost $1.8 million per year; goal to reduce the ratio to 2 to 1 would cost $2.3 million per year
D.2.2.2: Continue annual review of thin-client technologies. Identify appropriate applications. Pilot project(s) during the next two years.	Technology Services	Pilot report findings	2009-10 and 2010-11 school years	Estimated hardware cost is $4,000 per server to cover 50 personal computing devices, plus technical staff time to deploy and manage
D.2.2.3: Allocate sufficient funding to implement and maintain a five year replacement cycle of printers and/or other peripherals (projectors, doc cameras, etc.) Create a comprehensive plan in 2009-10 school year.	Technology Services	Report describing strategy	2009-10 school year	Estimated minimum costs of $250,000 per year
D.2.2.4: Continue efforts to acquire donated equipment where possible. Review donations policy. Integrate donations with	Technology Services	Summary report	On-going	Estimated $18,000 in associated costs

Activity:	Who:	Measured By:	Timeline:	Budget:
student work options and programs to provide computers to families.				per year
D.2.2.5: Maintain sufficient technical support staffing. Reduce current computer to technician ratio from 650 to 1 to 550 to 1. Maintain this ratio if student to computer inventory is increased from 3 to 1 (9,100 computers) to 2 to 1 (12,800 computers).	Technology Services	Hiring staff	On-going	Adding 2 FTE for current inventory is $135,000 per year, increasing to 2 to 1 ratio is 9 FTE at $600,000 per year

Objective D.2.3: Provide appropriate network infrastructure environment.

Activity:	Who:	Measured By:	Timeline:	Budget:
D.2.3.1: Complete server consolidation to reduce number of local area servers and implement Active Directory system across the entire district.	Technology Services	Summary report	December 2009	Reallocation of existing staff time
D.2.3.2: Improve network monitoring, auditing and management capabilities by implementing monitoring software tools, utilizing external consulting resources, and reallocating internal network specialist time.	Technology Services	Secure services and software, recommend changes, implement action items	Spring 2010	$10,000 consulting costs, $10,000 software costs, reallocation of staff time
D.2.3.3: Improve network security by conducting a comprehensive security audit and implementing recommendations.	Technology Services	Report summarizing recommendations and action implemented	Fall 2010	$75,000 security assessment, $100,000 action items
D.2.3.4: Upgrade and maintenance of Network Operations Centers and enterprise infrastructure.	Technology Services	Annual Technical Services Report	On-going between 2009 and 2012	$50,000 per year, in collaboration with Building Services

Objective D.2.4: Provide easy and secure local and remote data access.

Activity:	Who:	Measured By:	Timeline:	Budget:
D.2.4.1: Maintain antivirus protection.	Technology Services	Update license payment	On-going	$12,00 per year for MacAfee software license
D.2.4.2: Maintain inbound Internet email malware protection.	Technology Services	Update license payment	On-going	$4,800 per year for USInternet's Securence software license
D.2.4.3: Maintain Web filtering system in compliance with CIPA.	Technology Services	Conduct assessment and implement action items	Fall 2011	Upgrade cost $12,000
D.2.4.4: Improve WAN authentication process for major systems including Novell, GroupWise, Infinite Campus, GUI Special Education/IDEA, Lawson, Kronos, Horizon, Destiny to create single sign-on functionality and to reduce manual account adjustments by support staff.	Technology Services	Implement system	August 2009 and on-going	Reallocation of existing staff time
D.2.4.5: Improve local and remote secure wireless access. Document WAN, fixed-building, and mobile solution options by August 2009.	Technology Services	Report and deployment	August 2009 assessments, deployment by fall 2010	Assessments estimated at $150,000, deployment costs of $1,100,000
D.2.4.6: Explore open DNS to enable student and public use of personal computers on the MMSD network.	Technology Services, Legal, Teaching and Learning	Report summarizing recommendations	Fall 2009	Reallocation of existing staff, assumed open source options for software

Objective D.2.5: Provide support for instructional and business application environments.

Activity:	Who:	Measured By:	Timeline:	Budget:
D.2.5.1: Replace student email system.	Technology	Deploy	Summer 2009	Reallocation of

Activity:	Who:	Measured By:	Timeline:	Budget:
	Services	replacement system		existing staff time
D.2.5.2: Upgrade GroupWise Archive system and reduce GroupWise account sizes.	Technology Services	Deploy system upgrade, communicate changes to staff	Summer 2009	Reallocation of existing staff time
D.2.5.3: Explore productivity software options including upgrade of Microsoft Office suite, open office, and Google apps (or other cloud computing options).	Technology Services	Report summarizing recommendations, implement action items	Fall 2009 for assessment, deployment after	Reallocation of staff time for assessment, solution costs vary from none to $50,000
D.2.5.4: Continue to improve desktop support (see Activity D.2.2.5)	Technology Services			
D.2.5.5: Improve Drupal web content management system performance and ongoing support. Conduct on-going professional development sessions for school and department publishers. Encourage web publisher community support network.	Technology Services	Implement adjustments	On-going	Reallocation of existing staff time, minimal external consulting costs
D.2.5.6: Continue expansion of enterprise document management system.	Technology Services with other business units and functional departments	Assessment reports, deployment of action items	On-going	$25,000 per year in consulting and deployment costs, significant process efficiency improvements
D.2.5.7: Expand use of technical collaboration tools including project management and messaging systems.	Technology Services	Summary of recommendations	On-going	First option is open source software with no license costs

Objective D.2.6: Provide effective desktop support for end-users.

Activity:	Who:	Measured By:	Timeline:	Budget:

Activity:	Who:	Measured By:	Timeline:	Budget:
D.2.6.1: Expand use and effectiveness of Help Desk work order system in support of buildings and Business unit managers (see Activity D.1.2.1)	Technology Services			
D.2.6.2: Improve desktop re-imaging capability.	Technology Services	Summary of recommended changes	On-going	Reallocation of existing staff time
D.2.6.3: Explore options that involve use of supervised student help for specific tasks.	Technology Services, Assistant Superintendent-Secondary, Principals, Teaching & Learning	Recommendations report	2009-10	Reallocation of existing supervisor time

E. Efficiencies

This goal area focuses on opportunities to achieve greater efficiencies in technology use and support. Both functional departments and instructional areas are included.

Goal E.1: Establish efficiency measures in administrative and instructional computing.

Objective E.1.1: Review functional operations for efficiency improvements and deploy as appropriate

21st century Skill Focus:

Activity:	Who:	Measured By:	Timeline:	Budget:
E.1.1.1: Create administrative workstations that include dual monitors for specific occupations where intensive multi-tasking application use is common. Have a laptop with or without a docking station be an option over a desktop. The laptop would be configured with VPN remote access.	Technical Services Director and staff	Standards established and communicated	September 2009	Differential cost over standard desktop is $200 to $400
E.1.1.2: Create data integration tasks that automate the movement of data between Infinite Campus and such systems as the Moodle learning management system, Destiny library system, and other systems.	Chief Information Officer, IS staff	Data integration routines deployed	September 2009, the on-going as other systems opportunities are identified	Estimated 40 hours per system, but included as normal tasks
E.1.1.3: Investigate thin client alternatives to	Technical Services	Recommendations	June 2010	Estimated 120 person

Activity:	Who:	Measured By:	Timeline:	Budget:
desktop purchases. Thin clients have the potential to defer replacement cycles over longer periods as the processing power is derived from the server running the client. The technology is also stated to save technical support time by eliminating certain manual workstations by workstation tasks like imaging. Research competing thin client options and identify a pilot opportunity.	Director and staff, Systems Programmer	made and pilot conducted (as appropriate)		hours, pilot equipment costs are $5,000
E.1.1.4: Annual review of enterprise resource programs including human resources information systems, accounting and finance systems, procurement systems, work order management system, facilities management system, student information systems.	Chief Information Officer and other functional department managers and staff	Reports for each area to Superintendent	On-going on a rotating basis and as business needs require	Such projects will range from 120 to 2,00 person hours depending on the system
E.1.1.5: Review processes that can be redesigned as electronic workflows and comments in all functional departments.	Technical Services Director with other functional department staff	Reports with recommendations completed for each department	On-going	Estimated 80 person hours of internal work per project on average, consultant costs are estimated at $4,00 per project, four projects per year is $16,000

Objective E.1.2: Review functional operations for efficiency improvements and deploy as appropriate.
21st century Skill Focus:

Activity:	Who:	Measured By:	Timeline:	Budget:
E.1.2.1: Explore the use of Google Docs as a tool that can support file sharing without internal network and storage overhead costs. This idea is not appropriate for all situations, but there may be situations where this does make sense. Research the use of these tools with other school districts. Include a pilot project with teachers in summer 2009 and extend into 2009-	Chief Information Officer, Technical Services Director, Teaching & Learning, Education Services	Report with recommendations to Superintendent	March 2010	Pilot costs are staffing for substitutes and extended employment $10,000, equipments for teachers $9,600

Activity:	Who:	Measured By:	Timeline:	Budget:
10 school year.				
E.1.2.2: Establish software acquisition standards consistent with the ELM process that favorably weight browser-based, and open source attributes. Communicate procedures to all instructional staff.	Technical Services Director and staff, Teaching & Learning Executive Director, Educational Services Executive Director	Procedures published	December 2009	No additional costs, part of regular staff tasks
E.1.2.3: Investigate thin client alternatives to desktop purchases. Thin clients have the potential to defer replacement cycles over longer periods as the processing power is derived from the server running the client. The technology is also stated to save technical support time by eliminating certain manual workstations by workstation tasks like imaging. Research competing thin client options and identify a pilot opportunity.	Technical Services Director and staff, Systems Programmer	Recommendations made and pilot conducted (as appropriate)	June 2010	Estimated 120 person hours, pilot equipment costs are $5,000
E.1.2.4: Leverage curriculum and work experience options to address basic technology related tasks that would augment support needs. This would be done in conjunction with appropriate supervision of students when performing such tasks which might be provided by the Technical Services support supervisors, the technicians, and the school-based instructional staff in some combination. Explore models from other school districts.	Technical Services, Teaching & Learning, Educational services, and Student Services administrators and staff	Recommendations reported to Superintendent	April 2010	Estimated 120 person hours

F. Access & Opportunities

This goal addresses equitable access to technology as well as the vision for the appropriate technology needed for all students to thrive in the 21st century. Student access to technology both in and out of schools should be considered in all decisions regarding technology deployment. Access is not universal. Socio-economic status directly correlates with computer and Internet access. Access has also shown to be directly related to student

outcomes like graduation. Simultaneously, the district should consider how it can offset the cost of increasing access of devices to lower income students by reviewing policies regarding allowing students to bring their own computing equipment into the schools. To facilitate a more comprehensive and cohesive planning approach to technology decision-making for students, staff, and parents a formalized and inclusive research and development approach is required.

Students with disabilities also have limited access to technology and rely on technology to close the gap in access to the curriculum. New technology should contribute to increased access for students with visual, physical, cognitive, emotional/behavioral and learning disabilities. Increased access to appropriate technology for students with disabilities will enhances teachers' ability to differentiate instruction and provide universal access to learning.

Goal F.1: Ensuring access and opportunity for all students to succeed using 21st century technology.
Objective F.1.1: Implementing technology acquisition and deployment strategies that ensure the MMSD Board of Education Equity Policy (http://www.madison.k12.wi.us/policies/9001.htm) is adhered to when planning for and deploying technology solutions within schools.
21st century Skill Focus:

Activity:	Who:	Measured By:	Timeline:	Budget:
F.1.1.1: When deploying technologies such as mobile wireless devices in schools consideration of student to device ratios should reflect the access issues. Schools with larger percentages of low-income students should have a lower ratio of students to computing device. Similarly, these considerations should be made in determining the deployment strategy for wireless networks within schools.	Chief Information Officer, Assistant Superintendents for Elementary and Secondary Education, Assistant Superintendent Business Services	Recommendation to Superintendent	April 2010	None
F.1.1.2: Research other school districts that have opened network access for student owned computing technologies in order to develop recommendations for MMSD.		Recommendation to Superintendent	April 2010	None
F.1.1.3: Possible revisions to MMSD Board of Education Policy 4403 (http://www.madison.k12.wi.us/policies/4403.htm)	MMSD Legal Counsel, Chief Information Officer, Technical Services Director	Recommendation to Superintendent	April 2010	None

Objective F.1.2: Create a more formal technology research and development process by December 2009

21st century Skill Focus:

Activity:	Who:	Measured By:	Timeline:	Budget:
F.1.2.1: Create technology R&D team - Identify purpose and scope; Identify team members – include Technical Services, Teaching & Learning, Educational Services, Student Services, Business Services, Human Resources, Research & Evaluation, Principals, Teachers, Secretaries; Identify a team leader(s); Create a schedule for the team's functions, i.e., meeting times, locations, agenda building process, etc.	Chief Information Officer	Team created and meetings scheduled	October 2009	Estimated costs are for substitute teachers and extended employment needed for staff requiring such, approximately $5,000 per year
F.1.2.2: Create communications strategy to inform the MMSD employees, parents, and students of the process.	Public Information Coordinator, Chief Information Officer	Strategy deployed	October 2009	No additional costs, task assigned to staff with existing responsibilities
F.1.2.3: Identify stages of research and development intensity with associated criteria – initial idea, worthy of additional secondary research – literature review, contacts with others using the technology, worthy of proof of concept or field test, worthy of pilot project, worthy of full deployment with associated deployment plan. Track the technology tools under development using this classification approach.	R&D team	Classification approach deployed	December 2009	Part of team's tasks (see action step 1)
F.1.2.4: Create a project tracking tool that can be included as part of the communication strategy so staff, parents, and the broader community are aware of the technology tools under review by the MMSD R&D team and the specific stage of review.	R&D team, Information Services staff	Tracking tool reported to Superintendent	February 2010	Part of team's tasks (see action step 1), No additional costs, task assigned to staff with existing responsibilities
F.1.2.5: Identify and deploy methods to gain input from the staff and community – digital suggestions box, blog/forum, surveys, routine meetings.	R&D team, Information Services staff	Input methods reported to Superintendent	February 2010	Part of team's tasks (see action step 1), No additional costs, task assigned to staff with existing responsibilities
F.1.2.6: Identify a partners advisory group that includes personnel from local corporations, the University of Wisconsin-Madison, Madison Area Technical College, Wisconsin state government agencies, municipal government agencies	Chief Information Officer, R&D team	Group formed	October 2009	No costs

Activity:	Who:	Measured By:	Timeline:	Budget:
F.1.2.7: Develop a strategy to reach out to national corporations with a local presence to create laboratory projects within the MMSD schools	R&D team	Strategy reported to Superintendent	February 2010	Part of team's tasks (see action step 1)
F.1.2.8: Investigate creation of a laboratory within the Doyle Building or at another partner agency location where new technologies could be hosted and reviewed by staff as part of the research and development investigation process. This could also double as a professional development site.	Chief Information Officer, Technical Services Director, Building Services Director	Feasibility report to Superintendent	March 2010	Estimated 40 person hours

Objective F.1.3: Implement technology acquisition and deployment strategies that ensure access to technology, and use of technology to access curriculum, for students with visual, physical, cognitive, emotional/behavioral and learning disabilities.
21st century Skill Focus:

Activity:	Who:	Measured By:	Timeline:	Budget:
F.1.3.1: When acquiring and implementing new technologies, consideration should be give to access and utilization for students with disabilities. This includes, but is not limited to, easy access to screen readers/text-to-speech software, speech-to-text software, switch and scanning access, touch screen technology, portability/access throughout the school building, access to organizational tools, use of video prompting sequences, compatibility with specialized software for students who need alternative access to meet their educational goals.	Chief Information Officer, Assistant Superintendents for Elementary and Secondary Education, Assistant Superintendent Business Services; Educational Services, Teaching and Learning, Instructional Technology	Recommendation to Superintendent	April 2010	None
F.1.3.2: Research, acquire and implement technologies to ensure compliance to IDEA 2004 mandates to ensure that textbooks and related core instructional materials are provided	Technical Services, Teaching & Learning, Educational	Acquisition and implementation of technologies to access instructional materials;	April 2010	Estimated costs are for substitute teachers and extended employment needed for staff requiring

Activity:	Who:	Measured By:	Timeline:	Budget:
to students with print disabilities at the same time as students without disabilities. Alternative formats include audio text, digital text, braille and large print. Staff development and support will be needed related to compliance procedures, use of technology and implementation in the curriculum.	Services, Student Services, Business Services, Human Resources, Research & Evaluation, Principals, Teachers	Student use		such for professional development, approximately $30,000; Staff costs to support: .5-1 FTE for 1-2 years until it's fully implemented. Additional costs for procurement of additional assistive technologies - $250,000.

G. Policymaking, Accountability, Vision and Equity

Goal G.1: The District will maintain the shared vision necessary to ensure every student reaches his or her highest potential.
Objective G.1.1: The District will maintain a shared vision.

Activity:	Who:	Measured By:	Timeline:	Budget:
G.1.1.1: Outward communication via regular updates to the District's Web site.				
G.1.1.2: 2-way communication via administrative and Computer Contacts' meetings, administrative blogs.				

Goal G.2: The District will develop and maintain appropriate forward-thinking information and technology policies and procedures.
Objective G.2.1: Institute policies and procedures that promote the ethical and efficient use of information technology.

Activity:	Who:	Measured By:	Timeline:	Budget:
G.2.1.1: Identify at least one point person for each of our current core information and technology policies and procedures.	Chief Information Officer, Assistant Superintendents for Elementary and Secondary Education, Assistant Superintendent Business Services;	Recorded in annual report.	April 2010.	None

Activity:	Who:	Measured By:	Timeline:	Budget:
	Educational Services, Teaching and Learning, Instructional Technology			
G.2.1.2: Annual review and revision of standard information and technology policies.	Policy point people.	Recorded in annual report.	April 2010	None

H. Partnerships

The effective use of technology in education is larger than the operations of the public school system. It is a community effort. This goal area addresses the numerous comments provided during the needs assessment surveys and focus group listening sessions that called for building partnerships between schools, parents, higher education, community agencies, and businesses and corporations to promote effective technology use.

Goal H.1: Create partnerships to support effective use of technology in schools
Objective H.1.1: Establish an on-going technology planning process that involves community stakeholders
21st century Skill Focus:

Activity:	Who:	Measured By:	Timeline:	Budget:
H.1.1.1: Identify scope and purpose, e.g., building awareness of MMSD technology needs and initiatives, identifying potential partnership projects, reviewing ideas for new technology initiatives, evaluating the technology initiatives for value, creating community support for the technology initiatives.	Executive Director Teaching & Learning, Executive Director Education Services, Chief Information Officer	Summary report provided to the Superintendent	January 2010	None
H.1.1.2: Identify and invite partners to a technology advisory committee including personnel from local corporations, the University of Wisconsin-Madison, Madison Area Technical College, Wisconsin state government agencies, municipal government agencies.	Executive Director Teaching & Learning, Executive Director Education Services, Chief Information Officer	Summary report to the Superintendent	January 2010	None
H.1.1.3: Create priority list of technology efforts	Technology advisory	Summary report to	April 2010	None

Activity:	Who:	Measured By:	Timeline:	Budget:
for partners to review, suggest other initiatives or modifications of current initiatives. List must be a transparent road map for the entire community to follow upon which technology investment decisions are based. Example is the existing MMSD Building Services project list.	committee in conjunction with Executive Director Teaching & Learning, Executive Director Education Services, Chief Information Officer	the Superintendent		
H.1.1.4: Create technology leadership advisory group that includes school staff. Have the staff invite students to participate with them. Have parents also participate. Focus is on reviewing emerging technologies and providing input on project prioritization. Provide recommendations to the Superintendent.	Coordinated by Chief Information Officer with support from various administrators and staff	Team will be have been created and have held its first meeting	December 2009, then on-going meeting at least twice per school year and once in summer	Extended employment for staff $6,000, food $500

Objective H.1.2: Explore innovative school community partnerships
21st century Skill Focus:

Activity:	Who:	Measured By:	Timeline:	Budget:
H.1.2.1: Create an annual community technology forum that engages teachers, students, staff, administrators, parents, community agencies, corporation and employers, UW, MATC, and others in a dialogue around emerging technologies and the needs of the community. Large and small group sessions in this face to face format would create the motivation for continued project development and implementation of community priority initiatives. The idea is to leverage the insights and energy of the entire community to accomplish both the school district's goals and the community's more broadly.	Coordination provided by Chief Information Officer in conjunction with City officials	Report outlining forum to Superintendent and Mayor	October 2010	Estimated 40 person hours
H.1.2.2: Investigate corporate sponsorship of a teacher professional development program in the information technology area (e.g., computer programming, network design, systems security, etc.) whereby the teacher becomes certified in teaching courses articulated between MMSD and UW-Madison and MATC; sponsorship would include the tuition and other instructional costs for the teacher to become certified.	Executive Director Teaching & Learning, support from Chief Information Officer and Technical Services Director	Report update defining efforts and possible recommendations	March 2010	Estimated 40 persons hours
H.1.2.3: Create a MMSD/corporate partnership which allows job sharing between the district and a corporation whereby the employee teaches half day and works within the corporation half day.	Executive Director Human Resources, Assistant Superintendent Secondary Schools, Executive Director Teaching & Learning, Chief Information Officer	Report update defining efforts and possible recommendations	November 2010	Estimated 40 persons hours
H.1.2.4: Expand work experience options for students in information technology especially in local IT businesses especially in small start up	Assistant Superintendent Secondary Schools, Executive Director Teaching	Report update defining efforts and possible	January 2011	Estimated 40 persons hours

Activity:	Who:	Measured By:	Timeline:	Budget:
business which provide entrepreneurship training.	& Learning, Executive Director Student Services, Chief Information Officer	recommendations		
H.1.2.5: Expand service learning projects by extending information technology projects to community agencies for such things as computer repair, web page development, and troubleshooting. Identify potential partners and project opportunities. Relay the potential projects to school officials such as principals, guidance counselors, learning coordinators.	Assistant Superintendent Secondary Schools, Executive Director Teaching & Learning, Executive Director Student Services, Chief Information Officer	Report update defining efforts and possible recommendations	January 2011	Estimated 40 persons hours

Objective H.1.3: Open the schools into the evening to provide programming in part focused on technology
21st century Skill Focus:

Activity:	Who:	Measured By:	Timeline:	Budget:
H.1.3.1: Explore creation of technology enabled lighted school houses staffed until 9:00 pm Monday through Thursday evenings, and on weekends. Provide technology training for students and parents at these sites. Coordinate with MATC, community centers, and other agencies to avoid redundant services.	Project team consisting of MMSD administrators, support staff, City officials, higher education, community agencies	Team created and charge identified	October 2009	Estimated four meetings plus tasks between meeting, total 160 person hours
H.1.3.2: Identify potential partners and services, formulate budget requirement, prepare recommendations to the Superintendent	Project team	Report provided to Superintendent	March 2010	

I. Projected Budget

Professional development recommendations include adding four full-time equivalent technology integration teachers to assist their colleagues in learning about newly emerging technologies and to collaborate with curriculum coordinator staff to integrate technology into content area professional development. These fours positions would annually cost $300,000. In addition, we recommend adding a technology coach in each school. For elementary schools we recommend this be .2 FTE, .4 FTE at middle schools, and 1 FTE for each high school, for a total of 15 FTE. This annual cost is $1,145,000. In addition, we recommend offering extended employment, professional advancement credit (PAC), and substitute teachers so teachers may participate in professional development session during the summer and school year. The estimate for this annual cost would be approximately $600,000 for 500 teachers to participate in an average of six days of professional development. We also recommend that one full-time equivalent staff person be hired to implement professional development all staff in basic operational and productivity software tools such as email, word processing, spreadsheets, etc. This cost is estimated to be $70,000 annually. Professional development sites should also be created at various locations throughout the district to make professional development as physically accessible as possible for staff. This one time cost is estimated at $250,000.

We estimate that an allocation of $2.3 million per year be made to support our personal computing hardware environment for students. This would allow for certain infrastructure improvements on an annual basis as well as achieving an average four-year replacement cycle for individual user computing devices such as desktops, laptops, netbooks, and other handheld devices. The recommendation to provide all teachers and instructional staff with a wireless Internet accessible personal computing device which is updated on a three-year rotation cycle is estimated to cost $400,000 annually. Administrative, clerical, and technical support staff computers should be replaced on a three-year replacement cycle at a cost of approximately $100,000 per year. In addition to increased annual personal computing device investment costs, it is estimated that annual infrastructure costs would be $250,000 per year to increase and replace equipment as needed. Further, providing data projector and document cameras in every classroom will cost an estimated $1,500,000. These are devices are estimated to have a six-year useful life resulting in an annual cost of $250,000. Tablet PCs in each classroom would cost $350,000, or about $70,000 per year on a five-year replacement schedule. Response units could be shared across four classrooms would also have a full investment cost of $350,000, and again $70,000 per year on a five-year replacement cycle. For interactive white boards we recommend six portable units per elementary school, 12 per middle school, and 30 per high school, for a total of roughly 450 across the district. At an estimated cost of $3,000 per board the total investment would be over $1,300,000. On a six-year replacement cycle boards would cost $220,000 per year. Leasing options should be explored for all technologies as a possible cost savings measure. Similarly, extended warranties are potential ways to limit support needs for our internal technicians to more appropriate higher priority support projects and efforts.

The wireless project is estimated to cost approximately $1,250,000. These costs include initial site assessments, local components, central network management facilities, and installation costs. We estimate that another $1 to $2 million would be needed for the hardwired facilities that would be needed to create network and electrical capacity for such things as data projectors, document cameras, charging carts for wireless personal computing devices, and other peripherals. We anticipate a total of up to $3,250,000 million in investments for wireless and hardwired capacity needs.

The previous and projected growth in technology and security infrastructure technical support staff investments required to advance these needs. Our recommendation is that we target the technician staff to computer ratio to no more than 1 to 550. A Gartner research industry benchmark is actually 1 to 150. We are currently staffed in the district at 1 to 650, with 14 full-time equivalent staff in these roles. With the recommended increase in personal computing from the current 9,100 to 12,800 to maintain a 1 to 550 ratio we would need to add nine additional technical support staff at an annual total cost of $600,000. (Simply reaching the 1 to 550 benchmark for technicians to computers ratio with the current inventory, i.e., not increasing the volume of school, classroom, or district computers, would require increasing by two FTE.) In order to manage a growing infrastructure network we also recommend increasing the number of network specialist staff from three to four at a total annual cost of $85,000. Beyond internal staff, it I also anticipated that some amount of external specialist consultation is necessary for specific projects. Our recommendation based on previous years is that $100,000 is an appropriate sum to include in annual budgets for such activities.

Annual costs

Personal computing devices – students:	$2,300,000
Personal computing devices – teachers and instructional staff:	$400,000
Personal computing devices – administrative, clerical, and technical support staff:	$100,000
Display and print technologies (e.g., data projectors, document cameras, printers):	$250,000
Tablet PCs:	$70,000
Student response systems:	$70,000
Interactive white boards:	$220,000
Technology integration teachers:	$300,000
Technology coaches in schools:	$1,145,000
Teacher extended employment, PAC, substitute costs:	$600,000
Trainer operational and productivity tools:	$75,000
Technical staff:	$685,000
External consultation support:	$100,000
TOTAL	**$6,240,000**

One-Time Costs

Wireless infrastructure:	$1,250,000
Hardwired infrastructure:	$1,000,000 to $2,000,000
Professional development centers:	$250,000
TOTAL (high range)	**$3,500,000**

Dissemination to Stakeholders

Distribution Details

The plan will be shared on the web site in a prominent location. It will also be discussed at the technology research and development leadership team meeting and the technology community advisory team meetings that will commence in the fall of 2009. Staff will be provided a link to the plan in an all-staff announcement. Parents and students will be informed of the plan using the Infinite Campus student information system parent and student portals. We can also use the Campus Messenger autodial telephone system to inform parents of meetings to discuss the technology plan. The technology research and development leadership team will manage information accumulated using various digital tools about existing and merging technologies throughout the duration of the planning period. That information will in part be the basis for mid-course adjustments.

Monitoring Evaluation and Revision

A. Monitoring and Evaluation Tools and Processes

There will be a standing oversight committee for the technology plan that includes the Chief Information Officer, the Executive Director of Teaching & Learning, and the Executive Director of Educational Services who will have executive level accountability for the implementation of the plan. Each responsible party will report to the oversight group on the attainment of their goals, objectives, and action steps. As adjustments are made to the plan recommendations will be made to the Superintendent.

Annually, a survey will be conducted among staff, students, parents, and administrators to determine the extent the plan is meeting its stated goals as well as to provide input into adjustments as needed.

The technology research and development leadership team will also serve as a venue for obtaining status on technology plan implementation progress as well as to provide ideas around adjustment. This group's role is designed specifically to help build awareness around emerging technologies that have horizon as short as twelve to eighteen months. The plan will and should change based on the knowledge gained from the R&D efforts.

B. Community Stakeholder Reporting Process

The community technology advisory group is created to assisting in focusing on our vision around technology, identify emerging technologies and partnership opportunities, and to serve as a vehicle for bringing the knowledge around the District's technology efforts into the community.

An annual community-wide technology summit would also serve to inform the community around the technology plan's implementation, to collect new ideas to pursue, and to build networks to accomplish community-wide technology goals that extend beyond the District.

C. Ongoing Long-term Planning Process and Timeline

The action plans for each of the objectives specify which department, or division of the school district is responsible for leading the activity and also describe the data the department or division will collect to document accomplishment of the activity. The specific data elements indicated represent the assessment tools the District will use to monitor and evaluate the progress toward reaching each objective. Each data element serves as evidence of District progress.

Monitoring Progress

The director of each department which has responsibility for implementing activities designed to move the district toward achievement of the objectives and, ultimately, goals will name a **"point person"** to take the lead on each activity. This person will develop a task analysis of the activity and guide the implementation of each task (e.g., professional development, purchasing guidelines, adult literacy). The District's **Technology Council** will convene quarterly meetings with all of the "point people" for each goal. At these meetings participants will (a) review the data elements specified for evaluation, (b) assess progress to date and (c) make appropriate mid-course corrections.

D. Mid-Course Corrections Process

The District's **Technology Council** will convene quarterly meetings with all of the "point people" for each goal. At these meetings participants will (a) review the data elements specified for evaluation, (b) assess progress to date and (c) make appropriate mid-course corrections.

Policy	Status	Approval Date	BOE Policy #
Acceptable Use Policy (Staff)**	BOE Approved	6/17/2002	3720
Acceptable Use Policy (Student)**	BOE Approved	6/17/2002	3721
CIPA - Internet Safety*			
Confidentiality**	BOE Approved	8/26/2002	4150
Copyright (Compliance)*	BOE Approved	6/2/2003	6500
Copyright (H.R. 2215/TEACH Act)*			
Copyright (Materials)*	Information on current practices.		
Copyright (Intellectual Property)	BOE Approved	12/2/1991	8221
Use of Copyrighted Materials Permission Request (.doc)	Current Practice		
Distance Education/Virtual Learning**			
Donations	BOE Approved	6/2/2003	6177
eMail (Staff)**	BOE Approved	6/17/2002	3720
eMail (Student)**	BOE Approved	6/17/2002	3721
Equity	BOE Approved	6/2/2008	9001
Evaluation of Learning Materials (ELM)	BOE Approved	6/5/2000	3611
Fines**	BOE Approved	7/9/1979	3710B
Intellectual Freedom**			
Inter-library Loan	BOE Approved?	1981	
Loss of Materials**	BOE Approved	7/9/1979	3710B
Materials Selection*	BOE Approved	3/27/1989	3612
Privacy (Records)**	BOE Approved	8/26/2002	4157
Reconsideration of Materials (Process)*	BOE Approved	3/27/1989	3613
Reconsideration of Materials - Form*			
Resource Sharing (Interlibrary Loan)**			
Resource Sharing (Public Use)**			
Security (Staff)	BOE Approved	6/17/2002	3720
Security (Student)	BOE Approved	6/17/2002	3721
Web Publishing Admin**		August, 1998	
Weeding of Equipment			

Policy	Status	Approval Date	BOE Policy #
Weeding of Materials**	LMS Policy 7.51	Revised June 2002	

* Required by DPI. *Information & Technology Literacy: A Collaborative Planning Guide for Library Media and Technology*. Wisconsin Dept. of Public Instruction, 2002
** Recommended by DPI. Undated memo.

Glossary

Web 2.0 – A definition of Web 2.0 can be found at: http://en.wikipedia.org/wiki/Web_2.0

References

Alspaugh, J. W. (1999). The Relationship between the number of students per computer and educational outcomes. *Journal of Educational Computing Research, 21*(2), 141-150.

Apple Computer (2005). Research: What it says about 1 to 1 learningpp. 20 p.). Available from http://ubiqcomputing.org/Apple_1-to-1_Research.pdf

Apple Computer (2007). Research on 1 to 1 learning programs: A reviewpp. 14 p.). Available from http://images.apple.com/education/k12/onetoone/pdf/ResearchLearningPrograms.pdf

Ascione, L. (2005). Technology strikes a chord in music education: Electronic music software makes instruction more interactive *eSchool News*, (December 14, 2005), 4. Retrieved from http://www.eschoolnews.com/news/top-news/index.cfm?i=36695&page=1

Baker, E. L., Gearhart, M., & Herman, J. L. (1994). Evaluating the Apple Classrooms of Tomorrow. In E. L. Baker & H. F. O'Neil (Eds.), *Technology assessment in Education and training* (pp. 173-198). Hillsdale, NJ: Lawrence Erlbaum Associates.

Barnett, H. (2001). *Successful K-12 technology planning: Ten essential elements. ERIC Digest.*

Baughman, J. C. (2000). *MCAS and school libraries: Making the connection*. from http://web.simmons.edu/~baughman/mcas-school-libraries/Baughman%20Paper.pdf.

Boers-van Oosterum, M. A. M. (1990). *Understanding of variables and their uses acquired by students in traditional and computer-intensive algebra.* University of Maryland, College Park, MD.

Bottoms, G. (2002). Using technology to improve instruction and raise student achievement: Outstanding practices. Available from http://www.sreb.org/Programs/HSTW/Outstanding/2001_Outstanding_Pract(01V02).pdf

Bottums, G., & Uhn, J. (2007). Project Lead the Way\ works: A new type of career and technical program Available from http://www.pltw.org/pdfs/SREB_Research_Brief.pdf

Buckland, M. (1992). *Redesigning library services: A manifesto*. Chicago, IL: American Library Association.

Butzin, S. M. (2001). Using instructional technology in transformed learning environments: an evaluation of Project CHILD. *Journal of Research on Computing in Education, 43*(4), 367-373.

Callison, D. (2004). *Surveys of Indiana school library media specialists: 2003-2004*. Paper presented at the 2004 AIME Conference. from http://www.ilfonline.org/Units/Associations/aime/Data/Survey%20of%20Indiana%20School%20Libraries%202004.pdf

Carl D. Perkins Career and Technical Education Improvement Act of 2006, 20 U.S.C. 2301.

Chappell, J. (2008). An introduction to notation software. *In Tune Monthly*.

CoSN releases new report for educators exploring the use of collaborative technologies to enhance education (2006, September 7, 2006). *eSchool News*. Retrieved March 21, 2009, from http://www.eschoolnews.com/conference-info/cosn/cosn-news/index.cfm?i=38605.

Cradler, J. (1994). Summary of current research and evaluation findings on technology in education Retrieved April 8, 2009, from http://www.wested.org/techpolicy/refind.html/

Criswell, C. (2008a). Setting up a music lab: The essential steps. *Teaching Music, 15*(4), 26-27.

Criswell, C. (2008b). The Value of podcasting. *Teaching Music, 16*(2), 26-27.

Daggett, W. R. (n.d.). Jobs and the skills gap Available from http://www.leadered.com/pdf/Job-Skills%20Gap%20White%20PaperPDF.pdf

De Leon, J. E., & Borchers, R. E. (1998). High school graduate employment trends and the skills graduates need to enter Texas manufacturing industries. *Journal of Vocational and Technical Education, 15*(1). Retrieved from http://scholar.lib.vt.edu/ejournals/JVTE/v15n1/JVTE6.html

Devaney, L. (2008). Technology makes art education a bigger draw. *eSchool News*, 4. Retrieved from http://www.eschoolnews.com/news/top-news/?i=55283

Dunham, P. H., & Dick, T. P. (1994). Research on graphing calculators. *Mathematics Teacher, 87*(6), 440-445.
Dwyer, D. C. (1994). Apple classrooms of tomorrow: what we've learned. *Educational Leadership, 51*, 4-10.
Free K-12 content available through iTunes U. (2008). *eSchool News*, 2. Retrieved from http://www.eschoolnews.com/news/top-news/index.cfm?i=54390
Fuchs, T., & Woessmann, L. (2004). *Computers and student learning: Bivariate and multivariate evidence on the availability and use of computers at home and at school* (No. 1321). Munich, Germany: CESifo.
Fullan, M. G. (1990). Staff development, innovation and institutional development. In B. Joyce (Ed.), *Changing culture through staff development* (pp. 3-25). Alexandria, VA: ASCD.
Goldberg, A., Russell, M., & Cook, A. (2003). The Effect of computers on student writing: A meta-analysis of studies from 1992 to 2002. *The Journal of Technology, Learning and Assessment, 2*(1), 51.
Gordon, M. T., Moore, E. J., & Gordon, A. C. (2001). *Library staff support public access computing: Experience increased workloads, stress and satisfaction*. Retrieved July 24, 2008. from http://www.gatesfoundation.org/NR/Downloads/libraries/eval_docs/pdf/Lib_staff_501.pdf.
Groves, S. (1994). *Calculators: A learning environment to promote number sense*. Paper presented at the annual meeting of the American Educational Research Association.
Gulek, J. C., & Demirtas, H. (2005). Learning with technology: The impact of laptop use on student achievement. *Journal of Technology, Learning, and Assessment, 3*(2), 38 p. Retrieved from http://escholarship.bc.edu/jtla/vol3/2/
Joseph, N. (2003). Where art meets technology. *A & S Perspectives*, (Autumn 2003). Retrieved from http://www.artsci.washington.edu/news/Autumn03/TechnologyArt_complete.htm
Kimble, C. (1999). The Impact of technology on learning: Making sense of the research Retrieved March 27, 2003, 2003, from http://www.mcrel.org/pdfconversion/policybriefs/pb_impacttechnology.html
Kosma, R. D. (2008). *21st Century skills, education & competitiveness: A resource and policy guide*. Tucson, AZ: Partnership for 21st Century Skills.
Kulik, J. A. (1994). Meta-analytic studies of findings on computer-based instruction. In E. L. Baker & H. F. O'Neil (Eds.), *Technology assessment in education and training* (pp. 9-33). Hillsdale, N.J.: L. Earlbaum Associates.
LaFollette High School 2009-2010 curriculum guide (2009). Available from http://lafolletteweb.madison.k12.wi.us/files/lafollette/curriculumguide.pdf
Lance, K. C. (2002). Impact of school library media programs on academic achievement. *Teacher Librarian, 29*(3), 29-34.
Lance, K. C., Rodney, M. J., & Hamilton-Pennell, C. (2005). *Powerful libraries make powerful learners: The Illinois study*. from http://www.islma.org/pdf/ILStudy2.pdf.
Lance, K. C., Welborn, L., Hamilton-Pennell, C., & Colorado. State Library & Adult Education Office (1993). *The impact of school library media centers on academic achievement*. Castle Rock, Colo.: Hi Willow Research and Publishing: Colorado Department of Education.
Lemke, C., & Coughlin, E. C. (1998). *Technology in American schools: Seven dimensions for gauging progress*. Retrieved July 8, 2008. from http://www.mff.org/pubs/ME158.pdf
Levin, D., & Arafeh, S. (2002). *The Digital disconnect: The widening gap between Intenet-savvy students and their schools*. from http://www.pewinternet.org/pdfs/PIP_Schools_Internet_Report.pdf.
Lowrie, T. (2000). Externally-driven innovations in the vocational education and training sector: Issues associated with staff development. In A. Truell (Ed.), *AERA Vocational education Special Interest Group 2000 proceedings* (pp. 65-82). Washington, DC: American Educational Research Association.

Madison Metropolitan School District (Madison WI) (2004). Agreement between Madison Metropolitan School District and Project Lead the Way, Inc. Madison, WI: Madison Metropolitan School District, Legal Services.
Mann, D., Shakeshaft, C., Becker, J., & Kottkamp, R. (1999). *West Virginia story: Achievement gains from a statewide comprehensive instructional technology program*. Beverly Hills, CA: Milken Family Foundation.
Manzo, K. K., & Davis, S. D. (2005). The Virtual stage. *Education Week, 24*(26), 27-29.
March, T. (2005 / 2006). The New www: Whatever, whenever, wherever. *Educational Leadership, 63*(4), 14-19.
Marshall, J. M. (2002). *Learning with Technology: Evidence that technology can, and does, support learning*. San Diego, CA: San Diego State University.
Miller, R. H. (2000). Electronic resources and academic libraries, 1980-2000: A historical perspective. *Library Trends, 48*(4), 645-670.
Monke, L. (2005 / 2006). The Overdominance of computers. *Educational Leadership, 63*(4), 20-23.
Murray, C. (2005). James urges tech infusion. *eSchool News*, 3. Retrieved from http://www.eschoolnews.com/conference-info/ascd/ascd-news/index.cfm?i=36308
National Association for the Education of Young Children (2008). Technology and young children -- Ages 3 through 8 Retrieved Nov. 24, 2008, 2008, from http://www.naeyc.org/about/positions/PSTECH98.asp
Newmann, F. M., & Wehlage, G. G. (1993). Five standards of authentic instruction. *Educational Leadership, 50*(7), 8-12.
North Dakota Department of Career and Technical Education (n.d.). Standards of quality: For all approved programs at the secondary and postsecondary level Retrieved March 29, 2009, from http://www.nd.gov/cte/services/program-eval/docs/Standards.pdf
Owens, G. S. (1994). Making small beautiful: access, ownership, and resource sharing outside the ARL. *Journal of Library Administration, 20*(1), 59-75.
Pace, A. K. (2006, December 13, 2008). Follett acquires Sagebrush Software. http://blogs.ala.org/pace.php?title=follett_acquires_sagebrush_software.
Peebles, J., Kiefer, K., Lea, M. K., Pochop, K., & Evans, M. (2006). *Information and communications technology plan: July 1, 2006 - June 30, 2009*. Retrieved July 24, 2008. from http://www.madison.k12.wi.us/lms/infotech/ICTPlanBOEApproved.pdf.
Peterson, K. D. (2002). Positive or negative. *Journal of Staff Development, 23*(3), pp. 10-15.
Richardson, J. (2008). The plugged-in school: Districts harness technology to attract and retain new teachers. *The Learning System, 3*(7).
Ringstaff, C., & Kelley, L. (2002). *The Learning return on our educational technology investment: A review of findings from research*. from http://www.wested.org/online_pubs/learning_return.pdf.
Rojano, T. (1996). Developing algebraic aspects of problem solving within a spreadsheet environment. In N. Bednarz, C. Kieran & L. Lee (Eds.), *Approaches to algebra: Perspectives for research and teaching*. Boston, MA: Kluwer Academic Publishers.
Roland, C. (2007). The Art of digital storytelling. *School Arts, 107*(2).
Schachter, J. (1999). *The Impact of education technology on student achievement: What the most current research has to say*. Santa Monica, CA: Milken Family Foundation.
Scholastic Library Publishing (2008). *School libraries work!* (3rd ed.). [Danbury, CT]: Scholastic Library Pub.
Sheets, C. (1993). *Effects of computer learning and problem-solving tools on the development of secondary school students' understanding of mathematical functions*. University of Maryland, College Park, MD.
Sichivitsa, V. (2007). Audacity in vocal improvisation. *Teaching Music, 14*(4), 49-51.
Sivin-Kachala, J., & Bialo, E. R. (2000). *2000 research report on the effectiveness of technology in schools* (7th ed.). Washington, DC: Software Information Industry Association.

Smith, E. G. (2001). *Texas school libraries: Standards, resources, services, and student's performance*. from http://www.tsl.state.tx.us/ld/pubs/schlibsurvey/index.html.

Smith, E. G. (2006). *Student learning through Wisconsin school library media centers: Library media specialist survey report*. Retrieved July 19, 2008. from http://www.dpi.wi.gov/imt/pdf/finallmssurvey06.pdf.

Stansbury, M. (2008). 'Learning' replaces 'teaching' *eSchool News*, 2. Retrieved from http://www.eschoolnews.com/conference-info/ascd/ascd-news/index.cfm?i=53185

Todd, R. J. (2005). *Report of the Delaware school library survey 2004*. from http://www2.lib.udel.edu/taskforce/study/titlepage.pdf.

Todd, R. J., & Kuhlthau, C. C. (2004). *Student learning through Ohio school libraries: Background, methodology and report of findings*. from http://www.oelma.org/studentlearning/default.asp.

Vygotski, L. S., & Cole, M. (1978). *Mind in society : the development of higher psychological processes*. Cambridge: Harvard University Press.

Wenglinsky, H. (1998). *Does it compute? The relationship between educational technology and student achievement in mathematics*. Retrieved July 8, 2008. from ftp://ftp.ets.org/pub/res/technolog.pdf.

Zucker, A. A., & McGhee, R. (2005). *A study of one-to-one computer use in mathematics and science instruction at the secondary level in Henrico County Public Schools*. Retrieved July 20, 2008. from http://ubiqcomputing.org/FinalReport.pdf.

1. Classroom Technology Environment – Career and Technical Education		
Standard Technology Model		
	Description:	**Rationale:**
Common Career and Technical Education (CTE) Lab:	****Common CTE Lab:** 28 Computers 1 Teacher station with dual monitors 1 Teacher laptop (DVD player, CD/DVD burner) 1 Presentation station with LCD projector 1 ELMO 1 Demonstration Camera 1 Screen 2 Printers (color and black and white) 1 Scanner 1 Site License of SynchronEyes or similar software 1 Site license of Microsoft Office 1 Wireless presentation remote 1 VCR and DVD player 1 TV (cable hook up) 1 Digital camera 1 Digital video camera	
Middle School		
Middle School Family and Consumer Education Lab	**Common High School CTE Lab**** without computers Mobile computer lab with 28 computers 6 Fully equipped Kitchens with one handicap accessible Kitchens that are up to safety code with Sanitary counter tops and GFI outlets Sink Dish washer Towels, dish clothes, hot pads Set of pots and pans Blender Kitchen Aid Mixer Garbage disposal Set of silverware Set of Knives Set of utensils Mixing bowls Bakeware Measuring equipment Storage containers 6 Table settings per kitchen Cabinet locks Cabinets	

1. Classroom Technology Environment – Career and Technical Education		
Standard Technology Model		
	Description:	**Rationale:**
	Instant hot water tap Stoves with dual Convection ovens Mouse-proof storage bins for flour, sugar, pasta, etc. Locked cabinet or drawer for knives 2 cutting boards per kitchen area 6 Microwaves 2 Freezers 4 Fridges 1 Washing machine 1 Clothes Dryer 30 Chef knifes 30 Paring knifes 6 Bread knifes 28 Sewing machines and sewing equipment 1 Herb garden 1 Food dehydrator	
Middle School Project Lead The Way Lab (Technology Education)	**Common High School CTE Lab**** 28 Computers that can run the AutoDesk software 1 Printer 11x17 color	
High School		

1. Classroom Technology Environment – Career and Technical Education		
Standard Technology Model		
	Description:	**Rationale:**
Automotive Technology Lab	**Common High School CTE Lab**** (with only 10 computers) 2 Laptops with scanner software 4 Scanners (Ethos, Modis, Genysis, Solus Pro) 1 Tire Changer 1 Spin Balancer 3 Vehicle lifts 1 Air compressor and drier 1 Torch set 1 220V Welder 1 120V Welder 10 Sets of tools 14 Sets of small engine tools 1 Parts washer 1 Valve grinder 1 Brake lathe 1 Transmission flusher 1 Alignment rack 28 L head engines 28 OHV engines Automotive diagnostic tools Supply cabinets and fire safety cabinets 14 Electrical boards Work Tables (10-14)	

1. Classroom Technology Environment – Career and Technical Education		
Standard Technology Model		
	Description:	**Rationale:**
Woodworking and Construction Lab	**Common High School CTE Lab**** (with only 10 computers) 1 Printer for 11x17 1 Plotter 2 Saw Stops CNC 4x8 foot machine 1 Wide Belt sander 2 Band saws 2 lathes 1 Kreg machine 4 Router tables 1 Planner 1 Spindle sander 3 Sanding tables 1 Ventilation system 1 Paint and varnish area 3 Drill presses 3 Miter boxes 1 Panel saw 2 Scroll saws 1 set of Festool equipment Work Tables (10-14)	
Standard Business Lab	**Common High School CTE Lab**** 1 Smart board	

1. Classroom Technology Environment – Career and Technical Education		
Standard Technology Model		
	Description:	**Rationale:**
Business (Web & Digital Communications & Interactive Media)	**Common High School CTE Lab** with the following computer upgrades:** - upgraded/larger flat screen monitors (ex. Dell Ultra Sharp, 2208WFP 22-inch Widescreen Flat Panel LCD Monitor with Height Adjustable Stands) -upgrade w/ Webcams (for collaboration with schools from different countries) - Dual monitors for teacher station & stand for second monitor 1 Smart board 1 Adobe Creative Suite or similar software license 2 Scanners 6 digital cameras [18x optical zoom minimum, glass optics (Lica), minimum 10 megapixel - Panasonic DMC-FZ28K Lumix preferred] 28 Digital Tablets (ex. WACOM Intuos3 - 12x12 USB or most current model) 12 digital video cameras (Flip or other) 1 HP Large format color laser printer (11 x 17) 1 HP standard format black and white printer 1 HP standard format color printer 5 Memory cards for cameras 10 Extra Batteries & Chargers	
Business & Marketing (Finance, Business Management & Administration, Marketing Lecture)	**Common High School CTE Lab**** with 30 **WIRELESS** Laptop computers 1 Smart board w/ projector mounted from ceiling w/ Senteo™ interactive response system 1 Site License of Adobe Creative Suite or similar software Dual monitors for teacher station & stand for second monitor 3 digital video recorder 2 digital camera Dual Credit Accounting or similar software QuickBooks site license or similar software Sports & Entertainment Simulation or similar software 1 HP standard format black & white printer 1 HP standard format color printer Memory cards for cameras Extra Batteries & Chargers	

1. Classroom Technology Environment – Career and Technical Education		
Standard Technology Model		
	Description:	**Rationale:**
Business (Network Systems, Information Support & Services, Programming & Software Development)	**Common High School CTE Lab**** 1 Smart board w/ projector mounted from ceiling 1 Site License of Adobe Creative Suite or similar software 1 Site License of GameMaker or similar software Dual monitors for teacher station & stand for second monitor 1 HP standard format black & white printer 1 HP standard format color printer Scantek/LJGroup IT software or similar software various IT Essentials software (partion magic, remote access, and others) A+ certification Test Preparation Software Memory cards for cameras Extra Batteries & Chargers	
Business (Computer literacy)	**Common High School CTE Lab**** 1 Smart board w/ projector 1 Adobe Creative Suite or similar software license Keyboarding software (Ainsworth, Microtype) or similar software site license Dual monitors for teacher station & stand for second monitor 28 - 4 GB or 8 GB flash drives (for saving large graphics files) 2 Scanners 2 digital cameras HP standard format black and white printer HP standard format color printer 3 Flat Panel TVs wall mounted	

1. Classroom Technology Environment – Career and Technical Education		
Standard Technology Model		
	Description:	**Rationale:**
Marketing Lab	**Common High School CTE Lab**** with 30 **WIRELESS** Laptop computers 1 Smart board w/ projector mounted from ceiling w/ Senteo™ interactive response system 1 Site License of Adobe Creative Suite or similar software Marketing Test Preparation Software upgrade w/ Webcams (for collaboration with schools from different countries) Dual monitors for teacher station & stand for second monitor 3 digital video recorder 2 digital camera QuickBooks site license or similar software Inventory control software or similar software 1 HP standard format black & white printer 1 HP standard format color printer 1 HP Poster format color laser printer 6 iMac computers Final Cut Studio editing software site license (12 seats) 2 professional/consumer camcorders (Prosumer) Memory cards for cameras Extra Batteries & Chargers	
School Store	**Common High School CTE Lab**** with only 10 computers Pinnacle software Adobe CS3 software Advertising software Video editing software Security system with four cameras Theft prevention sensors School Store Cash Register Point of sale system Label maker Digital camera Smart board Digital signage Poster printer 2 scanners Safe for cash deposits	
Computer Science	**Common High School CTE Lab**** 1 Smart board 14 Tear down computers Server for 14 tear down machines	

1. Classroom Technology Environment – Career and Technical Education		
Standard Technology Model		
	Description:	**Rationale:**
	Routers Switches Security products Wireless capability Routers Ghost program	
Family and Consumer Ed Lab	**Common High School CTE Lab**** with only 10 computers 6 Fully equipped Kitchens with one handicap accessible Kitchens that are up to safety code with Sanitary counter tops and GFI outlets Sink Dish washer Towels, dish clothes, hot pads Set of pots and pans Blender Kitchen Aid Mixer Garbage disposal Set of silverware Set of Knives Set of utensils Mixing bowls Bakeware Measuring equipment Storage containers 6 Table settings per kitchen Cabinet locks Cabinets Instant hot water tap Stoves with dual Convection ovens Mouse-proof storage bins for flour, sugar, pasta, etc. Locked cabinet or drawer for knives 2 cutting boards per kitchen area 6 Microwaves 2 Freezers 4 Fridges 1 Washing machine 1 Clothes Dryer 30 Chef knifes 30 Paring knifes 6 Bread knifes 1 Herb garden 1 Food dehydrator	

1. Classroom Technology Environment – Career and Technical Education		
Standard Technology Model		
	Description:	**Rationale:**
Health Science Occupations Lab	**Common High School CTE Lab**** with only 10 computers 12 anatomy in clay manikins Storage for clay Anatomy model with removable organs 24-hour clock Lab space with (minimum) 3 hospital beds with rails and locking wheel brakes 1 Call bell 1 Glove rack 1 Small garbage container and 1 Sharps container 3 privacy screen 4 pillows per bed 3 sets linens per bed (fitted sheet, half sheet, incontinence pad, flat sheet, bedspread, pillow case, bath blanket) 8 towels and wash cloths per bed Clothing protectors Wheelchair with foot rests 3 overbed tables 3 bedside stands Balance scale with height bar Procedures manikin with M/F interchangeable genitals Choking manikin CPR manikin set (adult, toddler, infant) Shampoo tray and doll head with hair Gait belts TED stockings Patient gowns and Isolation gowns Emesis basins Bath basins Dentures/denture cup/brush Urinals Graduates Standard bedpans Fracture bedpan Laundry bins Cane and Walker Limb restraints Restraint alternative (pressure sensing alarm or wander guard) Spoons Food trays Cups Catheters Urinary drainage bags Commode Shower chair, XL and XXL pants and button-down and pull-over shirts Storage shelves for equipment Locking cabinet with small storage drawers for equipment Locking file cabinet for students' paperwork with PHI.	

1. Classroom Technology Environment – Career and Technical Education		
Standard Technology Model		
	Description:	**Rationale:**
Early Childhood Lab	**Common High School CTE Lab**** with only 10 computers 8 "Baby-Think-It-Overs" Storage/recharging case to reprogram 8 "Baby-Think-It-Overs" 1 Fully equipped Kitchen 1 Microwave	
Interior Design Lab	**Common High School CTE Lab**** with only 10 computers CAD software for architecture and interior design planning and 3D display 28 Architectural rulers	
Fashion Design Lab	**Common High School CTE Lab**** with only 10 computers 28 Sewing machines 3 Sergers 1 Embroidery Machine 1 Electric scissors sharpener 2 sets design cards for embroidery machine 1 full length 3-way mirror 1 dress form (manikin to drape pattern designs on) 2 lockable storage cabinet with the small drawers for equipment storage 2 lockable storage space with shelves for the sewing machine/serger/emboidery storage 1 Storage space with shelves for fabric 1 Storage cabinet with the large drawers for student project storage are needed. Power and lowered counter space (or sewing machine cabinets) are needed for the machines.	This career path is using CAD for fitting and pattern development and for career portfolio development.
Project Lead The Way Lab	**Common High School CTE Lab**** 28 Computers that can run the AutoDesk software 1 Printer 11x17 color *Civil Engineering and Architecture Course:* 1 Plotter *Introduction to Engineering Design and Principles Of Engineering Courses*: 1 3D Printer 1 Laser Cutter *Computer Integrated Manufacturing Course*: 1 CNC Mill	

1. Classroom Technology Environment – Career and Technical Education		
Standard Technology Model		
	Description:	**Rationale:**
	1 Robotic Arm	
Metals Manufacturing Lab	**Common High School CTE Lab**** with only 10 computers 1 Printer 11X17 color 4 Welding booths with translucent curtains and adjustable work tables 4 MIG welders 1 TIG welder 2 metal cutting band saws 1 sandblaster / beater 2 pedestal belt/disc combo sanders 2 pedestal grinders (with 3 different grinding wheels and 1 wire wheel) 2 full-size milling machines 2 metal lathes 1 oxy-acetylene torch 2 plasma cutters 1 power hacksaw 1 pedestal punch press 1 48” sheer 1 90 degree pedestal sheer 1 CNC plasma cutter table 1 spot welder 2 melting pots 1 English wheel 1 flammable safety cabinet 1 sheet metal roller 2 breaks 1 hydraulic pipe bender 2 drill presses Worktables (10-14 ideal) 6 Cabinets Hand tools to fill one cabinet Various wrenches to fill one cabinet Various clamps and vise grips to fill one 1 Cabinet Various fasteners and 2 pop-rivet guns to 4 Cabinets 2 or more for student storage Measuring tools to fill one cabinet Sheet metal and pipe storage racks	

1. Classroom Technology Environment – Career and Technical Education		
Standard Technology Model		
	Description:	**Rationale:**
Video Production Lab	**Common High School CTE Lab**** 14 iMac computers Site license Final Cut Studio editing software (16 seats) 12 professional/consumer camcorders (prosumer) 2 studio quality cameras 3 studio monitors 1 studio video switcher 1 studio audio switcher 1 lowell light kit 10 handheld microphones 8 lavalier microphones 8 battery operated camera lights 8 lowell/tota ac powered portable lights 12 bogen/manfrotto tripods	
Computer Graphics Lab	**Common High School CTE Lab**** 28 computers that have a minimum of 2 gb ram Site license for Adobe CS4 14 digital still cameras (12X optical zoom, 10 megapixels) Memory cards for cameras	

2. Classroom Technology Environment - Fine Arts

K - 5th Grade Visual Arts - Standard Technology Model

Description-Quantity	Rationale	Total Cost	Professional Development	Other
K-12 Visual Arts Technology Items	WI Academic Standards-Visual Arts investigates concepts that see, imagine, design, create, produce, and identifying connections to both cultural and historical elements. The access to the technological classroom resources identified assist in the pursuit of these standards.	$6,587.99	Technology components new to staff will require ongoing professional development opportunities. In addition, there will need to be online communication tools that connect staff to each other to share uses, success, and challenges utilizing these resources	MMSD Tech. Serv. Pricing 2009
Online Curricular Resources-i.e. Davis Publications "Explorations in Art- Digital" K-5 Resources rough estimate	Provides resources for online music curriculum.	$10,525	Technology use for online curriculum resources will require ongoing professional development opportunities. In addition, there will need to be online communication tools that connect staff to each other to share uses, success, and challenges utilizing these resources in the classroom.	Davis Publications
Beginning Design Software-(i.e. Kid Pix)	Technology resource for student use in art design.	$1,200.00	Review of instructional use.	Estimated price could be installed within school lab for use and one teacher's computer
DVD/VCR/TV -1	Resource provides students with audio and visual examples to discuss standards based on analysis and evaluation of own work and others.	$300.00	None needed, however videos/DVDs/Online resources require additional review prior to the use in the classroom. A team will be gathered to explore the	Estimated price

Description-Quantity	Rationale	Total Cost	Professional Development	Other
			appropriate uses of these materials and the natural connections to help build artistic skills and knowlede.	
	TECH. TOTAL	**$18,612.99**		

6th - 8th Grade Visual Arts - Standard Technology Model

Description	Rationale	Total Cost	Professional Development	Other
K-12 Visual Arts Technology Items	WI Academic Standards-Visual Arts investigates concepts that see, imagine, design, create, produce, and identifying connections to both cultural and historical elements. The access to the technological classroom resources identified assist in the pursuit of these standards.	$6,587.99	Technology components new to staff will require ongoing professional development opportunities. In addition, there will need to be online communication tools that connect staff to each other to share uses, success, and challenges utilizing these resources	MMSD Tech. Serv. Pricing 2009
Online Curricular Resources- i.e. Davis Publications "Explorations in Art- Digital" 6-8 or Silver Burdett resources	Provides resources for online music curriculum.	$5,000	Technology use for online curriculum resources will require ongoing professional development opportunities. In addition, there will need to be online communication tools that connect staff to each other to share uses, success, and challenges utilizing these resources in the classroom.	Davis Publications rough estimate
Design software (i.e. Adobe Creative Suite, Photoshop)	Technology resource for student use in art design.	$2,000.00	Review of instructional use.	Estimated price could be installed within school lab for use and one teacher's computer

Description	Rationale	Total Cost	Professional Development	Other
VCR/TV -1	Resource provides students with audio and visual examples to discuss standards based on analysis and evaluation of own work and others.	$300.00	None needed, however videos/DVDs/Online resources require additional review prior to the use in the classroom. A team will be gathered to explore the appropriate uses of these materials and the natural connections to help build artistic skills and knowlede.	
PRS	-	$1,000	Review of instructional use.	MMSD Tech. Serv. Pricing 2009
Digital Video Camera	-	$500	Review of instructional use.	MMSD Tech. Serv. Pricing 2009
Wireless Slate	-	$1,000	Review of instructional use.	MMSD Tech. Serv. Pricing 2009
	TECH. TOTAL	**$16,387.99**		

9th - 12th Grade Visual Arts - Standard Technology Model

Description	Rationale	Total Cost	Professional Development	Other
K-12 Visual Arts Technology Items	WI Academic Standards-Visual Arts investigates concepts that see, imagine, design, create, produce, and identifying connections to both cultural and historical elements. The access to the technological classroom resources identified assist in the pursuit of these standards.	$6,587.99	Technology components new to staff will require ongoing professional development opportunities. In addition, there will need to be online commuication tools that connect staff to each other to share uses, success, and challenges utilizing these resources	MMSD Tech. Serv. Pricing 2009
Interactive Whiteboard Promethean Board - $1300 on stand for additional art class use (i.e. photography class)	WI Academic Standards-Visual Arts investigates concepts that see, imagine, design, create, produce, and identifying connections to both cultural and historical elements. The access to the technological classroom resources identified assist in the pursuit of these standards.	$1,300	Ongoing Professional development required to assist with instructional use.	MMSD Tech. Serv. Pricing 2009 (Promethean Price deal 3/09)
Design software (i.e. Adobe Creative Suite, Photoshop)	Technology resource for student use in art design.	$2,000.00	Review of instructional use.	Estimated price could be installed within school lab for use and one teacher's computer
VCR/TV -1	Resource provides students with audio and visual examples to discuss standards based on analysis and evaluation of own work and others.	$300.00	None needed, however videos/DVDs/Online resources require additional review prior to the use in the classroom. A team will be gathered to explore the	Estimated price

Description	Rationale	Total Cost	Professional Development	Other
			appropriate uses of these materials and the natural connections to help build artistic skills and knowlede.	
PRS	-	$1,000	Review of instructional use.	MMSD Tech. Serv. Pricing 2009
Digital Video Camera	-	$500	Review of instructional use.	MMSD Tech. Serv. Pricing 2009
Wireless Slate	-	$1,000	Review of instructional use.	MMSD Tech. Serv. Pricing 2009
	TECH. TOTAL	**$12,687.99**		

K - 12th Grade Music - Standard Technology Model

Description	Rationale	Total Cost	Professional Development	Other
Interactive Whiteboard Board - SMART-$3298 mounted Promethean mounted $3200; $1300 on stand;	WI Academic Standards-Music investigates concepts that include student opportunities to describe, create, improvise, and identifying connections to both cultural and historical elements. The access to the technological classroom resources identified assist in the pursuit of these standards.	$3,298	Ongoing Professional development required to assist with instructional use.	MMSD Tech. Serv. Pricing 2009
Stereo System including- 5 disc CD changer Removable speakers Recording capabilities Microphone jacks CD-recorder or MP3 Recorder, IPOD	WI Academic Standards-Music investigates concepts that include student opportunities to describe, create, improvise, and identifying connections to both cultural and historical elements. The access to the technological classroom resources identified assist in the pursuit of these standards.	$1,000	Technology components new to staff will require ongoing professional development opportunities. In addition, there will need to be online commuication tools that connect staff to each other to share uses, success, and challenges utilizing these resources in the classroom.	Estimated price
VCR/TV -1	Resource provides students with audio and visual examples to discuss standards based on analysis and evaluation of own performance and of others.	$300.00	None needed, however videos/DVDs/Online resources require additional review prior to the use in the classroom. A team will be gathered to explore the appropriate uses of these materials and the natural connections to help build musical skills and knowledge.	Estimated price
Electric Keyboard w/MIDI capabilities, touch sensitive,	Classroom, practice, performance resource	$3,000	Review of instructional use.	Estimated price

Description	Rationale	Total Cost	Professional Development	Other
full size keys and 88 keys.				
Portable Boom Box -1	Tool utilized to play musical selections for Standards that focus on analysis and evaluation of own performance and of others, as well for Standards highlighting singing along and playing with other.	$200.00	None needed. Musical examples used in class must fit the objectives/musical concepts/age level appropriateness of the class listening to the pieces.	Estimated price
Overhead projector		$274.99	Safety instructional review.	https://www.schooloutfitters.com/catalog/
Digital Video Camera	Resource provides students with audio and visual examples to discuss standards based on analysis and evaluation of own performance and of others.	$500	Review of instructional use.	MMSD Tech. Serv. Pricing 2009
Teacher PC with: Headphones, CD burner, External speakers		$829	Review of instructional use.	MMSD Tech. Serv. Pricing 2009
Printer- Small B&W		$527	Review of instructional use.	MMSD Tech. Serv. Pricing 2009
	TOTAL	**$6,631**		

K - 5th Grade Music - Standard Technology Model

Description	Rationale	Total Cost	Professional Development	Other
K-12 Music Technology Items	WI Academic Standards- Music investigates concepts that include student opportunities to describe, create, improvise, and identifying connections to both cultural and historical elements. The access to the technological classroom resources identified assist in the pursuit of these standards.	$6,631	Technology components new to staff will require ongoing professional development opportunities. In addition, there will need to be online communication tools that connect staff to each other to share uses, success, and challenges utilizing these resources in the classroom.	
Online Curricular Resources- i.e. Silver Burdett	Provides resources for online music curriculum.	$11,529	Technology use for online curriculum resources will require ongoing professional development opportunities. In addition, there will need to be online communication tools that connect staff to each other to share uses, success, and challenges utilizing these resources in the classroom.	Silver Burdett rough estimate
	TECH. TOTAL	**$18,159.99**		

6th - 8th Grade Music - Standard Technology Model

Description	Rationale	Total Cost	Professional Development	Other
K-12 Music Technology Items	WI Academic Standards-Music investigates concepts utilizing singing, musical instruments, movement, student opportunities to describe, create, improvise, and identifying connections to both cultural and historical elements. The access to the classroom r	$6,631	Technology components new to staff will require ongoing professional development opportunities. In addition, there will need to be online communication tools that connect staff to each other to share uses, success, and challenges utilizing these resources.	
Interactive Whiteboard Board - SMART or Promethean on stand $1300 on stand for sharing between two music areas.	WI Academic Standards-Music investigates concepts that include student opportunities to describe, create, improvise, and identifying connections to both cultural and historical elements. The access to the technological classroom resources identified assist in the pursuit of these standards.	$1,300	Ongoing Professional development required to assist with instructional use.	MMSD Tech. Serv. Pricing 2009
MIE System- Full 16 stations will accommodate 30 students and one teacher. All software, hardware, cords, connections included.	WI Academic Standards-Music investigates Composition, improvisation, and analysis of music concepts utilizing musical instruments.	$22,995.00	Technology components new to staff will require ongoing professional development opportunities. In addition, there will need to be online communication tools that connect staff to each other to share uses, success, and challenges utilizing these resources.	Yamaha pricing as of 2009
Online Curricular Resources-	Provides resources for online	$3,000	Technology use for online	Silver Burdett rough estimate

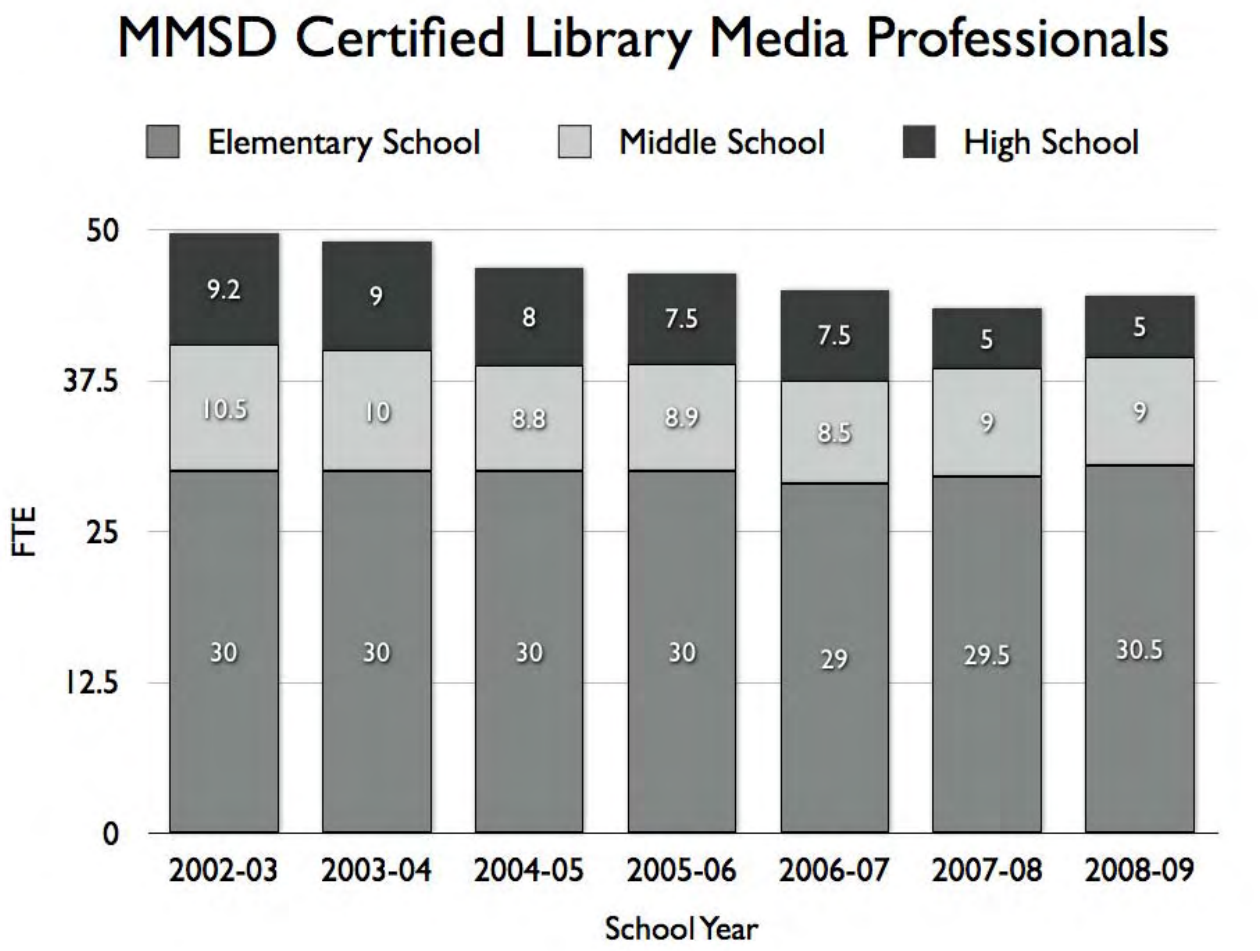
i.e. Silver Burdett	music curriculum.		curriculum resources will require ongoing professional development opportunities. In addition, there will need to be online communication tools that connect staff to each other to share uses, success, and challenges utilizing these resources in the classroom.	
	TECH. TOTAL	**$33,925.99**		

9th - 12th Grade Music - Standard Technology Model

Description	Rationale	Total Cost	Professional Development	Other
K-12 Music Technology Items	WI Academic Standards-Music investigates concepts utilizing singing, musical instruments, movement, student opportunities to describe, create, improvise, and identifying connections to both cultural and historical elements. The access to the classroom r	$6,631	Technology components new to staff will require ongoing professional development opportunities. In addition, there will need to be online communication tools that connect staff to each other to share uses, success, and challenges utilizing these resources	
Interactive Whiteboard Board - SMART or Promethean on stand $1300 on stand for sharing between two music areas.	WI Academic Standards-Music investigates concepts that include student opportunities to describe, create, improvise, and identifying connections to both cultural and historical elements. The access to the technological classroom resources identified assist in the pursuit of these standards.	$1,300	Ongoing Professional development required to assist with instructional use.	MMSD Tech. Serv. Pricing 2009
MIDI Keyboards or MIE System- Full 16 stations will accommodate 30 students and one teacher. All software, hardware, cords, connections included. (Amt. for MIE)	WI Academic Standards-Music investigates Composition, improvisation, and analysis of music concepts utilizing musical instruments.	$22,995.00	Technology components new to staff will require ongoing professional development opportunities. In addition, there will need to be online commuication tools that connect staff to each other to share uses, success, and challenges utilizing these resources	Yamaha pricing as of 2009
Software for composition (i.e.	Provides resources for online	$1,000.00		Estimated price

Sibelius), arranging, musical resource online opportunities (i.e. Travels w/Music online resource)	music curriculum.			
	TECH. TOTAL	**$32,925.99**		

3. Library Media Center Staffing (Certified)



4. MMSD LMC Materials Circulation - April 1, 2008 - March 31, 2009

School	Enrollment*	Total Circulation	Per Pupil Circulation
Allis / Nuestro Mundo	597	31,602	52.93
Chavez	575	34,899	60.69
Crestwood	372	21,528	57.87
Elvehjem	408	22,296	54.65
Emerson	289	16,147	55.87
Falk	339	21,536	63.53
Franklin	371	25,275	68.13
Glendale	415	30,756	74.11
Gompers	228	20,056	87.96
Hawthorne	336	24,058	71.60
Huegel	422	32,500	77.01
Kennedy	541	28,111	51.96
Lake View	265	14,554	54.92
Lapham	229	19,805	86.48
Leopold	684	35,627	52.09
Lincoln	365	33,749	92.46
Lindbergh	217	15,671	72.22
Lowell	274	8,499	31.02
Marquette	221	11,666	52.79
Mendota	270	15,088	55.88
Midvale	355	22,210	62.56
Muir	422	17,147	40.63
Olson	273	16,389	60.03
Orchard Ridge	253	20,213	79.89
Randall	346	21,401	61.85
Sandburg	330	18,558	56.24
Schenk	414	32,686	78.95
Shorewood Hills	412	35,115	85.23
Stephens	420	30,282	72.10
Thoreau	379	21,676	57.19
Van Hise	341	16,335	47.90
Elem Totals#	**11363**	**715435**	**62.96**

School	Enrollment*	Total Circulation	Per Pupil Circulation
Black Hawk	386	8,317	21.55
Cherokee	576	19,275	33.46
Hamilton	757	17,208	22.73
Jefferson	478	11,310	23.66
O'Keeffe	429	11,041	25.74
Sennett	641	12,427	19.39
Sherman	377	14,775	39.19
Spring Harbor	268	5,773	21.54
Toki	538	6,366	11.83
Whitehorse	475	16,011	33.71
Wright	241	5,076	21.06
MS Totals#	**5,166**	**127,579**	**24.70**

East / East DCP	1,734	9,261	5.34
La Follette	1,646	9,898	6.01
Memorial	1,924	11,981	6.23
Shabazz	116	487	4.20
West / West DCP	2,041	6,807	3.34
HS Totals	**7,461**	**38,434**	**5.15**

MSCEL		9,062
Video Library		1,994

* 2008 Third Friday Count

5. Students per Library Media Specialist – 2002-2009