"But our dream today is not fundamentally about technology. Technology is a means to an end. Our dream is about communication––the most basic human strategy we use to raise our children, to educate, to heal, to empower and to liberate." US Vice-President Al Gore at the G-7 Conference, Brussels, 26 February 1995.

Introduction

MMM Public Schools (MPS) is the fourteenth largest school district in the nation and serves 103,000 students in 155 schools. Seventy-one percent of students are eligible for free or reduced lunch. Minority enrollment (74%) has more than tripled since 1966; 58% of the students are African American, 26% white, 10% Hispanic, 3% Asian, and 2% other non-whites. Students' achievement patterns continue to show a need to reduce the gap between the performance of minority students and white students in most schools.

MPS is in the forefront of urban educational reform. With dynamic leadership over the past four years, MPS

- has developed K-12 Teaching and Learning Goals that are interdisciplinary and closely aligned with the Wisconsin Learner Outcomes;

- has recently completed a draft of K-12 content standards that are presently guiding the development of performance assessments; and

- is scaling up its School to Work reform effort for the 1995-96 school year to prepare all children to be life long learners and productive members of society.

Wisconsin and MMM stand out as leaders in the School to Work (STW) movement. STW is not a vocational track in MMM; it engages all students whether they will go on to further education upon graduation or enter the workplace, for they all need strong preparation: "Schools that teach, use and model technological literacy will prepare students for work in the information age-students who will have significant, productive jobs in the post-industrial economy. Schools that fail …to use the new literacy will become holding pens for second-class students, training them for jobs that rarely exist and add little to the national wealth" (Ross Bailey, 1994).

Technology is a key element of the district's K-12 goals, its standards and assessments, and the MPS School to Work plan. Goal 6 states "Students will use technological resources capably, actively, and responsibly." Written in 1991, the K-12 Teaching and Learning Goals led to an MPS technology initiative and strategic plan described fully in Appendix E. Recently completed was a thorough study by Coopers and Lybrand of the resources and use of technology in every school and office in the district with needs for hardware, software, and staff development identified for each site. Described in the study was a goal technology architecture for both the district and the schools (see Exhibits 1 and 2). MPS has begun the roll-out of technology according to the plan with the purchase of $5 million worth of computers in May, 1995 alone, connection of every school with the Internet in June, 1995, and staff development initiatives for novice and intermediate-level users of technology scheduled to begin in the summer months. Curriculum integration is the principal goal of the staff development--both integration across discipline lines and the incorporation of technology into instruction.

HISTORY OF MPS TECHNOLOGY STRATEGY

In 1989, MMM Public Schools (MPS) performed a strategic planning study of the technology needs and requirements for the District. The recommendations from that study included the creation of the Executive Technology Review Committee (ETRC). That Committee, comprised of key users and decision makers who operate at the highest management levels including school principals, was charged with establishing a vision for technology for the District and guiding the administration's efforts to achieve that vision. As the ETRC focused, there was general recognition that work was required for development of instructional systems. The ETRC launched two related activities to address this need. In October of 1992, the ETRC facilitated a meeting of approximately 35 teachers from across the District who developed the Instruction Technology Standards. These comprehensive educational technology standards formed the backbone for the second activity, the development of a Strategic Plan for Technology for both instructional and administrative functions.

The purpose of the Strategic Plan for Technology was to develop an approach at a District wide level to achieve the mission and strategic goals of the District. The key themes resulting from the visioning process are presented within the context of the MMM Board of School Directors' Mission and Strategic Objectives.
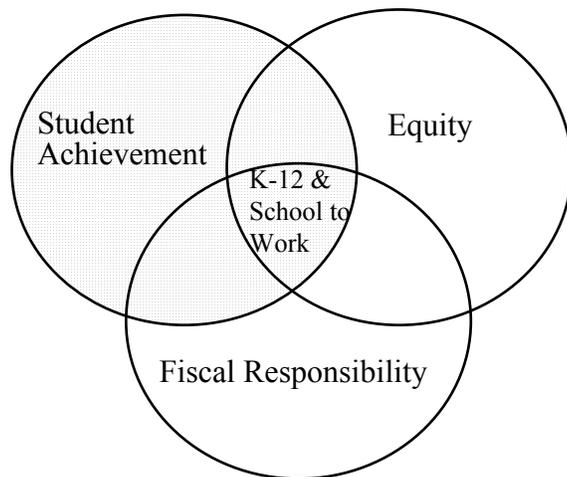
Student Achievement - Students will use technological resources capably, actively, and responsibly.

Educational programs must prepare students for an increasingly technological world, in which the only constant is change. Accordingly, the District must develop a community of lifelong learners - both students and teachers - allowing for diverse learning styles and recognizing that the classroom extends beyond school walls. To achieve this goal, the Strategy set forth the issues which need to be addressed in District technology efforts.

Strategy Issues
- Develop new evaluation strategies for assessment of student achievement
- Improve computer literacy to foster development of complex problem solving and logic skills

- Use technology to manage the educational process
- Build market valued skills for both students and teachers
- Staff development strategy must be directly related to student achievement
- Innovation and creativity for faculty and staff need to be fostered
- Increase and foster parent/family involvement in the education process

People Issues
- Develop objectives to improve student use of technological tools
- Develop and commit to formal technology training for teachers, administrators and appropriate staff

Process Issues
- Recognize the need to change the instructional process
- Conduct periodic evaluations of instructional technology to ensure the appropriate technologies are used at the classroom level
- Determine the District's information requirements to support the "System of Schools" approach
- Communicate and leverage best practices throughout the District

Technology Issues
- Develop and District wide interactive communications infrastructure to meet the instructional and administrative needs of the District
- Work to integrate technology throughout the K-12 curriculum
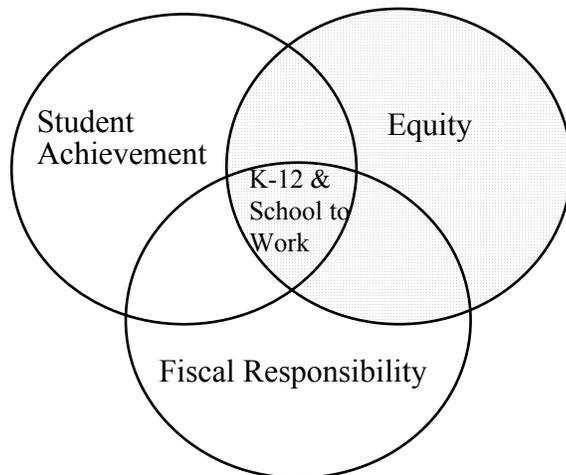
Equity - Provide equitable access to technological resources.

The overwhelming conclusion from the visioning process was that the definition of equity must be expanded beyond socio-economic lines to include;
- the development of an equitable governance structure for technology,
- an environment that supports long-term technology planning,
- the development of a communications infrastructure that ensures equity and access for all staff and student to appropriate technology and instructional materials,

- increased commitment to staff inservice programs for appropriate technologies, and
- increased student use and access to both instructional and informational technology.

Strategy Issues
- Expand the definition of equity
- Develop a comprehensive technical support strategy that includes plans for repair, upgrade and replacement
- Foster equity by increasing access capabilities throughout the District
- Encourage creativity and innovation by allowing schools to compete for additional District funds for school level technology initiatives
- Develop and implement a comprehensive roll out strategy for technology initiatives that considers uniqueness of individual initiatives, but ensures equity throughout the District
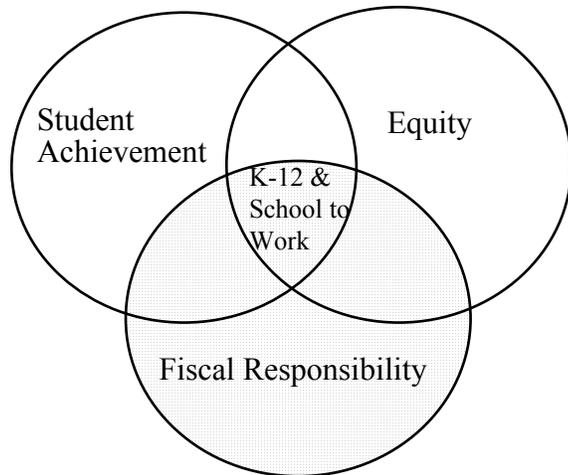
People Issues
- Develop a comprehensive, long term staff development program so that all teachers, administrators, and appropriate staff have access to the necessary training
- Allocate the resources needed to formally recognize technology coordinators at the school and District level

Process Issues
- Produce a formal process to ensure technology access for all students

Technology Issues
- Create a communications infrastructure that will allow all students, teachers, administrators and appropriate staff access to instructional and administrative information
- Develop a means to access external sources of information
- Work to expand the role of the schools and sites in technology decisions that affect the District
- Monitor existing technology assets and ensure proper maintenance in order to gain full use of all resources

Student Achievement / Equity / Fiscal Responsibility Venn diagram with K-12 & School to Work at the center.

Fiscal Responsibility - Implement technology to more efficiently and effectively streamline administrive functions.

MPS is becoming more efficient. The District is actively pursuing alternative funding in order to minimize the burden on taxpayers. MPS is re-engineering many of its labor intensive processes to operate more efficiently.

Strategy Issues
- Develop funding strategies for technology initiatives
- Develop a District wide core competency skill center
- Develop an equipment resource strategy to aid the technology procurement process

People Issues
- Produce inservice training for all initiatives in order to maximize derived benefits

Process Issues
- Improve efficiency levels for administrative systems through automation of labor intensive processes and elimination of non-value adding activities
- Create new methods to aid in the evaluation of programs, groups and individuals

Technology Issues
- Develop a communications infrastructure to give teachers administrators and appropriate staff access to information necessary for the decision making process
- Focus technology purchases throughout the District
- Emphasize flexible, portable, scalable technology in future technology purchases
- Distinguish between common applications and point solutions and adjust procurement strategies accordingly

The District's K-12 teaching and learning goals demonstrate a priority for technology. One goal that specifically addresses this is: a rapidly changing technological society

requires the focus of learning shift from the simple acquisition of facts to the synthesis and application of concepts. Additionally, the K-12 learning goals support these objectives by focusing on how students will use technological resources capably and responsibly. Goal performance indicators are outlined for elementary, middle, high, and alternative students. The preparation of students to meet the demands of the next century will require that high school graduates be more employable, highly skilled, and productive. In part, this educational mandate will ensure that students as future workers are highly literate and proficient in applications of technology.

Technology also plays a significant role in the MPS "School to Work" program. Preparing students to become life long learners begins at the start of their school career and never ends. Technology is becoming one of the most important enablers of life long learning, both in schools and in the work place. MPS students require exposure and integration of technology throughout the curriculum.

Following the visioning process, a set of recommended initiatives were developed and sequenced by priority and dependency, resulting in an implementation action plan. The implementation action plan addresses the interrelationships of the initiatives and provides the rationale. An executive summary of the initiatives is attached. Currently, the Technology Standards, Tools and Techniques, Curriculum Enhancement, Staff Development & Training, School/Site Technology Roll Out, Financial Management, and Communication Plan initiatives are in progress.

The first initiative, and a vital step before implementing the other initiatives, is the development of a District wide information plan. An information plan documents data needs, stewardship, and other requirements. The MPS Information Plan was developed by Coopers and Lybrand, a Big 8 accounting firm, over a five month period and is being presented to the MMM Board of School Directors in June, 1995. It details the technology implementation process throughout the District. The MPS Information Plan addresses the needs and provides the design of the future that will enable the goals of the K-12 and School to Work to become a reality. The following describes the Information Plan objectives and results.

Objective	Results
Understand MPS technology needs	• Process models describe the work done, data required, and systems used. • General recommendation are made to address these needs. • An implementation strategy and its cost projections are presented.
Understand MPS data needs	• Information requirements are defined relative to processes. • Data models define the structure of overall data requirements.
Define technology architecture	• The major components (applications, support, platforms, and communications) are presented. • A data management strategy is recommended.
Define security/business resumption	• Requirements for a business resumption strategy are defined.
Understand barriers to implementation	• Results of both a technological and curricular survey are analyzed and detailed. • Individual school reports are being distributed to each school.

Identify process improvement targets	• General recommendations include process improvement opportunities.

Each MPS school was visited, and multiple surveys were administered to meet the MPS Information Plan objective of gaining an understanding of the potential cultural, technological, and physical barriers to a successful implementation of the technology plan at each school. The technology profile resulting from these surveys is an indicator of what technological tools are in place at each school site and how each school is incorporating technology for administrative and instructional purposes. This profile represents one of the many efforts which MPS will undertake to create the high technology, hyper learning environment a knowledge age society demands.

Overall the surveys identified a number of significant points relative to a successful implementation:

√ Recent computer purchases to advance the School/Site Technology Roll Out have lowered the ratio of students to computers from 10 to approximately 7. This has greatly increased the availability of technology for students in all schools.
√ Almost 50% of MPS students utilize computer software in a language other than English.
√ About half of the MPS teachers and administrators believe they have access to resources to assist them in the use of technology.
√ Although lack of training remains an issue, an overwhelming majority of teachers and administrators would use more technology if the training were available.
√ There is a great spirit of openness to the greater use of technology at MPS.
√ There is a high priority placed on acquiring technology expertise by teachers and administrators.
√ Computer technology remains a significant priority for administrators.
√ Only about 1/3 of MPS students have basic computer skills.
√ Access to computers is limited beyond school hours, but during school a number of options exist for access.
√ The use of computers to enhance critical thinking skills is minimal.

The implementation strategy detailed in the Information Plan describes a technology architecture designed to achieve the following objectives:

• Interconnections to all schools and administration through a wide area network that handles voice, data, and video. It also allows external access to the network by employees, parents, students and the community.
• Implementation of a local area network managed environment at each school.
• The goal architecture is built on the basis of three students per computer and recommends that all old (Apple IIe, Intel based 286 or less, and terminals)

workstations be replaced in middle, high and alternative school with the elementary schools keeping half of their older workstations to address basic skills in lower grade levels.

- Greatly enhanced training and support.
- Encouragement of more use of classroom computers where student are directly impacted by the technology.
- Introduction of a "Groupware" solution early in the implementation increasing productivity, enhancing the sharing of best practices and improving the effectiveness of meetings.
- Universal access to Internet implemented by June 30, 1995.
- Migration from mainframe to client/server based application systems, where applicable.

TECHNOLOGY ARCHITECTURE
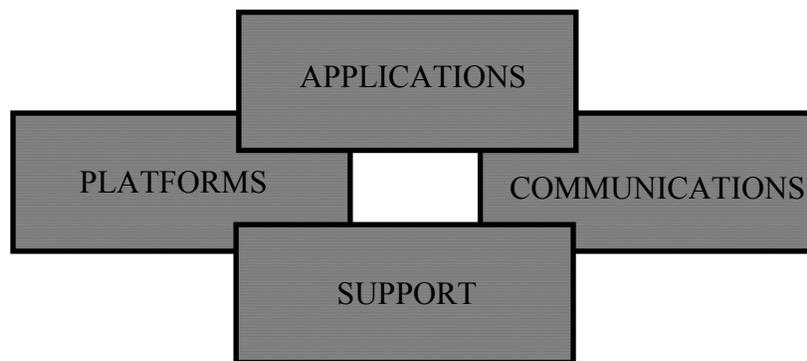
A technology architecture has four major components: applications, support, platforms, and communication. Applications represent the automated procedures with which the user(s) interacts to achieve some significant result. Custom developed and package application software can support business processes, personal productivity or curriculum deliver. Support provides the installation, maintenance, and training required to sustain the architecture and its effective use. Platforms represent the hardware (mainframe, mini, or personal computer) on which the applications run. Communication represents the ways the computers talk to each other to exchange commands or data.

A number of changes in the MPS support structure are underway, most significantly, the formation of a new Department of Technology that reports directly to the Superintendent. Planned training centers will also provide significant support. One of these training centers is currently being considered for Marshall High School as part of the Technology Challenge Grant.

The architecture being implemented by MPS represents a significant departure from the current environment in addition to requiring a significant investment. Architectural components have been specified and the Technology Standards project is progressing in providing the District price leveraging opportunities through mass purchase of the

components. Facilities issues are being addressed through State level grants and local bonding supported by the City of MMM.

Our business community partners have contributed greatly to the technology efforts. Specifically, our local communications carrier, Ameritech, has worked at establishing a level of technology at a pilot group of our schools under a grant referred to as "Super Schools". The Super Schools are Marshall High School, Washington High School, Allen-Field Elementary School, and Hi-Mount Elementary School. All four sites are linked through a fiber optic cable. In addition, Watertown and Fort Atkinson High Schools (two rural area schools outside of MMM County) are part of this project. During the 1993-1994 school year, Ameritech provided initial training on using the distance learning equipment and MPS facilities staff made the needed room modifications to optimize the distance learning experience. During the 1994-1995 schools year, Washington and Marshall High Schools used the classrooms to share three courses: Advanced Placement Calculus, French III/IV, and Spanish IV/V. Only one teacher for each course was required. In addition many share projects were planned through this project.

Hi-Mount and Allen-Field Elementary Schools are using the distance learning classrooms under the Ameritech Super Schools project continuously during the day. Included in this project is Spanish and cross cultural experiences. Other activities include staff development and sharing, student council, peer mediation, multi-cultural sharing, class projects between MPS sites and the rural school partners.

The Learning Village project also sponsored by Ameritech brings together the Super Schools and a middle school, Fritsche. A component of the Learning Village project is the funding of $70,000 at each site for the purchase of laptop computers. These computers are targeted for student home use. They will be equipped with software to do word processing, spreadsheet, and data base applications. They also have internal modems which allow students to hook up to the Learning Village, Washington's Vax computer, or Hi-Mount's bulletin board systems. Included in the Learning Village is the opportunity to explore the Internet. Approximately 100 staff from Washington, Hi-Mount, Allen-Field and central administration were trained in the first sessions on the Internet. Additional sessions are planned and in progress.

Video conferencing is accomplished through Picture-Tel provided by Ameritech. This project is proceeding with other Super Schools throughout the State, and includes access for business or community members who have utilized the Hi-Mount site for business needs in video conferencing.

A Homework Hotline was established at Washington High School and Hi-Mount Elementary School. This hotline was used to keep parents and students informed of school events and homework assignments. Student and parent call in by pressing different numbers to access information on class assignments, guidance information, school events, cafeteria menu and principal's messages. At Hi-Mount, all teachers have a voice mail box to enable parent and community to leave messages for staff. In addition,

Hi-Mount has incorporated Phone Master to regularly phone community members with school updates similar to an electronic newspaper. This system is also used to contact parents when students are absent from school.

Ameritech has also committed to bringing fiber optic lines to the door of each school in the State of Wisconsin. Secondary schools will receive fiber optics to the door over a two year period. Elementary schools will be brought into the network on an as needed basis, requiring that the district identify the schools to be impacted and provide a six month notice.

These events, from a district wide strategy to individual school implementations including business and community partnership, evidence a strong commitment, area wide support, and competence in achieving the goals of the Technology Challenge Grant.