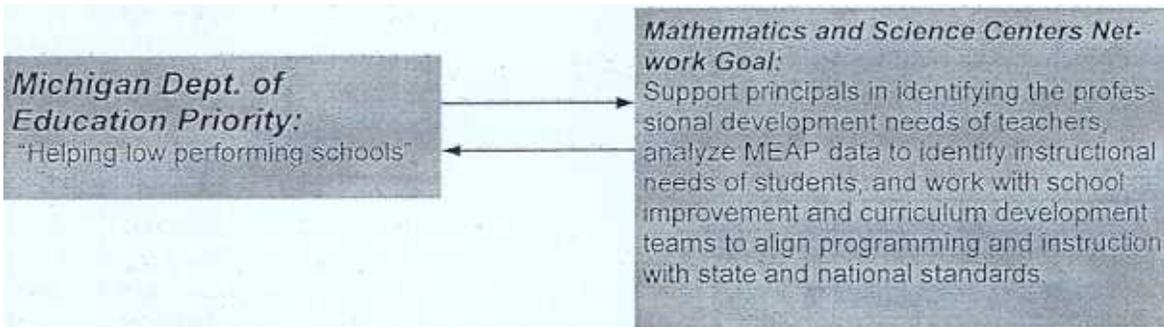


IMPACTS OF MICHIGAN'S MATHEMATICS AND SCIENCE CENTER NETWORK'S DEVELOPMENT OF LEADERSHIP

<p style="text-align: center;">Impact on Schools</p> <ul style="list-style-type: none"> • Teacher leaders not only assisted Principals in giving teachers needed instructional support, they also are preparing for greater leadership roles such as principalships. • Coordination of Centers' strategic plans with ISDs' service plans and district needs assure programming has maximum impact on schools. • Centers provided forums for LEAs to share information and best practices. • Centers contracted with outside sources for evaluation of Center programming to assure quality programming to districts. • By partnering with Centers and Universities, schools have had opportunities to benefit from state and national grants. 	<p style="text-align: center;">Impact on Teachers</p> <ul style="list-style-type: none"> • Teacher leaders made presentations at both state and national conferences (Michigan Council of Teachers of Mathematics, Michigan Science Teachers Assoc., Michigan Assoc. For Computer Users in Learning, and Michigan Assoc. Of School Administrators. • Teachers assumed leadership roles in designing & coordinating building activities, conducting workshops, & writing grants. • Teachers developed manuals for pre-service students in mathematics and science content for K-8 classrooms. • Teacher leaders facilitated data-analysis workshops to assist teachers in targeting instruction to student needs. • Teachers received needed support for grant writing. • Teachers have had opportunities to work with University faculty and Center staff to develop graduate courses that support standards-based education • Centers identified teachers not currently considered "highly qualified" and planned with them to meet requirements within the time frame.
<p style="text-align: center;">Impact on Communities</p> <ul style="list-style-type: none"> • <u>Breaking the Mold Leadership Training</u> developed both education and community leaders. • Centers contributed to the professional educational community through contributions to professional newsletters and journals. • Contributions (financial, materials, time) from business, industry, and individuals increased as the value and importance of engaging students in real-world experiences was recognized. • Center advisory boards provided opportunities for the exchange of ideas, networking, and sharing of resources. 	

CURRICULUM SUPPORT



Curriculum Support for UNDERACHIEVING SCHOOLS

- Centers meet with "high priority" schools to update and realign mathematics and science curricula and assist in the development and selection of appropriate instructional material.
- Centers assist "high priority" schools by loaning needed equipment, kits, and other educational resources to meet the needs of the school's adopted curriculum.
- Centers maintain a continuous presence in "at-risk" schools to provide assistance with coordinating various initiatives to make the maximum use of resources and assure alignment of work to the Michigan Curriculum Framework.
- Graduate credit mathematics and science courses to assist teachers in meeting NCLB'S "Highly Qualified" criteria were developed through Center/University partnerships.
- Development of a science literacy series that integrates reading and writing skills with science curriculum content.

PROFESSIONAL DEVELOPMENT Supporting Curricula Alignment with State Standards

- Centers worked with teams of teachers and administrators to study data using variables such as instructional time, teacher prep time, lab work, student products, and other assessments to improve programming.
- Teacher Institutes that facilitate the creation of innovative teaching units to engage students in authentic learning and assessment have been implemented.
- Multiple sessions were provided to assist teachers in their understanding and knowledge of Michigan's GLCEs.
- Centers provide technical support, advice, and modeling of instruction for schools adopting new mathematics and science curricula.
- Involvement with a Department of Environmental Quality Grant to develop environmental curriculum units for the Clean Michigan Initiative. The Michigan M/S Center Network will also be involved in the professional development to train teachers to use the developed curriculum units.

IMPACTS OF MICHIGAN'S MATHEMATICS AND SCIENCE CENTERS CURRICULUM SUPPORT TO LOCAL SCHOOL DISTRICTS

Impact on Teachers	Impact on Schools
<ul style="list-style-type: none"> • Teachers have gained skills in using curriculum mapping. • Teacher Leaders teamed with University Faculty and Center Staff to develop graduate courses focused on both curriculum and content. • Teachers learned to write and assess high quality science investigations. • Teachers developed lessons, units, and materials aligned with the Michigan Curriculum Framework. • Teachers have had opportunities to work on curriculum development with specialists from the American Geological Institute and TERC. 	<ul style="list-style-type: none"> • Most Centers reported a high percentage of local districts that have developed aligned mathematics and science curricula while working with Centers. • Center Directors have on-going relationships with all mathematics and science curriculum councils in their region. • Center Directors participated in Principal and Superintendent Round-tables in which curriculum issues were a major focus. • In many regions, Centers provided schools with MEAP data packets that included content and strand data-analysis. • Centers played a role in making educators aware of research and evaluation on specific curricula. • Schools received support in selection and implementation of new curriculum materials. • In one region, a county-wide science curriculum was developed and implemented.
Impact on Students	
<ul style="list-style-type: none"> • As inquiry-based science kits were used, students improved their ability to "work together, solve problems, and work independently." Teachers reported these students have a much deeper understanding of content. • Centers provided web-site links to research-based materials for students to use in their investigations. • Standardized curricula and pacing guides across all buildings in large urban districts enabled students to have more successful transitions when moving to different buildings within the district. 	

COMMUNITY AND PARENT ENGAGEMENT

NCLB goal:
"Partnering with parents and communities"

Michigan Mathematics and Science Center Network Goal
Engage businesses, universities, museums, governmental agencies, and parents in supporting and providing quality mathematics and science education and experiences

Business and Industry have collaborated with Centers to provide:

- Used office furniture and equipment for schools
- Scientific equipment and supplies
- Opportunities for student internships
- Mentoring experiences for students
- Job shadowing experiences
- "Teacher in Industry" internship experiences
- Sponsorship of fund-raising activities. Funds are used for development of outdoor education facilities and programs.

Through Centers' efforts, professionals in the community are assisting with:

- student research projects
- Science Olympiads and science fairs
- career presentations
- mentoring

Partnerships With Other Institutions and Organizations

- Centers have collaborated with over 35 Michigan universities, 4 year colleges, and community colleges to plan professional development and student programming, write grants, and share resources.
- Over 14 museums and planetariums have shared programming with Centers.
- Centers have provided programming and support to 12 environmental/outdoor education centers.
- Centers have involved the public libraries, National Park Service, Dept. of Natural Resources, U.S. Forest Service, Conservation Districts, fire departments, crime labs, and Watershed Councils in Center programs.



Examples of engaging parents and other individuals:

- Many Centers organize Family Math and Science Nights designed to engage parents and students in hands-on, inquiry based activities
- Expanded Environmental Learning for the Future (ELF), trained 100 adult volunteers to facilitate sessions featuring hands-on inquiry-based science in elementary classrooms for over 1,800 students.
- Visiting scientist and mentoring programs provided students opportunities to learn directly from professionals in mathematics and science

IMPACTS OF MATHEMATICS AND SCIENCE CENTERS' EFFORTS TO ENGAGE PARENTS AND COMMUNITIES

<p style="text-align: center;">Impact on Schools</p> <ul style="list-style-type: none"> • Mathematics and Science Partnership grants enabled Centers, schools, and universities to partner together to provide quality content-based professional development aligned with state and national standards. • Schools had access to field-experiences coordinated by Centers for area students. • Schools received equipment and materials for inquiry-based and advanced mathematics and science courses. • Industries provided resources for special programs such as "Journey Through the Universe." 	<p style="text-align: center;">Impact on Teachers</p> <ul style="list-style-type: none"> • Teachers had greater access to materials and equipment through contributions from business and industry. • Community members were trained to assist or deliver enrichment lessons in classrooms. • A partnership with the Kellogg Biological Station enabled teachers to be involved in a science literacy project. <div style="text-align: center;">  </div>
<p style="text-align: center;">Impact on Students</p> <ul style="list-style-type: none"> • When parents took part in Math/Science Family Nights and inquiry-based workshops, students received greater support with homework. • Students' are entering career tracks based on their internship experiences in the local community. • In some cases, students' internships have led to part-time or summer employment. • Students became active in environmental programs such as the Student River Congress and watershed projects. • Students worked with mentors from professional science communities such as Pfizer Corporation. 	<p style="text-align: center;">Impact on Communities</p> <ul style="list-style-type: none"> • Parents are taking part in workshops to learn about inquiry teaching and learning. • A regional museum received assistance from teachers recruited by a M/S Center to develop exhibits emphasizing mathematics and science concepts. • The DNR received assistance from students using GIS/GPS to map, study, and develop forest management plans. • Through work with a M/S Center, Northwestern Michigan College's Water Institute developed a regional focus. • Community education programs were developed through collaborations between Centers and community colleges, watershed councils, children's museums, outdoor education centers and the Inland Seas Education Association.

RESOURCE CLEARINGHOUSE

In what ways are Center resources being used to support best practices in mathematics, science, and technology education?

Centers support schools in the use of technology by:

- Providing training and strategies for integration of technologies*
- Loaning schools a variety of equipment: laptop computers, computer simulations, digital cameras, light box and optics sets, Lego sets, Robolab sets, eLab sets, microscopes, video cameras, video microscope systems, and digital projectors
- Providing workshops for teachers and students on evaluating website validity
- Providing Star Lab training for teachers

*Detail numbers of hours, enrollments, and technology-focused sessions can be found in the Appendix Page 20-24.

Maintaining and expansion of resources for local school districts

- Centers are a dissemination point for several organizations including MCTM, MSTA, and MDSTA.
- Resource libraries are maintained by Centers, many accessible through Center websites.
- Facilitation of Instructional Swap Shops which provide thousands of pieces of donated science lab materials free of charge for area teachers.
- Centers play an active role in the development, distribution, and maintenance of inquiry-based mathematics and science kits statewide. In addition, Centers provide training and in-classroom support for using the kits or other equipment and instructional materials available on-loan from the Centers.

Identification of Resources

- Identification of resources available for field studies investigations.
- Use of newsletters to distribute information about upcoming educational opportunities for students and teachers and links to educational resources.
- Centers provide web-site links to instructional resources.



IMPACTS OF RESOURCE CLEARINGHOUSES MAINTAINED AND COORDINATED BY MATHEMATICS AND SCIENCE CENTERS

IMPACT ON SCHOOLS	IMPACT ON TEACHERS
<ul style="list-style-type: none"> • The Battle Creek Mathematics & Science Center provided training for maintenance and distribution of hands-on science kits in their region and across the state. In 2002-2003, they distributed 2,849 kits to Michigan districts • Centers' websites provided schools with access to a wide range of resources from loan programs (equipment, curriculum materials, videos, books); links to mathematics and science organizations, and information on state and national initiatives. • Centers facilitated the sharing of resources (equipment, professional development facilitators, materials) between school districts. • One Center received a grant to operate a national designation site for the TERC/NSF funded "Earth Science by Design" curriculum unit development project. 	<ul style="list-style-type: none"> • ITV rooms at many Centers provide local teachers access to distance-learning and video-conferencing opportunities. • Teachers received technology (such as graphing calculators, digital cameras, scanners) by participating in grant-funded professional development sponsored by Centers. • Traveling science vans supplemented teachers' lessons. • Teachers had access to curriculum resource boxes (videos, books, posters, CD ROMS). • Teachers were given access to MEAP-like science assessments.
<p style="text-align: center;">IMPACT ON STUDENTS</p> <ul style="list-style-type: none"> • Students had opportunities to work in professional quality laboratories maintained by Centers in some regions. • Students had opportunities to take part in high quality programming at observatories. • Students participated in Lego League competitions because of access to Lego – Kit loan programs. 	<p style="text-align: center;">IMPACT ON COMMUNITIES</p> <ul style="list-style-type: none"> • Four Centers serve as a NASA Educator Resource Center. The program brings NASA resources and personnel to the community as well as to teachers. • Needs assessments (engaging academic and industry leaders) were conducted to assess the quality of science laboratories in schools across a region with the purpose of targeting resources to the most needed areas.

LEVERAGED RESOURCES

Funding Crisis: In 2003, the Michigan Mathematics and Science Centers experienced a major set-back. The foundation grant from the State of Michigan was cut 75% by the state legislature. Never before has the leverage of funds from other sources been so important. To compound the problems, grant acquisition became more challenging with reduced staff and lack of available matching funds required by many funding agencies. In addition, local school districts had fewer funds available to support teachers to attend professional development or support other services of the Centers.

Resources Leveraged Through Collaborations with Universities and Colleges

- Establishment of teachers' professional development academies in collaboration with state universities
- Collaboration with a state university to sponsor a full day regional mathematics conference
- Collaboration with a university and an urban school district to provide a mathematics endorsement program for middle school teachers
- Partnership with universities and school districts in writing proposals for the National Mathematics and Science Partnership Grant program
- Collaboration with state universities on the development or revision of graduate programs in education
- Inclusion of pre-service teachers in science, mathematics and technology content professional development courses offered to districts
- Partnering with higher-education institutions and school districts to procure grants under the Michigan Mathematics and Science Partnership Program

In the past year, Michigan Mathematics and Science Centers have leveraged an additional \$5,155,173.

On a temporary basis, some Intermediate School Districts (ISDs) provided general fund dollars to their Mathematics and Science Centers to support core staff positions in light of state funding cuts.

If overall funding for public education continues to be reduced, this ISD support is not likely to be sustained.

EXAMPLES OF LEVERAGED SUPPORT

- One Center raised \$900,000 in a capital campaign for the expansion of facilities which included a science exploration center with 21 interactive exhibits and the construction of a Center for Outdoor Studies that will engage community residents, professional scientists, and local students in research activities.
- Teacher Quality Grants (Title II) are developing science leaders in underachieving schools and building teachers' science content knowledge.
- A community foundation provided \$20,000 for minority and "at-risk" students to attend a summer mathematics and science program.

FOCUS ON "HIGH PRIORITY" SCHOOLS

Providing services to underachieving schools continues to be a major focus of Michigan's Mathematics and Science Centers. As underachieving schools are identified by the Michigan Department of Education, Centers make a variety of programs and services available to help improve teaching and learning of mathematics and science at the high priority schools.

Needs assessments are conducted to target services to the specific needs of underachieving school buildings and districts. Examples of the types of services offered are described below. For further information on services provided across the state, please refer to the document: "Spotlight on Services to Underachieving Schools," found on the Michigan Mathematics and Science Center Network website: www.mscenters.org

Examples of Services to Underachieving Schools

- Several Centers select underachieving schools each year for intensive assistance that includes building-wide professional development. Much of the PD occurs at the classroom level and includes (1) classroom observations to determine areas of need, (2) modeling science lessons, (3) small group PD designed to meet the needs identified by classroom observations, (4) content integration assistance, (5) assessment assistance, and (6) gap analysis.
- Some Centers have partnered with universities to provide elementary and middle school mathematics institutes to increase teacher mathematical content and pedagogical knowledge, help teachers work toward a Master of Arts in Education, and provide teachers an opportunity for reduced tuition as they earn "highly qualified" status.
- Community funding and support allowed one Center to continue its Science Academy focused on minority students.
- Several Centers are involved in Mathematics and Science Partnership Grants that will strengthen content knowledge of teachers in underachieving schools.
- Once Center Director acted as an advocate for a large urban middle school by facilitating monthly meetings of Center Staff, ISD personnel, school building administrators, and teacher leaders. The Center provided intensive professional development in mathematics and science as well as arranged for staff training in other content areas and pedagogy.
- One Center has developed a two week outdoor education program that provides urban teen-agers the opportunity to connect math and science learning to the world beyond the classroom. The program combines preparation for ACT testing with deepening content knowledge of rocks and minerals, simple machines, forestry, water quality, and animal life through outdoor hands-on experiences.
- Many Centers assist schools with data analysis and targeting of programming. This involves compiling and presenting five-year data trends to district staff in efforts to promote understanding and involvement in the improvement process. Center staff support local districts in analyzing student performance results to determine strengths and weaknesses. Centers work with schools (at both a building and individual teacher level) to develop strategies for raising achievement that range from curriculum alignment to lesson planning.
- Centers work with teachers from underachieving schools to develop professional development plans that will assist teachers in becoming "highly qualified."

APPENDIX

Michigan Mathematics and Science Center Network Data Tables 2002-2003

PROFESSIONAL DEVELOPMENT

Table 1: Professional Development Participants

Parti- cipants	# of Individ.	Total Hours	Reported Gender**		Position					
			Males	Females	Admin	Math Tchrs.	Science Tchrs.	Tech Tchrs.	Com- bined Subject	Other or Un- known*
Pre-K	338	4,433	18	320	5	8	3	1	243	78
Elemen- tary	6,075	64,362	744	5,248	181	271	233	10	4,691	689
Middle/ Jr. High	2,162	28,985	602	1,512	46	648	601	30	239	598
High School	2,055	28,093	925	1,112	68	605	471	76	110	725
Others*	3,556	37,330	909	2,335	256	310	265	52	577	2,096
Total	14,186	163,203	3,198	10,527	556	1,842	1,573	169	5,860	4,186

*Other includes persons who work across levels, are not teachers or administrators, or did not indicate position.

** 3.25% of individuals did not indicate Gender.

Of those who indicated ethnicity, 23% were non-Caucasian.

Teachers averaged 11.5 hours of participation in Center programming during the 2003-2004 academic year.

WHAT WERE THE NATURE AND EXTENT OF THE PROFESSIONAL DEVELOPMENT ACTIVITIES?

Professional development was delivered in many ways, depending on the identified needs in the service area. Two primary formats included: (1) single events, lasting from a portion of one day to several consecutive days, focused on a particular topic, skill, or issue, and (2) series— a series of sessions with a single focus, one building on the previous one, conducted periodically over a several week/month period.

Table 2: Single Event Professional Development Activities

		Math	Science	Technology	Integrated M/S/T	Other	Total
Pre-K	Events	1	4	4		2	11
	Hours	3	19	10		35	67
	Participants	51	101	38		11	201
Elementary	Events	111	209	45	1	19	385
	Hours	372	965	148.5	2.5	68.5	1,556.5
	Participants	1,579	2,179	424	41	258	4481
Elementary & Mid/Jr. High	Events	25	92	6		15	138
	Hours	214	703.5	23.5		92	1,033
	Participants	795	1,257	53		287	2,392
Mid/Jr. High	Events	25	29	3		6	63
	Hours	248	1426	6.5		42.5	1,723
	Participants	511	631	11		87	1,240
Mid/Jr. High & High School	Events	8	13	41	1	10	73
	Hours	33.5	379	162	12	87.5	674
	Participants	83	177	488	11	190	949
High School	Events	13	22	16	1		52
	Hours	49	76	51.5	2		178.5
	Participants	490	167	126	15		798
Other Mixed Levels	Events	41	82	98	2	76	299
	Hours	261.5	613.75	445	10	450.25	1,780.5
	Participants	1,420	1,641	1,215	58	1,901	6,235
Total	Events	224	451	213	5	128	1,021
	Hours	1,181	4,182.25	847	26.5	775.75	7,012.5
	Participants	4,929	6,153	2,355	125	2,734	16,296