

Michigan Mathematics and Science Centers Network 2017-2018 Annual Report



Building tomorrow's citizens by inspiring excellence in
mathematics and science education today.

Prepared by
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Western Michigan University

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Michigan Mathematics and Science Centers Network

Building tomorrow's citizens by inspiring excellence in mathematics and science education today.

The Michigan Mathematics and Science Centers Network (MMSCN) is a primary infrastructure supporting the improvement of science, technology, engineering, and mathematics (STEM) education in Michigan. Programs and services of the thirty-three Mathematics and Science Centers are made available to all Michigan public and private schools in their service areas. The following report primarily on the 2017-2018 school year as well as summarizes some of the Network's activities across its decades of service. Individual Centers produce an annual report of accomplishments, which are available from each Center.

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Michigan Mathematics and Science Centers Network



Mission Statement:

Building tomorrow's citizens by inspiring excellence in mathematics and science education today.

Vision Statement:

Michigan will be a national leader in STEM education and every citizen will understand the importance of STEM competency to career and college readiness and the state's economic success. The 33 regional Michigan Mathematics and Science Centers individually and collectively as the MMSCN will provide leadership by:

- Elevating the awareness of the importance of STEM education in the global economy.
- Communicating that STEM literacy contributes to every aspect of quality of life in Michigan, including economic development, and making sure that students are well suited for the jobs that await them.
- Developing programs and tools for K-12 education – including teacher professional learning – that build subject area competence and support STEM literacy.
- Establishing a system for consistent delivery of STEM programs.
- Promoting student interest and increased achievement in STEM subjects.
- Driving Michigan efforts to incorporate multi-State standards for STEM education and realize those standards in classrooms across the state.
- Cultivating and strengthening relationships with all stakeholders, including state and national organizations and business/industry.

Identity Statement:

Each Center is a member of a statewide network of 33 Mathematics and Science Centers. The Network is a core element of the system of support for K-12 STEM education in Michigan. We provide high quality STEM opportunities that can reach every child in our state either through direct student services or by providing teacher professional development.

Our membership includes Directors with expertise in every facet of STEM and STEM education. Therefore, the Network is both a catalyst and resource for educational innovation. State and national initiatives can be quickly mobilized throughout Michigan because of the strong working relationships that individual Centers maintain with their constituent schools, teachers and students. Center Directors also nurture and sustain collaborations between business and industry partners and their local stakeholders.

Essential Elements of the Statement

- Fostering the Achievement of STEM Literacy
- Educational Equity for Every Child in Michigan
- Expertise in Every Facet of STEM Education
- Network Resources Leveraged to Local Districts – Local Representation to Network
- Ability to Mobilize Educational Innovations
- Cultivating Collaborations between STEM Education, Business and Industry

30 Years of Service to Michigan Schools

In the 30 years of its existence, the Network has provided programs and services to teachers, students, schools, and communities across Michigan. The Mathematics and Science Centers Program was created by legislation in 1988, providing grant funds to establish Centers in cooperation with local and intermediate school districts and higher education institutions. Throughout the 2017-2018 school year, all school districts across Michigan have had access in their region to one of 33 M/S Centers.

Mathematics and Science Centers have provided quality programming for teachers and students to improve STEM education in Michigan despite more than a decade of reductions in base funding from the State School Aid Act-Section 99. Although the Network and Centers have actively sought grants, contracts, and in-kind contributions to support programming, the overall 80% decrease in state funding levels since 2002 have resulted in fewer professional learning hours for teachers, fewer STEM program hours for students, and decreases in other support services. The Network has entered uncertain times, facing the largest cut in state funding. Each Center continues to leverage additional funds from other sources to continue to offer their excellent and valuable services and programs to the students, educators, and communities they serve.

Over the last year, the MMSCN has been working to redesign their manner of providing services to effectively respond to the evolving landscape of STEM education in Michigan. Prior to funding changes, the MMSCN provided services with financial support from the State School Aid Budget and the federal Mathematics and Science Partnership (MSP) grants. It is the intention of the MMSCN to work with the governor's office, the Michigan Department of Education, the Department of Technology Management and Budget, Michigan Legislators, and the MiSTEM Regional Network to continue to support STEM initiatives in Michigan, by specifically focusing on teacher professional learning.



Impacts and Opportunities

The Michigan Mathematics and Sciences Centers Network (MMSCN) offered programs and services to thousands of teachers and their students, all designed to improve the teaching and learning of mathematics and science. This was the fifteenth year of significantly reduced funding from the Michigan Legislature. The 33 Centers continued to provide public and private schools in their regions with various student services, teacher professional learning, curriculum, leadership support, community partnership, and resource sharing programs. Below are highlights from the annual report of the MMSCN. Readers are encouraged to review the entire report. Information about the Network is available from Jody Redmond, President (jredman@wmisd.org), Mary Starr, Executive Director (mary@starrscience.com), or at www.mimathandscience.org.

Highlights from the 2017-2018 Annual Report

Portfolio of Capacities and Accomplishments

- For 30 years, the Michigan Mathematics and Science Centers Network has been providing STEM education programs and services to teachers, students, and schools across Michigan. Through this effort, the Network has built important capacities to plan, facilitate, and assess statewide and Center-based STEM programming and services. This portfolio summarizes those capacities and accomplishments, and reflects the competencies of the Michigan Mathematics and Science Centers Network. The portfolio can be found on pages 4-12 of this report

Michigan Department of Education Statewide Projects

- In addition to the many regular local and regional activities, the Network facilitated two multi-year statewide projects serving Michigan teachers and their students, as well as several Mathematics and Science Partnerships (MSP) Projects. Findings are summarized from the 2017-2018 academic year (see pages 13-19 of this report).

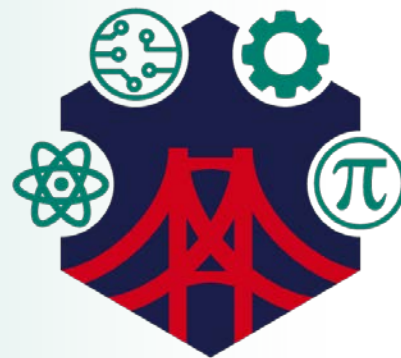
Michigan Mathematics and Sciences Centers Network Key Metrics

8,533 teachers and other educators participated in professional learning (PL) programs, including: 97 individuals teaching pre-K, 4,761 teaching elementary, 916 teaching middle/junior high, 1,046 teaching high school, 562 teaching mixed grade levels, and 1,150 identified as others (administrators, para-professionals, etc.).

- 1,414 professional learning (PL) programs were offered: 423 in math, 758 in science, 54 in technology, 41 in engineering, and 138 in other topics.
- A total of 9,668 hours of PL were provided; 13,030,903 total PL enrollments.
- 36,614 students participated in student services programs: 13,453 elementary, 3,551 elementary and middle/junior high, 6,934 middle/junior high, 2,509 middle/junior high and high school, 3,192 high school, and 8,230 from mixed grade levels (some students may have attended multiple programs).
- Over the past 19 years, 38,733 PL programs were offered; total enrollment over 19 years was 562,400 (many teachers participated multiple years in multiple programs).
- In the same 19 year period, 2,972,635 students were served directly by Centers (some students were served multiple years in more than one program).
- Four Centers provided innovative outreach and accelerated high school programs to meet student needs in their service areas. These highly motivating math and science programs are not otherwise available to schools.
- For more information about data from individual centers, contact SAMPI: sampi@wmich.edu or the director of each center (see page 38 of this report).

A Portfolio of Capacities and Accomplishments

Improving STEM Education in Michigan



For more than 25 years, the Michigan Mathematics and Science Centers Network has been providing STEM education programs and services to teachers, students, and schools across Michigan. They have implemented more than 20 statewide projects and hundreds of Center-based activities to improve teaching and learning of science, technology, engineering, and mathematics.

Through this effort, the Network has built important capacities to plan, facilitate, and assess statewide and Center-based STEM programming and services. Accomplishments include improving teacher STEM subject-matter knowledge, pedagogical skills, and classroom practices; providing high quality programs for K-12 students; helping teachers and schools implement state-level content expectations; improving student STEM learning; and building teacher and administrator STEM leadership skills.

This portfolio summarizes those capacities and accomplishments, and reflects the competencies of the Michigan Mathematics and Science Centers Network. It can be used to highlight and promote Network and individual Center capabilities and accomplishments; share with prospective clients seeking Network programs and services; help prepare grant and contract proposals; and inform funding agencies and policy makers about Network capacities.

For more information about the Network or this portfolio, contact SAMPI (sampi@wmich.edu)

Network Capacities, continued

Preparing Michigan Teachers to Implement State-Level Content Expectations

Background.

Since its inception in the early 1990s, the Network has organized and facilitated sustained teacher professional development programs and services designed to help teachers implement state-level science, technology, engineering, and mathematics (STEM) curriculum content expectations in their schools and classrooms.

Since 1990, the Michigan Department of Education (MDE) has developed curriculum standards consistent with state and national STEM education improvement efforts. Individuals from the Network actively participated in MDE statewide committees to develop these content expectations. Subsequently, through the statewide network of 33 Centers, thousands of teachers received professional development in multiple regional and local school sessions. These sessions focused on 1) increasing familiarity and knowledge of the expectations, 2) how to design curriculum and instruction to support the expectations, 3) identifying instructional materials and equipment to support the curriculum, and 4) learning strategies for assessing student progress toward achieving curriculum objectives.

Statewide Efforts.

The Network has planned and facilitated a variety of statewide projects to help teachers implement mathematics and science content expectations, providing programming for teachers and schools in all regions of Michigan. Examples of **mathematics projects** have included *Promoting Reform in Mathematics Education (PRIME)*, *Algebra for All*, and *MSU Measurement Project*. Examples of **science projects** have included *Modeling Science Instruction in Michigan*, *Science and Math Misconceptions Management (SaM3)*, *Michigan Environmental Education Curriculum Support (MEECS)*, and *Teachers Engaged in Science Leadership Activities (TESLA)*.

Teachers Engaged in Science Leadership Activities (TESLA).

This four-year program, which began in 2015, was planned and implemented by the Network. It focuses on improving teaching practices of Michigan K-12 science teachers and helping them align their curriculum and instruction with the Michigan Science Content Expectations based on the Next Generation Science Standards (NGSX). A large cadre of Michigan science leaders has received sustained professional development to prepare them to serve as facilitators of NGSX workshops, a national program being implemented in Michigan and other states.

Classroom teachers participate in multi-day workshops: 1) Next Generation Science Exemplar (NGSX), a 5-day series focused on core ideas of science, scientific and engineering practices, and crosscutting concepts; 2) Michigan Science Plan Tier 1-4 workshops, providing teachers with an overview of the Michigan Framework for K-12 Science Education, implementing investigations in the classroom, data analysis and computational thinking, and role of argumentation and explanation in science classrooms.

Evaluation Findings.

The SAMPI Evaluation Team at Western Michigan University collected and analyzed TESLA-related data over the course of the project. Sample findings from the evaluation are presented on the following page.

Network Capacities, continued

TESLA: Teachers Engaged in Science Leadership Activities Sample Evaluation Findings.

Finding #1: Cadre of Science Leaders

- Approximately 153 Michigan science leaders were prepared to facilitate NGSX Workshops

During 2015-16, the Network's TESLA initiative prepared 100 science education leaders through an intensive series of professional development sessions to facilitate NGSX and Michigan Science Plan workshops with K-12 science teachers throughout Michigan. An additional 53 science education leaders received training in 2017-18.

Evaluator Comments: Intensive training of a large cadre of facilitators substantially increased the capacity of the Network to provide teacher professional development. Centers collaborated with these facilitators to recruit teacher participants and facilitate the workshop series.

Finding #2: Nature and Extent of Participation

- **250** five-day NGSX workshops (**35 hours**) were held at sites across Michigan (Nov 2016-Aug 2018)
- **7** additional associated Michigan Science Plan sessions (**42 hours**) were also provided
- **2,403** teachers were served through these workshops in 2016-17

Approximately 47% of participants were K-5th grade teachers, 32% 6th-8th, 26% 9th-12th in 2017-18. Workshops were conducted throughout the state, most in southern lower Michigan.

Evaluator Comments: The Network was able to help prepare a large number of teachers across all grade levels to implement Michigan Science Content Expectations in their classrooms. The Network has the capacity to provide substantive teacher professional development in all Michigan regions.

Finding #3: Participant Familiarity with Michigan Science Content Expectations.

- There was a statistically significant improvement in teacher participants' familiarity with the Michigan Science Content Expectations.

Evaluator Comments: Pre-post workshop survey results show teachers more familiar and knowledgeable of the new Michigan Science Content Expectations. These teachers will be better prepared to implement them in their own classrooms, as well as assist their colleagues.

Finding #4: Discourse as an Effective Instructional Strategy for Engaging Students.

One important focus of the workshops was on use of teacher-student and student-student discourse (verbal discussion) of science concepts. An analysis of teacher responses to a question about the value of discourse in engaging students and learning science revealed the following teacher perceptions:

- Discourse allows students to verbalize or take more ownership in their learning
- Discourse enhances higher order thinking, reasoning skills, and STEM knowledge
- There is value or power in discussions, collaboration, talk
- Discourse creates safe environments where students listen to each other and revise their thinking

Network Capacities, continued

Delivering Teacher Professional Learning to Teachers Across Michigan



Background

Through the Math-Science Centers Network and the 33 Centers, all Michigan Districts and Schools received teacher STEM professional development (PD) programming over more than 25 years. Thousands of regular and special education teachers participated in PD in the areas of science, technology, engineering, and mathematics for all grade levels. Many PD formats were used, including summer institutes, monthly series of one-day sessions, online interactions, coursework, one-day workshops, on-going learning communities, conferences, mentoring, and district-level curriculum development. Nearly 550,000 teachers across Michigan participated in Network professional development sessions.

Focus on Building Teacher Capacities

Building capacity of teachers and other educators to design and implement curriculum and instruction that leads to improved student learning in STEM subjects, has been a high priority for the Network. Primary goals for this program are to improve the knowledge, skills, and classroom practices of K-12 teachers in STEM.

Focus on Meeting Identified Local School, District, Regional STEM Education Needs

Centers regularly served local districts and schools in their service areas, they are very familiar with the needs, capacities, and resources of their constituents.

Value of Customized Programming at the Center-Level

- Addressing needs specific to school or district teachers
- PD to develop or implement school/district curriculum and associated support materials
- PD providing teachers with instructional strategies and materials to implement the school/district curriculum

Focus on Network Programming to Provide PD Across Michigan

Network-level, common statewide STEM education needs were identified, programs designed, training of Center staff organized and implemented, and programs were disseminated statewide by trained Center staff.

The next page includes (1) a list of major statewide projects conducted by the Network, (2) the value of statewide programming and (3) a table of teacher participation in Network-provided professional development.

Examples of Network Statewide STEM Projects—2006-2018

High School Math and Science Success: 3-year statewide PD effort for high school math and science teachers to implement state high school content expectations

Michigan Environmental Education Curriculum Support (MEECS): Partnership with Michigan Department of Environmental Quality and Michigan Geographic Alliance to disseminate environmental education program

Michigan Math and Science Partnerships: major twelve-year grant program to facilitate collaboration of math-science centers, higher education, and other education agencies to increase academic student achievement in STEM fields by enhancing teacher content knowledge and instructional skills

Algebra for All/Project PRIME (Promoting Reform in Math Education): Intense multi-year PD program to build algebra content and pedagogical knowledge of middle and high school teachers

Michigan Mathematics and Science Teacher Leadership Collaborative: Program to develop cadre of teacher leaders in high priority schools to improve math and science learning

Family Engineering: Training teachers and other educators to facilitate school-based and afterschool events featuring engineering-related activities associated with the science content expectations.

Teachers Engaged in Science Leadership Activities (TESLA): 4-year project to reduce the student achievement gap through supporting K-12 science teachers to improve their teaching practices and bring them into alignment with the Michigan Science Content Expectations.

Value of Network Statewide Programming

- Focus on Michigan teacher and student needs and priorities
- Provide research-based, ready-to-implement curriculum and PD
- Serve teachers in all Michigan regions
- Economy-of-scale allows Centers to share resources
- ALL Centers able to offer services not otherwise available
- Provide financial support for substitutes and educational resources
- Connect local teachers to a broader network of Michigan teachers
- Strengthen Network partnerships with universities and other education organizations

Network Professional Development BY THE NUMBERS-1999 through 2017

549,370 Teachers enrolled in Network professional development
218,278 Total professional development hours provided by the Network
37,319 Total professional development programs offered by the Network

2016-17 Network Professional Development

10,743 *Teachers enrolled*

17,287 *PD hours provided*

Teacher participants by grade-level enrolled

583 High School, **1,282** Middle School, **2,016** K-8, **6,297** Elementary, **153** Pre-School

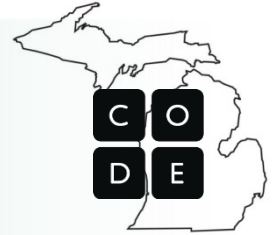
Teacher participants by PD topic

6,687 Math, **9,701** Science, **354** Technology, **593** Engineering, **1,118** Other

Network Capacities, continued

Code.org

Implementation across Michigan



As a regional partner with an internationally renowned program known as “Code.org,” the Michigan Math and Science Centers Network helped implement the program across Michigan. There have been 100 teachers that have participated, during the past year, including 86 high school and 14 middle school teachers. The purpose of this program is to make computer science accessible to all students.

The Code.org curriculum uses a collaborative approach to computer science while engaging students in the development of games, phone apps, animations, and more. In this way, students are able to see the versatility of the technology while forging meaningful connections through the creation and application of the programming they use in their everyday lives.

“Code.org has made students aware and given them confidence that [computer science] can be very useful to their life.”

The Michigan Math and Science Centers were initially made aware of a potential partnership with Code.org through the College Board. Center directors began disseminating information about the program at the local levels to recruit teachers while organizations such as the Michigan Science Teachers Association (MSTA) aided the dissemination process at statewide conferences.

Class enrollment rose from 2 to 22 students with the implementation of the Code.org curriculum.

Teachers across the state of Michigan are excited about this program. One teacher commented that enrollment in the computer science class at her school went from 2 students to 22 with the implementation of the Code.org curriculum. Along with increased enrollment, one teacher commented that female and minority students now comprise 25% of the class, whereas, previously they barely represented 10% of the students.

One center level example is the **Mason-Lake Oceana Mathematics and Science Center** which successfully led the largest launch of any advanced placement (AP) class in Michigan’s history with AP CSP during the 2017-2018 school year, nearly doubling the number of AP CSP classes being offered in the state. Through this Code.org partnership, Michigan schools were assisted with a sustainable K-12 computer science continuum.

Another example is the **Northwoods Math and Science Center** (NMSTC). Two years ago, none of the schools in the NMSTC district offered computer science courses. NMSTC advocated for adding the AP Computer Science Principles course. Teachers from three districts attended the workshops hosted by the MMSCN and Code.org and began offering computer learning to students for the first time. This year, three schools will extend their computer learning pathway to include the middle school Computer Science Discoveries course and several others are adding the Computer Science FUNdamentals elementary courses. One district now offers a complete K-12 computer learning pathway.

Teachers stated during interviews that the Code.org curriculum promotes problem-solving skills, writing skills, and students forging meaningful connections during the learning process. Several teachers also stated that the program’s built-in collaborative nature has helped teachers shift their pedagogy and their classroom environments to be one where students work together during the learning process.

Network Capacities, continued

Serving High School Students through Accelerated STEM Programs

Background

From the inception of the Network, several Centers developed and operated accelerated high school programs for students in their service areas. As many as nine Centers provided challenging and diverse college preparatory program in science, mathematics, and technology. High school students spend half of each school day at special Center facilities equipped with up-to-date science and computer labs engaged in activities to learn about basic and cutting-edge STEM topics.

As part of their program, students have opportunities to work with mentors, including physicians, surgeons, computer scientists, chemists, veterinarians, field and lab biologists, and other researchers. Many students, as part of their Math/Science Center experience, also enroll in college courses, where they learn college-level science and mathematics subject matter. This program is one of many Center and Network activities contributing to *talent development* in Michigan.

Math and Science Centers Accelerated High Schools: Student Accomplishments

Annually 100% of these students graduate and are accepted in college programs.

Nearly all students enroll in and successfully complete one or more science and/or math Advanced Placement (AP) courses.

ACT scores of these students are above state and national averages

Many students take advantage of Dual Enrollment opportunities, earning college credit for selected high school classes.

These students have received many millions of dollars in scholarships since 1995 to pursue college programs for future careers.

Over 25 years of programming, many students have received National Merit Scholarship Awards.

All students do authentic research in their schools and communities. Many compete in state and national research competitions.

Most students participate in individual and group STEM competitions.

Accelerated High Schools Participation Levels

~67,352 Students (Based on records from 1995 to 2018)

During that time, there were between 4 and 9 Centers with Accelerated High Schools.

Network Capacities, continued

Improving STEM Teaching and Learning in High Priority Schools

Background

Providing services to high priority schools continues to be a major focus of the Network. High Priority Schools are identified annually by the Michigan Department of Education (MDE). These are schools that have low student success rates and other educational deficits. During most years, 2 or more high-priority schools (a few Centers had 20 or more) have been identified in each of the Math/Science Center service areas. Centers reach out to these schools, offering them services through Center and Network programs. Efforts are made to enroll teachers and administrators in Center professional development, curriculum, leadership, and student programs and services. Instructional resources are also made available to these schools.

Network Services to High Priority Schools

Since 2004, the Network has received a list of high priority schools and offered programs and services to the teachers and administrators in those schools. Each year, 30-50% of these schools chose to participate in Center programs. Annually, there are 150-200 high priority schools identified by MDE.

Priority Schools Served 2008-2017	
605	<i>School served</i>
1,795	<i>Teachers served</i>
1,229	<i>Different activities provided</i>
14,536	<i>Activity hours</i>
38,387	<i>Total contact hours</i>

Examples of Programs and Services Provided

Centers offered a variety of programs, services, and consultations based on needs collaboratively identified by the school and Center staff.

- Providing math coaches
- Recruiting teachers to participate in NGSX science professional learning
- Providing kits and instructional materials aligned with curriculum
- Facilitating curriculum development in mathematics—creating quality lessons and formative assessments
- Engaging high priority schools in the *Intel Mathematics* Math/Science Partnership grant
- Helped organize an elementary STEM-focused school as a pilot turn-around school
- Facilitating high school program designed to encourage graduates to enroll in college programs
- Teachers participated in a Center-sponsored summer institute and school year follow-up workshops
- Cadres of teachers from high priority schools participated in the *Algebra for All* program
- Facilitated weekly professional learning communities focused on analyzing student test scores

Network Capacities, continued

Improving STEM Education through the Michigan Mathematics and Science Partnership (MSP) Program 2015-2018

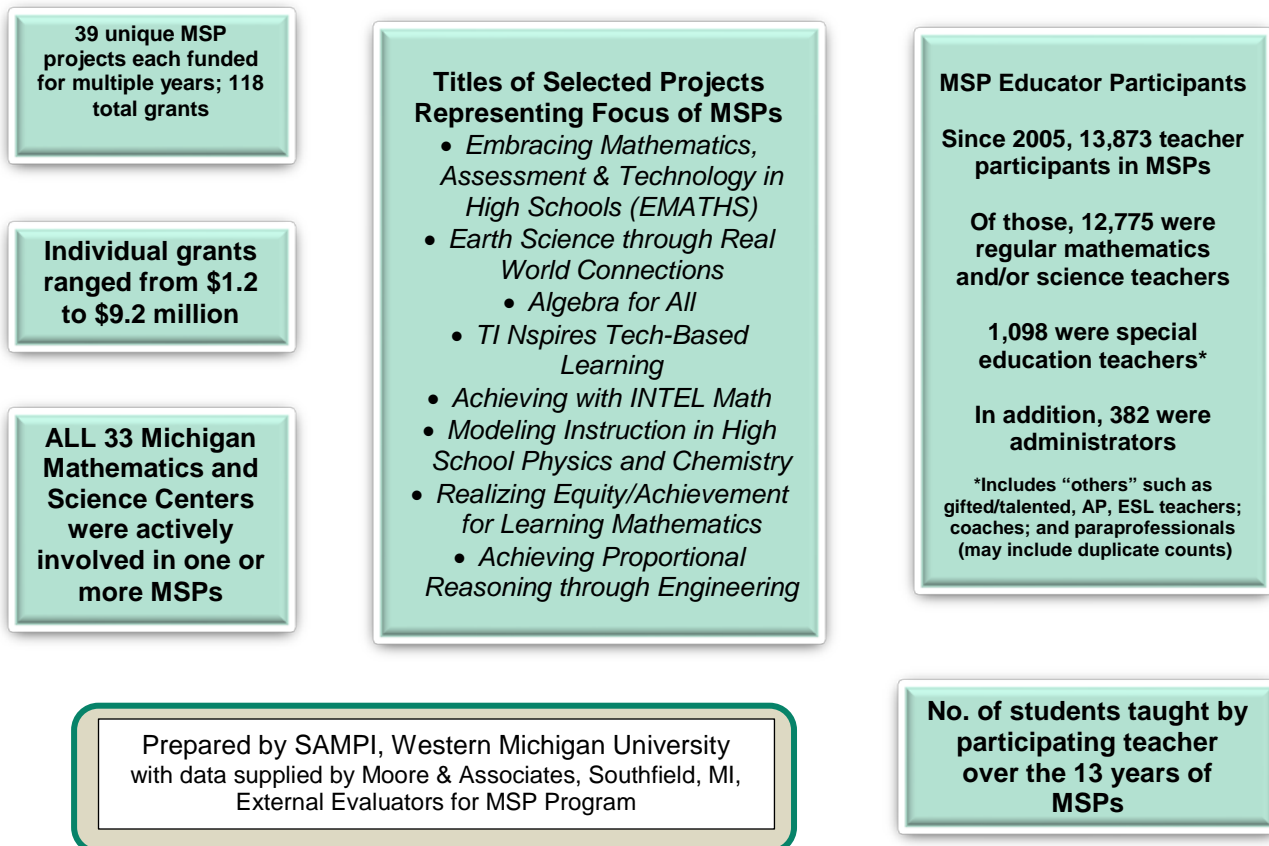
Background

The Michigan Mathematics and Science Partnership (MSP) program awarded grants to partnerships made up of Michigan Math and Science Centers, institutions of higher education (IHE), local schools/districts (LEAs), and other organizations interested in improving STEM education. Begun in 2005, MSPs were funded through the U.S. Dept. of Education Title IIB program. The purpose was to increase student academic achievement in science, technology, engineering, and mathematics (STEM) by enhancing content knowledge and teaching skills of teachers. The success of these efforts was grounded in strong partnerships, including the sustained involvement of the Math and Science Centers Network. Lead organizations included Math/Science Centers, Intermediate School Districts, and Michigan IHEs.

Roles of Math and Science Centers Network

The Network and Centers proposed specific MSP projects, served as coordinators of selected projects, collaborated with IHEs and LEAs, partnered with other MSP grant recipients, coordinated MSPs across Centers, recruited teachers, facilitated PD sessions, secured/prepared educational materials, provided meeting locations, and supported evaluation activities.

NATURE AND EXTENT OF THE MATH/SCIENCE PARTNERSHIPS



STATEWIDE PROJECTS 2017-2018

Value of Michigan Statewide Projects

The 33 Michigan Mathematics and Science Centers have functioned as a collaborative Network since their inception in 1988. The Network provides professional learning and student activities to target the needs of teachers, students, schools, and districts across the state. The Network has become an essential means of communication between organizations, like the MDE, Michigan teachers, and students.

Statewide Projects in 2017-2018:

TESLA (Teachers Engaged in Science Leadership Activities)

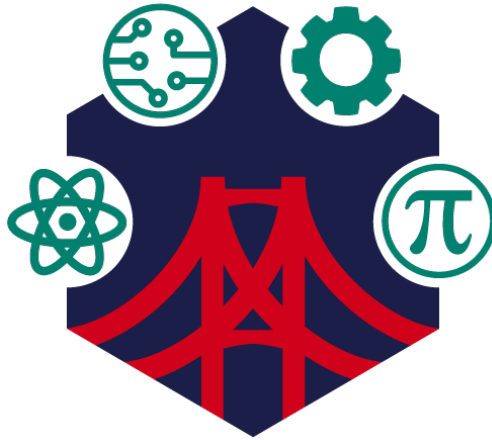
AP-CSP

Intel[®]

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UP-SMILE

Network statewide projects:

- Provide research-based, ready-to-implement curriculum and professional learning opportunities.
- Focus on topics and issues important to teachers and the state.
- Address the needs of students and teachers.
- Connect local teachers to a broader network of teachers.
- Allow the collection of student and teacher data.
- Lend credibility and urgency to the nature of the content presented.
- Allow teachers to remain up-to-date with the latest information.
- Give teachers the opportunity to step outside the role of teacher and experience a leadership role.
- Bring resource materials into the hands of teachers.



Other aspects of Network statewide projects:

- Economy-of-scale allows Centers to share resources and planning. All Centers, regardless of size, are able to offer instructional services that may not otherwise happen. Limited resources are used more efficiently.
- Centers have opportunities to collaborate and network with each other. They look beyond themselves and focus on the needs of others across the state.
- Centers and teachers have opportunities to build and strengthen relationships with universities and ISDs.
- Increased communication with local principals, curriculum directors, teachers, etc.
- Teachers learn and implement new technology.
- Centers have cadres of teachers “speaking the same language” and willing to share instructional strategies, successes, and failures.

TESLA - Year 4

Teachers Engaged in Science Leadership Activities

The Michigan Mathematics and Science Centers Network's four-year project, Teachers Engaged in Science Leadership Activities (TESLA), is creating leadership capacity and professional learning opportunities for science education leaders and science teachers throughout Michigan. Supported by funding from the Michigan Department of Education, TESLA focuses on two critical features of leadership capacity building: in-state experiences and inter-state collaboratives.

TESLA has continued to support teachers through professional learning in year 4. The project supported a new initiative focused on formative assessment this year. TESLA funds were used to host a series of formative assessment webinars with national experts in formative assessment practices. Topics covered included elementary learning progressions, subject specific formative assessment, formative assessment through talk, and using formative assessment with English learners. These webinars and associated materials have been made freely available to teachers.

The inter-state collaborative has been realized by the planning and initial implementation of NGSX (Next Generation Science Exemplar System). From September 2017 through August 2018, Michigan has prepared an additional 53 science education leaders to facilitate NGSX workshops with K-12 science teachers throughout the state. Each region of Michigan has facilitators within their region and access to additional state-wide facilitators who can travel to various locations. NGSX provides support for teachers in implementing modeling, argumentation, and explanation with K-12 science teaching.

Since December 2015, NGSX study groups have formed and have completed the 30 hour preparation program. As of September 2018, approximately 3,668 Michigan science teachers have been part of study groups through Centers, including 1,461 teachers since September 2017. Access to the NGSX site (normally \$200/teacher) has been provided to all teachers through TESLA funds. Access is provided for all study groups, which are led by Michigan prepared facilitators. This includes study groups facilitated by MMSCN Directors and Associates as well as other facilitators not directly linked to a Center.

Several strengths and limitations have been identified for the TESLA project during year 4 based on the analysis of the quantitative and qualitative data collected through the NGSX workshop surveys and the interviews with Math and Science Center Directors. Paired pre- and post-survey data from the NGSX workshops again showed that teachers reported improved familiarity with the NGSS in year 4. Directors noted that there has been a noticeable shift in teacher discussions related to implementing NGSX practices. Teachers are having richer discussions at statewide meetings around NGSX as a result of having a shared language. Directors have attributed several changes in their teachers to NGSX including improved understanding of science and engineering practices and better familiarity with the instructional shifts needed to align with NGSS. Teachers have also continued implementing problem-based learning, discourse, and modeling practices into their instruction. There continues to be difficulty reported with some teachers understanding how to implement NGSX practices in their classrooms. Additionally, it is challenging for teachers to have the release time and substitutes they need to attend the NGSX workshops. One way that the TESLA project has helped to address this problem is to continue training additional facilitators. The new facilitators have allowed districts to team together to offer workshops closer to teachers, making it easier for them to attend.

AP Computer Science Principles and CS Discoveries

The Michigan Mathematics and Science Centers Network, as a regional partner with Code.org, has supported 86 high school teachers with the implementation of AP Computer Science Principles (AP CSP) and 14 middle school teachers with the implementation of Computer Science Discoveries (CSD) starting in the summer of 2017. All 100 teachers are implementing a year-long course in computer science for their students using the internationally renowned materials created by Code.org.

The professional learning series for these teachers include a five day kick-off event in the summer of 2017. This is followed by four follow-up professional learning sessions during the 2017-2018 school year. Teachers also have access to an AP Course Audit which is pre-approved by the College Board.

AP CSP introduces students to the foundational concepts of computer science and challenges them to explore how computing and technology can impact the world. More than a traditional introduction to programming, it is a rigorous, engaging, and approachable course that explores many of the foundational ideas of computing so all students understand how these concepts are transforming the world we live in. CSD takes a wide lens on computer science by covering topics such as programming, physical computing, HTML/CSS, and data. The course inspires students as they build their own websites, apps, games, and physical computing devices.

The AP CSP course is projected to have the largest launch of any AP course in Michigan's history. Furthermore, Michigan had the largest cohort of any state in the nation at the Code.org summer TeacherCon in Philadelphia in the summer of 2017.

Modeling Instruction in Michigan

The Modeling Instruction in Michigan program provides professional development to Michigan secondary science teachers. It is a comprehensive statewide program conceived and organized by lead members of the Michigan Math/Science Centers Network in partnership with Eastern Michigan University, the Detroit Metropolitan Area Physics Teachers and the American Modeling Teachers Association. The project is funded by a Mathematics and Science Partnership grant.

Modeling Instruction was created by an NSF-funded grant carried out at Arizona State University. In our work, we make use of their carefully designed framework that has been shown to markedly increase teacher content mastery and instructional skill. The workshops are an immersion design where teachers learn from the same techniques and materials they will utilize with their students. Modeling Instruction relies on findings that show conceptual mastery of science content and practices is developed through student-centered investigations supported by well facilitated, productive academic talk in the classroom. Student preconceptions are directly confronted and compared to indisputable results from class demonstrations and experiments. Skilled teachers use discourse techniques to probe student thinking and prompt them to compare their evidence, models, and explanations. It is an excellent onramp to the vision of the new Michigan Science Standards because of a strong alignment with the instructional implication of the three dimensions of the NRC Framework for K-12 Education.

These are the major components of the program:

- Intensive three week long summer workshop in high school physics, chemistry and biology and also in middle school science
- Follow-up fall Saturday workshops and winter evening webinars
- Lesson Lap events where selected participants host guest participants and higher education partners who observe and reflect on instruction
- The Aspiring Modeling Facilitators Academy, which aims to increase the number of skilled facilitators

Here are some examples of the Modeling program in action:

COOR Math and Science Center has continued to act as a host site for the Statewide Modeling in Science training. Nearly all COOR area high school Science Teachers have attended at least one summer workshop, and most schools have adopted the Modeling programs as their science courses. While only 10.9% of 4th grade students in COOR scored proficient on last year's Science MSTEP (statewide average being 14.6%), 35.6% of 11th grade students scored in the proficient range (statewide average of 33.6%). Local teachers attribute much of this improvement to their use of Modeling.

The **Muskegon Regional Math and Science Center** (MRMSC) also acted as a host site for Modeling Instruction in Michigan. Over the last five years, workshops have been held to support physics, chemistry, physical science, Chemistry II, and middle school science. Teachers from the MRMSC service area also attended trainings available in Kent County. In addition, three Muskegon county teachers have been participating in the Aspiring Modeling Facilitators Academy to become Modeling Instruction facilitators

Math Recovery[®] Professional Development

Year 3

Supporting the implementation of Math Recovery[®] Professional Development was a project funded by the Michigan Mathematics and Science Partnership competitive grants program of the Michigan Department of Education. It was implemented by the Muskegon Area ISD Regional Mathematics and Science Center (MRMSC).

The original project, or Phase I (April 2015 – June 2016), had six major objectives:

1. To deepen teacher mathematics content knowledge and understanding of the continuum of mathematical thinking, assessment tasks, and instruction to move students forward along the continuum;
2. To strengthen district level expertise in providing on-demand support to teachers to promote strong teaching skills and in turn improve student mathematics achievement;
3. To provide administrative support for Math Recovery[®] implementation to create a system that will allow teachers to close the achievement gap of students in mathematics;
4. To improve student achievement in mathematics by developing mathematical understandings which move students along the continuum of mathematics thinking;
5. To build capacity in Michigan in understanding the development of early numeracy and to support teachers in closing the mathematics achievement gap in Michigan; and
6. To provide a coherent continuum of supports for all students (multi-tiered system of supports) to close the achievement gap and decrease the number of students needing tier 2 and 3 supports.

The key to achieving long-term growth in districts is sustainability. The continuation of the project, or Phase II (July 2016 – June 2018), therefore focused professional development efforts on two goals:

1. Continue to strengthen district-level expertise in providing on-demand support to teachers, and
2. Increase the number of regions in Michigan offering Math Recovery[®] professional learning.

AVMR Teacher Training

The Math Recovery[®] Add+VantageMR[®] (AVMR[®]) two-course training was offered during Phase I of the project to 299 K-5 teachers by the MRMSC and its three partners: Calhoun Intermediate School District, Eastern Upper Peninsula Mathematics and Science Center, and Mason-Lake Oceana Mathematics and Science Center. Efforts were successfully expanded to nine new Michigan regions during Phase II: Wayne County Regional Education Service Agency, Macomb Intermediate School District, Genesee Intermediate School District, Wexford-Missaukee Intermediate School District, Kent Intermediate School District, Oakland Science Mathematics and Technology Center, Capital Area Science and Mathematics Center, Mecosta-Osceola Intermediate School District, and AMA/Iosco Mathematics and Science Center. 279 teachers were impacted through the new regions.

The goal of the AVMR[®] was to provide K-5 teachers with efficient assessment tools to help them recognize their students' current understandings of number concepts in the domain of "Operations and Algebraic Thinking" and "Numbers and Operations in Base Ten" in the Common Core State Standards (CCSS). It offered a framework to increase students' level of sophistication in solving problems similar to progressing students in their reading level. AVMR[®] described constructs that provide a focus for building on students' knowledge to move them to higher levels of understanding and sophistication in solving math problems. Course 1 provided a detailed understanding of how children develop understanding of early numeracy, and Course 2 focused on number domains of place value and multiplication.

State Team Meetings

A team consisting of Math Recovery® facilitators from across the state of Michigan met regularly to develop resources and tools for Math Recovery® trained districts. These resources and tools serve as a statewide bank to provide support for early elementary teachers in their districts. State team members consisted of the project PI, the project coordinator, math consultants and Mathematics and Science Center Directors who helped implement Math Recovery® in their respective regions, and a math coach working with the project. SAMPI staff members attended some of these meetings as well. The team oversaw the selection and development of various resources and tools that support various districts' efforts at implementing Math Recovery®, including grade level summary documents to guide systemic collection within a district multi-tiered system of supports. These resources and tools have been made available to districts through a "Michigan Math Recovery®" Google Team Drive.

MTH 380 Course at GVSU

The MRMSC and Grand Valley State University (GVSU) created a course for elementary education math majors that integrated AVMR® training into the coursework. The course was offered during previous years of the project. In the past year, plans have been considered to offer a variation of the course after grant funding ends. Faculty at GVSU explored the possibility of running a class that integrates the Math Recovery® Fractions Course, which explores the difficulties students have making sense of fractions and supports teachers in understanding this topic with the goal of facilitating student advancement in fractions concepts.

Teacher Leaders (Coaches)

Project leadership established a teacher leader track during Phase I (April 2015 – June 2016) at two sites (Muskegon and Calhoun) through which a selected group teachers and coaches attended the Math Recovery® Intervention Specialist (MRIS®) course. Muskegon held monthly meetings with this group during Phase II (July 2016- June 2018) to work on specific district implementation – assessment plans, ways to communicate with administrators, etc. One of the project leaders said during an interview, "We continue their professional learning so that they can make it district specific in their implementation."

Champion Training

Two members of the project management team were interviewed and asked the following question: "What has been done to increase the number of regions in Michigan to be able to offer and support Math Recovery® professional learning?" Both team members responded that they were offering Math Recovery® Champion training. The Champion course consisted of five sessions along with additional virtual meetings to provide participants with instruction on how to deliver and support AVMR® Course 1 and 2 and how to apply the principles of Math Recovery® in the classroom. The opportunity to attend the course was offered to teacher leaders who had completed both the AVMR® and MRIS® trainings, as these were prerequisites.

UP-SMILE

Upper Peninsula Science and Mathematics Integrated through Literacy and Engineering

The Upper Peninsula Science and Mathematics Integrated through Literacy and Engineering (UP-SMILE) project was funded by the Michigan Department of Education's Mathematics and Science Partnership competitive grants program. The purpose was to support the efforts of middle and high school teachers across Michigan's Upper Peninsula to bring an integrated approach to their mathematics and science classrooms. UP-SMILE intended to bridge math and science content, maximizing integration of content and resulting in meaningful experiences for the students, teachers, and other educational stakeholders in the Upper Peninsula.

Professional Development Opportunities

UP-SMILE provided teachers with numerous opportunities to engage in cross-curricular STEM learning. Learning communities and workshops on underwater remotely operated vehicles, 3-D printers, computer science fundamentals, and other topics created pathways to incorporate science and math through technology. The following is a brief summary of each opportunity:

- *Professional Learning Community (PLC)*. A five-day PLC was offered during the 2017-18 school year to *59 middle and high school teachers* by four of the five Upper Peninsula math and science centers: Dickinson-Iron-Menominee Math Science & Technology Center (DIMSAT), Eastern Upper Peninsula Mathematics and Science Center (EUP), Seaborg Mathematics and Science Center (Seaborg), and Western Upper Peninsula Center for Science Mathematics and Environmental Education (WUP). The first four days focused on 3-D printing and Geographic Information Systems. The final day focused on strategies for implementing what they were learning into their curriculum and lessons.
- *EQulP Rubric Workshop*. UP-SMILE offered two workshops on the *Educators Evaluating the Quality of Instructional Products (EQulP)* rubric for lessons and units in science. The rubric provided criteria to measure the degree to which lessons and units were designed for the Next Generation Science Standards (NGSS). The workshops were held at EUP on April 18, 2018 and at Seaborg on April 19, 2018, and were offered to *15 middle and high school teachers*.
- *Computer Science Fundamentals Workshop*. UP-SMILE partnered with Code.org to offer a computer science fundamentals workshop to *271 K-5 teachers, mostly elementary*, at 19 sites across from April 28, 2018 to June 26, 2018. Five sites were in the Upper Peninsula and 14 were in the Lower Peninsula. Teachers were provided with daily lesson plans made up of inquiry-based activities, videos, assessments, and computing tools to help their students discover core computing concepts.
- *Underwater Remotely Operated Vehicles (UROVs) Workshop*. UP-SMILE partnered with the Square One Education Network to offer an introductory workshop for UROVs on June 11-12, 2018. Participants received an instruction manual, materials, and support to design, engineer and build a functional underwater remotely operated vehicle. The workshop supported standards and benchmarks in science, math, and technology. It was offered to *21 teachers of grades 4 through 12*.
- *Innovative Additive Manufacturing: 3-D Printer Workshop*. UP-SMILE again partnered with the Square One Education Network to offer a four-day 3-D printer workshop on June 19-22, 2018 to K-12 teacher. Teachers worked in teams of two to build their own 3-D printers to take back to school for student use and reproduction. The workshop was held at Northern Michigan University and was attended by *14 teachers*.
- *Great Lakes Coastal Wetlands Workshop*. UP-SMILE partnered with the University of Michigan Biological Station to offer this workshop on June 21-22, 2018. It introduced *10 middle and high school teachers* to Great Lakes research at the biological station with an emphasis on coastal wetland research being conducted by a group of researchers from across the country. Teachers were provided with the opportunity to practice field data sampling and analysis protocols for aquatic plant, animal, and insect data.

Math Recovery® AVMR® Training

Another part of the UP-SMILE project offered Math Recovery® Professional Development training to K-5 teachers across Michigan's Upper Peninsula during the 2017-18 school year. This is a 40-hour training called Add+VantageMR® (AVMR®). See the previous section regarding the Math Recovery® Professional Development Program on pages 17-18 for more details. The training consisted of two AVMR® courses designed to provide a detailed understanding of how children develop understanding of early numeracy (Course 1) and number domains of place value and multiplication and division (Course 2). K-5 teachers also were trained to administer AVMR® assessment tools that helped them recognize students' current mathematics understanding and build on their current ways of reasoning. The training was implemented at the following four sites:

- Copper Country ISD (CCISD)
- Delta-Schoolcraft Intermediate School District (DSISD)
- Dickinson-Iron-Menominee Math, Science, and Technology Center (DIMSAT)
- Eastern Upper Peninsula Intermediate School District (EUPISD)

A pre/post content test was administered to 59 teacher participants. The test contained 12 items covering math concepts and strategies teachers were exposed to during AVMR® training. Some items had several parts, bringing the total possible score to 25. Paired sample t-tests provided evidence that the training impacted the content knowledge of teacher participants at all sites; pre/post growth was statistically significant for all four sites. See the table below for details.

UP-SMILE Math Recovery® Professional Development
Teacher Pre/Post Test Analysis by Site, 2017-2018

Total possible score = 25	n	Pre-Test		Post-Test		p-value
		Score	%	Score	%	
All Teachers	59	18.4	73.8%	20.8	83.3%	<0.001*
CCISD	10	19.3	77.2%	21.6	86.4%	0.011*
DSISD	10	19.0	76.0%	21.5	86.0%	0.006*
DIMSAT	28	18.9	75.4%	21.0	83.9%	< 0.001*
EUP	11	16.6	66.5%	19.3	77.1%	0.002*

* Statistically significant difference.

Math Recovery® Fractions Course

The Math Recovery® Fractions Course was offered to 23 *teacher participants, most of whom taught elementary*. The Fractions Course explored the difficulties many students have making sense of fractions. It was a 3-month long, interactive, blended learning course which included web-based learning, independent learning activities, and a series of team meetings. Course topics included diagnostic assessments in fractions concepts and units coordination. The course emphasized the use of assessments, data collecting, and teaching tools to accelerate the ability of teachers to recognize students' current levels of understanding to make data-driven instructional decisions. Participants completed an online end-of-course questionnaire about their experiences. Most had clear ideas about how they expected to use what they learned. The most common response categories included:

- I will assess my students or use the assessments (3 responses).
- I will use what I have learned to bring my students to the next level in their understanding (3 responses).
- I will support other teachers who teach fractions (3 responses).

Most also thought their students would benefit from what they learned. The most common response categories included:

- Students will deepen/improve their understanding of fractions (6 responses).
- Students will have a teacher who is better able to teach fractions (3 responses).
- Students will have a teacher who understands why they are struggling or what they do/do not understand (3 responses).

For any questions regarding the UP-SMILE project, contact Kevin St. Onge, Director of the Eastern Upper Peninsula Mathematics and Science Center (EUP) at kevins@eupschools.org or 906-203-6117.

Network Collaborations with Professional Organizations

The Michigan Mathematics and Science Centers Network Directors collaborated with several state and national professional organizations. Below is a list of collaborations from this year and in years past. Professional organizations include but are not limited to Michigan Association of Intermediate School Administrators Mathematics Leadership Team and General Education Leadership Network (MAISA MLT and GELN), Michigan Association for Computer Users in Learning (MACUL), Michigan Council of Teachers of Mathematics (MCTM), Michigan Mathematics Coordinators and Consultants (M^2C^2), Michigan Science Professional Learning at the Network (MI Sci PL@N), Michigan Science Standards (MiSS) Team, Michigan Science Teachers Association (MSTA), MSU Create for STEM, National Council of Supervisors of Mathematics (NCSM), and National Science Teachers Association (NSTA). What follows are some of the examples of the collaborations with professional organizations.

MAISA Mathematics Leadership Team (MLT) and General Education Leadership Network

(GLEN): Several MMSCN directors and associates actively engage with the MAISA Mathematics Leadership Team (MLT). Further, three directors and one associate have taken leadership roles to help foster collaboration among the MMSCN, MAISA MLT and GELN, and the Michigan Mathematics Consultants and Coordinators (M^2C^2). Jodi Redman, the Director of the Manistee, Wexford-Missaukee Regional Math/Science Center, a mathematics and science instructional consultant at the Wexford-Missaukee ISD, and the co-chair of M^2C^2 collaborated with the Executive Committee of the MAISA MLT to plan and facilitate a shared professional learning activity for mathematics leaders across the State at the regular M^2C^2 meetings.

MACUL: Kevin Clark (Berrien) is currently the MACUL Board Past President, however there are currently no collaborations or projects that the Network and MACUL are working on together.

MCTM: Judith Falk (Great Lakes) serves on the MCTM board as the Region 10 Director. MCTM and MMSCN keep each other informed on STEM happenings throughout the state and work together on initiatives whenever possible. MCTM highlights and promotes current state math initiatives that the MMSCN supports. State math and science initiatives, resources and professional learning opportunities are linked on the MCTM website.

M^2C^2 : Jodi Redman (Manistee, Wexford-Missaukee) serves as the co-chair to M^2C^2 , a local affiliate of the NCSM.

MI Sci PL@N: MI Sci PL@N was conceived and convened by current and former MMSCN Directors; Dave Krebs, former director (Muskegon), Alycia Meriweather, former director (Detroit), and James Emmerling (Genesee). It is now led by James and Mary Lindow (Battle Creek). The MMSCN Professional Learning Committee's Science Directors continue to oversee the organization. Planning for meetings is done collaboratively with members of several professional organizations such as Create for STEM at MSU, MSTA, MSELA, MDE, etc. MI Sci PL@N holds four face-to-face meetings throughout the year. Its purpose is to enhance communication, encourage cooperation, and inspire collaboration among the members of professional organizations committed to improving science education. Collaboration time is scheduled following the meetings. Essentially these meetings allow members of the various organizations to be aware of what is happening around the state and to make connections as needed.

MiSS: The MiSS team was conceived and convened by the MMSCN (Mary Starr, MMSCN Executive Director, and James Emmerling, Genesee) to fill a perceived void in professional learning between the proposed Michigan Science Standards and available professional learning programs. This professional learning team includes MMSCN Directors and Associates and ISD representatives, with suggestions and feedback from MSU's Create for STEM, MDE, other teacher prep institutions, MSTA, and MVU. The team developed a professional learning program called MI Science PL@N. The program includes "levels" of professional learning for teachers and administrators to enhance their understanding of the vision of Framework aligned Michigan Science Standards Instruction.

MSTA: Mike Klein (Macomb) is the current treasurer and a past president of the Michigan Science Teachers Association (MSTA). He attends all meetings of both organizations (MSTA and MMSCN). The two organizations are joined by similar missions of leadership and support for science education in Michigan. Historically there has not been significant collaboration between the two groups; however, the MSTA conference in 2016 was the beginning of a more formal relationship. MMSCN presented several sessions as part of a Network strand and was also involved in the preconference workshops. Information sharing occurs via reporting at both meetings and occasional outside meetings between the executive directors of both organizations.

CREATE for STEM: CREATE for STEM is a Michigan State University sponsored research institute, Directed by Joseph Krajcik, a leading researcher and author of A K-12 Framework for Science Education and the Next Generation Science Standards which served as the foundation for the Michigan Science Standards. CREATE for STEM has a broad mandate for Collaborative Research in Education, Assessment and Teaching Environments for the fields of Science, Technology, Engineering and Mathematics and has partnered with the Mathematics and Science Centers on many different projects; MI Sci PL@N, researching and piloting aligned curricular materials, and science standards adoption efforts.

NCSM: The Michigan Council of Teachers of Mathematics (MCTM) and the Michigan Mathematics Consultants and Coordinators (M²C²) are both affiliate organizations of the National Council of Supervisors of Mathematics (NCSM). Several MMSCN Directors and Associates are active members of these organizations, as well as the NCSM. Several representatives serve in leadership positions with the national organization. For example, a past president of NCSM is Valerie Mills, former Director of OSMTech. Denise Brady (CASM) and Jason Gauthier (Allegan/Van Buren) currently serve on the NCSM Board of Directors. Dana Gosen (Director of OSMTech) is an NCSM Central Region 1 Team Member representing Michigan. Together, this team works with other Center representatives to communicate information, provide professional learning, and share resources made available through the NCSM with Michigan educators.

Open Door CoLaboratory: These are Virtual meetings to create more open communication between MDE, MMSCN, and the MI Sci PLN (statewide science professional developers) community by regularly collaborating on ideas before making them public. These conversations have been useful to address common concerns/questions and for vetting our thinking before sharing our ideas with a wider audience. Online discussions are preceded by conversations in a closed MI Sci PLN Google+ Community.

Student Services

Michigan Department of Education Strategic Goal:

“Provide every child access to an aligned, high-quality P-20 system from early childhood to post-secondary attainment – through a multi-stakeholder collaboration with business and industry, labor, and higher education - to maximize lifetime learning and success.”

U.S. Department of Education Goal:

“Improving the academic achievement of the disadvantaged”
“Promoting innovative programs”

Mathematics and Science Centers Network Goal:

“To improve and enhance STEM literacy

Examples of Programs for Underrepresented Students

- Active recruitment of underrepresented students for accelerated and special programs, including summer camps.
- Conferences for middle school girls focused on math, science and/or engineering.
- M/S Centers provide strategies for teachers to work with special needs students, such as differentiated instruction, and methods for teaching, writing and literacy.

Support for Students Attending Priority Schools

- M/S Centers identify Priority Schools for targeted programming, such as summer courses and special mathematics and science opportunities that support and enhance classroom work.
- Whenever possible, programs are offered to students at no (or low) cost.
- Centers provided training in the use of Data Director, MI School Data, and Illuminate Data and Assessment. Special emphasis was placed on identifying student populations that have an achievement gap and developing strategies for closing that gap.

Accelerated High School Programs

- Four Centers, in collaboration with local districts, provide advanced mathematics and science courses through half-day accelerated high school programs. Recruitment of minorities is a high priority. See pages 11 and 26 for reported outcomes of these programs.
- Centers save Michigan families money by providing Advanced Placement courses and dual enrollment opportunities with local colleges.

Student outreach services provided by M/S Centers:

- Weekend, evening, and after-school programs
- Research and professional programs
- Classroom instructional programs
- Outdoor education programs
- Mathematics, science, and engineering fairs
- Summer campus and academies
- Internships in industry and medical fields
- Mentoring
- Academic competitions/LEGO Leagues
- Advanced technology training
- Online learning through Michigan Virtual University
- Resources available for schools like STARLABs

Impacts and Opportunities: Programming for Students

Students Explore STEM Careers and Opportunities

Central Michigan Science, Mathematics, Technology Center offered three short, faculty-led courses in talent development in STEM fields which were open to middle school students. Each course had between 12 and 20 participants, overall about 50 students participated. The three courses were chemistry with an emphasis on energy, digital fabric design and architecture.

The **Dickinson-Iron-Menominee Math, Science, Technology Center** has sponsored a Summer Science Camp for over 20 years in partnership with the ISD. Approximately 100 students from grades K-8 participated in the week-long, grade-level camps this year. Each camp is taught by a certified teacher and the camps are aligned with the Michigan Science Standards.

The **Lapeer County Mathematics and Science Center** hosted its 7th Annual Girls' STEM Conference. This conference exposed junior high girls from across Lapeer County to college and career opportunities and options made available by pursuing challenging math, science and technology endeavors. The conference allowed 51 girls around the county to interact with female role models working in a variety of interesting fields where these areas are prerequisites. The conference also included hands on activities in the digestive system and weather systems.

St. Clair Math and Science Center (SCMSC) collaborated to introduce Design4theFuture Summer Camps this summer. Campers choose to explore robotics, coding, Digital Media Technology or Health Careers as an extension of the STEM Career Exploration Camps that SCMSC has collaborated with St. Clair Technical Education Center in the past. Center staff is also collaborating with Algonac Schools to create a real world, problem-based class that will have students work with local businesses to come up with creative ways to solve a problem presented by that business. The students will present their proposals to an authentic audience.

Students Participate in Academic Competitions

Huron M/S/T Center was awarded funding from Square One Education Network to participate in Square One's IVD program designed to stimulate innovative thinking through design and engineering. The program unites high school teams with corporate partners and includes professional coaching from engineers. Teams design and build a one-person electric vehicle in a nine-month window with students assuming the leadership for all portions of planning and development. The Huron MST Center student team was one of over 20 teams to participate in a performance day event at Mcity in Ann Arbor.

The **Manistee, Wexford-Missaukee M/S Center** sponsored a LEGO/Robotics competition for the twelfth year in a row. Over 50 students participated in the competition or the exposition. The competition for this year was created by career tech center students in the robotics program.

GVSU Regional Math and Science Center participated in the largest Region 12 Science Olympiad Tournament to date in March 2018. As a result of this competition, Grand Haven High School moved on to the National Tournament.

Innovative Student Programs

In Centers across the Network, students have opportunities to learn and work in unusual environments; sample **Science, Technology, Engineering, and Mathematics (STEM)** careers; and engage in real-world research with practicing scientists and other professionals. Often partnering with business and industry, government agencies, non-profit organizations, and individuals, programs are designed to motivate ALL students to pursue STEM subjects in elementary, middle, and high school, as well as in college and adult careers. Interesting and exciting opportunities are made available through Mathematics and Science Centers that are usually unavailable in their home schools and districts, opening new worlds to these students.

Accelerated High School Programs

Four Centers currently provide accelerated high school programs: Battle Creek Area, Berrien County, Kalamazoo Area, and Macomb ISD Math/Science Centers. The four Centers serve 61 school districts from seven counties in Michigan. High school students spend half of each school day at Centers enrolled in challenging and diverse college preparatory programs in science, mathematics, and technology. Equipped with up-to-date science and computer labs, students engage in activities to learn about basic and cutting-edge STEM topics.

Students from all four Centers are required to complete research projects, many of which span the whole year and include formal presentations and papers. Many students, as part of their Math/Science Center experience, are also enrolled in college courses, where they learn college-level science and mathematics subject matter. In the junior/senior years, students have opportunities to work with mentors, including physicians, surgeons, computer scientists, chemists, veterinarians, field and lab biologists, and other researchers.

From the Centers that reported for the 2017-2018 school year, 771 students were enrolled in accelerated high school programs, with approximately 20% identifying as minority students. All 100% of graduating seniors planned on entering college programs. The graduating seniors of Battle Creek were offered more than \$4.5 million in scholarships. Approximately 150 students were enrolled in at least one Advanced Placement course during the school year. Below are examples of outcomes in Accelerated High School Programs:

All students in the **Battle Creek Area Math and Science Center** secondary program completed a research project of their own design during their time at the Center. These projects are completed while students are enrolled in Independent Research, Research Methods, Advanced Placement Statistics, Analytical Chemistry, or Environmental Biology coursework. In May 2018, the Center held its annual Research Symposium with 117 individual research projects. The BCAMSC believes that by offering a rigorous and relevant curriculum it is educating the scientific and technical leaders of tomorrow while providing a nurturing and unique educational environment tuned to accommodate the intellectual needs of high functioning students.

Similarly, at the **Macomb Math, Science, and Technology Center** every senior undertakes an extensive research project in one of the core areas of science. These projects span the whole year and include formal presentations and papers. Many students partner with professional scientists and engineers in their chosen field of study and it is not uncommon for one or more of the projects to receive one of the top prizes at the Science and Engineering Fair of Metro Detroit.

Other Innovative Student Services

Many Centers provide innovative outreach programming using local resources to provide opportunities and to meet needs of schools, teachers, and students in their service areas. These highly motivating programs are not otherwise available to schools. Innovative instructional practices are used to engage all students.

Focus on Priority School

Providing Services to Previously-Identified Priority Schools Continues to be a Major Focus of the Michigan Mathematics and Science Centers Network.

Priority Schools were previously identified by the Michigan Department of Education (MDE) and individual Centers made programs and services available to help improve teaching and learning of science and mathematics at these schools. As of June 2017, the MDE released all Priority Schools and no longer distinguishes these schools. However, the Centers continue to regularly invite all Priority Schools, along with other schools in their service areas, to participate in staff professional learning, student programming, curriculum support activities, and instructional resource distribution. Centers customize services for specific Priority Schools as financial resources become available.

Examples of Programs, Partnerships, and Services for Previous Priority Schools

At **Oakland Science, Mathematics and Technology Center** (OSMTech) there is an interdepartmental team that works closely and collaboratively with state and locally identified districts and schools to support a continuous and systemic improvement process. Team members regularly work side-by-side with school and district staff to cohesively support improved educational outcomes for each and every learner within the system. This year, OSMTech staff met with district administrators at least quarterly to discuss the progress being made on the district goals and identifying additional support. District administrators have worked with Oakland Schools staff, including OSMTech staff, to clarify, refine, and make the district curriculum accessible.

Throughout the 2017-18 school year, **Saginaw Valley State University Regional Mathematics and Science Center** worked with teachers from Bay City Public Schools, one of the priority schools, as part of the Mathematics and Science Partnership (MSP) grant *Achieving with Intel Math (AIM)*. Teachers previously participated in Intel Math training, so the focus during the school year was implementation of the Michigan State Standards for Mathematical Practice.

Professional Learning

Mathematics and Science Centers Network Goal:

“Provide professional learning for STEM educators that assist them in providing curriculum and instruction aligned to the current standards.”

State Board of Education Strategic Goal:

“Develop, support, and sustain a high-quality, prepared, and collaborative education workforce.”

U.S. Department of Education goal:

“Preparing high quality teachers.”

Statewide Professional Learning

- **1,414** professional learning sessions were offered by M/S Centers in 2017-2018.
- **9,668** hours of professional learning programming were offered by M/S Centers in 2017-2018.
- **8,533** teachers and administrators enrolled in one or more professional learning sessions facilitated by M/S Centers. These participating teachers and administrators averaged **18.0** hours of professional learning offered by M/S Centers in 2017-2018.
- Of the Centers that reported, over 54% of the Mathematics and Science Centers coordinated efforts to meet the challenges of addressing the current standards, providing professional learning that focused on the Michigan Science Standards. In all, M/S Centers provided 758 science activities amounting to 4,861 hours for 7,351 participants.
- In addition, at least 30% of the Math/Science Centers held professional learning sessions focusing on developing leadership capacity within districts where teacher leaders engaged with instructional units and lessons designed around best practice strategies for implementing the Michigan Standards for Mathematical Practice. There were 423 activities totaling 3,901 hours for 4,743 participants.

How are the Centers impacting classroom practice?

- Documented changes in teaching practice due to participation in Center programming include more hands-on investigations, inquiry-based teaching and learning, concept mapping, and technology integration.
- Training on the use of science kits has encouraged inquiry-based learning.
- Feedback from teachers indicates that confidence in teaching science and math basic content is increasing.

Types of Professional Learning Offered through Centers' Programming

- | | | |
|---------------------------------------|-------------------------------------|-------------------------------------|
| • Content knowledge workshops | • Professional learning series | • Graduate courses |
| • Distance-learning series | • New teacher induction program | • Mentoring programs |
| • Summer institutes | • Video conferencing | • In-class coaching |
| • Technology training and integration | • Professional learning communities | • Sponsorship to attend conferences |
| • Online webinars and classes | • Statewide professional learning | • Study groups |

Professional learning has been a major core service for the **Eastern Upper Peninsula Math Science Center** through UP SMILE initiatives that include Math Recovery, NGSX, 3D Printing, GRACE GIS, data collection, computer science, engineering/design, and place-based learning. The professional learning offered encompasses all areas of STEM in an effort to build teacher capacity. The success of these programs has been largely due to the collaborative relationships that have been established over the past several years.

Great Lakes Mathematics and Science Center offered several opportunities to deepen teacher content and pedagogical knowledge in the areas of math and science. Specifically, number sense and fact fluency were focus areas for elementary math teachers. One district participated in the Foundations of Math training. In the area of science, teachers participated in an overview of the new Michigan Science Standards and how to incorporate phenomena based learning into their instruction.

Curriculum Support

Assisting the MDE with Mathematics and Science Initiatives

- Local schools are more aware of state mathematics and science initiatives, changes in state assessments, and policy changes because Centers disseminate information to teachers and administrators.
- **TESLA** was one of the statewide projects impacting hundreds of Michigan teachers and thousands of school students. The projects ensure teachers in Michigan are “speaking a common language” and have access to research-based, current professional learning.

Professional Learning Supporting Michigan’s Standards for Mathematical Practice

Centers around Michigan helped teachers navigate the Michigan’s Standards for Mathematical Practice by holding professional learning sessions related to Mathematical Practices for K-12 teachers, curriculum specialists, and administrators. The primary outcomes were to:

- Investigate the standards at specific grade levels for deeper understanding.
- Interact with the Mathematical Practices document and support materials in order to become familiar with the standards.
- Explore the processes and proficiencies of the Mathematics, ELA-Literacy, and Science Practices and their implications for classroom instruction.
- Investigate the Literacy in Science Standards in order to make decisions concerning curriculum, assessment and instructional practices.
- Identify appropriate next steps at the district level.

Support of Michigan’s Standards for Mathematical Practice and Science Standards

During the 2017-18 academic year, the **Grand Traverse Regional Math, Science, Technology Center** engaged 36 teachers from 11 districts in their regional science PLCs (Elementary, Middle School, HS Biology, HS Earth Science, and HS Physics/Chemistry). Based on pre- and post- unit assessment data action plans were formulated using the Collaborative Learning Cycle protocol to improve instructional strategies, curriculum resources, and teacher content knowledge. Baseline assessment data were used to begin identifying realistic future proficiency and growth targets.

The **AMA/Iosco Math and Science Center** has taken an active role in supporting three districts with the implementation of a blended secondary mathematics program offered through Pearson. This has included a twofold approach to professional learning: learning around the theories behind and the tools needed to run a blended, digital curriculum, and learning around the content and practice standards in mathematics.

As part of the work in science, the staff of **Glenn T. Seaborg Mathematics and Science Center** worked with multiple districts individually to assess current resources under consideration for adoptions. The Center also hosted an Educators Evaluating the Quality of Instructional Products (EQIP) Rubric workshop, providing a setting for cross-district collaboration and evaluation of NGSS aligned curriculum resources.

Leadership

Statewide Initiatives

The Michigan M/S Centers Network has taken a lead role in multi-year statewide initiatives to improve mathematics and science. *See pages 13-19 for details about these programs.*

Higher Education Collaboration

Centers have been collaborating with Michigan universities and colleges to develop professional learning workshops, seminars, and courses for teachers, developing instructional units, and provide summer institutes for both students and teachers.

Michigan Universities and Colleges involved have included:

- Adrian College
- Alpena Community College
- ASM Tech Early College
- Baker College
- Baker College of Cadillac
- Bay College
- Bay de Noc Community College
- Central Michigan University
- Cranbrook
- Eastern Michigan University
- Ferris State University
- Grand Valley State University
- Hope College
- Kalamazoo College
- Kalamazoo Valley Community College
- Kettering University
- Lake Superior State University
- Lansing Community College
- Lawrence Technological University
- Macomb Community College
- Madonna University
- Michigan State University
- Michigan Technological University
- Muskegon Community College
- North Central Michigan College
- Northern Michigan University
- Northwestern Michigan College
- Oakland University
- Saginaw Valley State University
- Siena Heights University
- St. Clair County Community College
- University of Michigan
- University of Michigan – Dearborn
- University of Michigan – Flint
- Wayne State University
- West Shore Community College
- Western Michigan University

Out of state Universities and Colleges involved have included:

- Arizona State University
- Case Western Reserve University (Ohio)
- Columbia University (New York)
- Cooper Union for the Advancement of Science and Art (New York)
- Montana State University
- University of California @ Berkley
- University of Maryland, Eastern Shore
- University of Notre Dame (IN)
- University of Nottingham (U.K.)
- University of South Florida
- Vanderbilt University
- Washington University (St. Louis)
- Washington College (MD)

Community and Parent Engagement

Through Centers' efforts, professionals in the community are assisting with student research projects, Science Olympiad, science fairs, career presentations, and mentoring.

Business/Industry/Agencies have collaborated with Centers to provide:

- “Teacher in Industry” internship experiences
- Student internships in technical fields such as food science, medicine, information technology, website design, engineering, architecture, aviation, pharmacy, dentistry, veterinary medicine, and forensic science.
- “Real World” application of research projects such as water monitoring
- Mentoring and job shadowing experiences for students
- Used office furniture, scientific equipment, and supplies for schools
- Career talks by business professionals

Examples of Partnerships with Other Institutions and Organizations

- Centers collaborated with at least 28 Michigan and out of state universities and colleges to plan teacher and student programming, write grants, and share resources.
- Many Centers organize Family Math, Science, and Engineering Nights and community education classes designed to engage parents and students in hands-on, inquiry-based activities. These programs build parents' awareness of and familiarity with inquiry-based teaching and learning that students are participating in at school.
- There is also a strong commitment between centers to collaborate to bring resources and education to a broad community.

The **Capital Area Math and Science Center** continued to support student programming initiatives at the district level with ongoing support of developing and established First Robotics programming and other STEM focused student programs such as HOSA (Health Occupations Students of America). These programs took place in school districts across the five counties. The purpose of these sessions was to engage students and parents in cultivating interest in the Science, Technology, Engineering and Mathematics (STEM) fields.

The **Sanilac Count Science and Mathematics Center** (SCSMC) partners with the Saint Clair County Community College (SC4) to provide local college classes for high school seniors. SCSMC also partners with SC4 in the Sanilac Academic Games. This event includes Math and Science Teams from each district in the service area to go head-to-head in a quiz bowl setting.

The continuation partnership **Jackson County M/S Center**, the **Livingston/Washtenaw Math & Science Center**, and the **Hillsdale-Lenawee-Monroe Math & Science Center** has proven to be highly beneficial to the districts throughout Jackson County. Having a regional shared director has allowed math and science consultants to reach our districts in more effective. The power of collaboration is evidenced by the math and science opportunities and experiences that were made available through intentional planning and preparation in the six county collaborative.

Resource Clearinghouse

Examples of how Center resources are used to support best practices in science, technology, engineering and mathematics education:

<p>M/S Centers support schools in the Use of technology by:</p> <ul style="list-style-type: none">• Allowing teachers to copy materials and borrow printed resources, videos, kits, and manipulatives required for classroom activities in particular science and/or mathematics curricula.• Developing partnerships with industries to secure equipment such as graphing calculators, scientific probes, and other lab equipment that would otherwise be cost-restrictive.• Providing training for integration of technologies to develop capacity to support teachers' abilities to use technology to improve instruction.	<p>Maintenance and expansion of resources for local school districts</p> <ul style="list-style-type: none">• Resource libraries are maintained by Centers, many of which are accessible through M/S Center websites.• M/S Centers are dissemination point for several organizations including MCTM, MSTA, and MDSTA.• M/S Centers play an active role in the development, distribution, and maintenance of inquiry-based mathematics and science kits statewide. In addition, M/S Centers provide training and in-classroom support for using the kits or other equipment and instructional materials available on-loan from the Centers.
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Centers create and sustain resources to support mathematics and science education

Many Mathematics and Science Centers utilize available human and material resources to provide programming, support to local ISDs/RESAs/RESDs, and provide training aligned to district curriculum.

Allegan/VanBuren Mathematics and Science Center completed the second year of their ALL IN (ALlegan INvention, INnovation and INclusion) STEM initiative, which focuses on equitable access to STEM opportunities for all students in Allegan County. A high quality resource lending program has been developed to support this work and the checkout system is evidence that there is a great need and desire for these resources as the requests have tripled since last year. Loaned resources include LEGO EV3 Robotics kits, DASH, Sphero and Ozobots robots, 3D printers, Family Engineering kits, a variety of MakerSpace materials and tools, Drones, and other STEM event and classroom resources.

In order to best fit the needs of its teachers, the **Detroit Mathematics and Science Center** allocated funds to move the Resource Clearinghouse to another location for 2018-2019 year. This will afford teachers easier access to the facility and a plethora of supplemental artifacts. The new location will offer additional staff to support resource lending, training, outreach, and more space to host professional learning.

The **Wayne RESA Mathematics and Science Center** provided (through funds from the MiSTEM grant), intervention kits, aligned to the Math Recovery assessments and learning progressions, to support teachers' implementation of tier 2 support of mathematics for students in K-5 classrooms. The center also provided Engineering is Elementary (EiE) intervention kits and teacher training to promote the engineering performance expectations in science standards.

Leveraged Resources

Severe Funding Cuts: For the thirteenth year in a row, the Michigan Mathematics and Science Centers have experienced a major funding set-back. The reduced foundation grant from the State of Michigan, cut 75% by the Legislature in the 2002-2003 school year, experienced an additional 25% cut in 2009-10. The Centers are now operating at more than 80% reduced funding. Never before has the leverage of funds from other sources been so important. To compound the problems, grant acquisition has become more challenging with reduced staff and lack of available matching funds required by many funding agencies. In addition, local school districts have fewer funds available to support teachers to attend professional learning or support other services of the Centers. Many Centers are only holding on “by a thread.” Leveraged resources have prevented several Centers from closing completely.

Of the Michigan Mathematics and Science Centers that reported in the 2017-2018 school year, an additional \$5,401,201 was leveraged from grants and community contributions.

Intermediate School Districts and Universities contributed approximately \$3,090,590 toward salaries and \$301,911 toward Centers’ general funds. A large portion of these contributed funds represent Title II, Part B funds or payment for general education services.

Examples of Resources Leveraged Through Collaborations with Business, Industry, Universities and Colleges

- Students had the opportunity to visit university campuses during science Olympiads, science fairs and other activities.
- Teacher Quality Grants (Title II, Part A) develop math and science leaders in underachieving schools and building teachers’ math and science content knowledge.
- Partnership with universities and school districts resulted in proposals for the Mathematics and Science Partnership Grants (Title II, Part B).
- Collaborations with state universities to sponsor full-day regional mathematics and science conferences for teachers.
- Inclusion of pre-service teachers in science, technology, engineering and mathematics content professional learning courses offered to districts.

Examples of Leveraged Support

The **Genesee Area Math Science Center** region has relied heavily on the strength of its partnerships with the organizations and research institutions that are willing to invest in Genesee/Lapeer Counties. The Center leveraged funds from the Lucas Foundation Grant, SEPA Grant, PIRE, and TESLA grants, among others. GAMSC has used these relationships to fund over a dozen professional learning and student service programs.

The **Western Upper Peninsula Center for SME** hosts the Lake Superior Stewardship Initiative (LSSI). LSSI is one of nine funded Hubs that comprise the Great Lakes Stewardship Initiative (GLSI) and the major goal of LSSI is to prepare K-12 students to become knowledgeable citizens, concerned about the quality of life in their community, and actively engaged in the stewardship of Lake Superior and its watershed. LSSI provided sustained professional learning for teachers, mini-grants to seventeen schools, assistance with stewardship projects, facilitation of school-community collaborations and community events. LSSI is funded by the Great Lakes Fishery Trust, Wege Foundation, and other funders. LSSI engages 17 schools, 112 teachers, 2274 students and 52 community partners in this work.

APPENDIX

Meeting State and National Goals

The M/S Centers Network serves as a catalyst and resource for improvement of the teaching and learning of mathematics and science. Centers provide services within their region that enhance and extend beyond those available to local districts. A major focus of their work is supporting schools in meeting the strategic goals of the State Board of Education, the priorities of the Michigan Department of Education, and national education goals.

Centers submit their annual report in order to meet the SBE priority areas. The table below illustrates the correlation of the Michigan Mathematics and Science Centers Network goals with state and national goals.

Michigan Department of Education Strategic Goals	U.S. Department of Education Priority Performance Goals	Michigan Mathematics and Science Centers Network Goals
Develop, support, and sustain a high-quality, prepared, and collaborative education workforce.	Increase college degree attainment in America.	Create a robust, extensive and inclusive STEM culture
Create a strong alignment and partnership with job providers, community colleges, and higher education to assure a prepared and quality future workforce, and informed and responsible citizens.	Support implementation of college- and career-ready standards and assessments.	Empower STEM teachers; strengthen educator pipeline
Provide every child access to an aligned, high-quality P-20 system from early childhood to post-secondary attainment – through a multi-stakeholder collaboration with business and industry, labor, and higher education – to maximize lifetime learning and success.	Increase enrollment in high-quality state preschool programs.	Integrate business and education
Reduce the impact of high-risk factors, including poverty, and provide equitable resources to meet the needs of all students	Ensure equitable education opportunities.	Ensure high quality STEM experiences

Michigan Mathematics and Science Centers Network Data Tables 2017-2018

Professional Learning

Professional learning 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, and focused on a particular topic, skill, or issue, or 2) a series of sessions with a single focus, conducted periodically over a several week/month period.

Teachers averaged **18.0 hours** of participation in Center programming during the 2017-2018 academic year.

Table 1: Professional Learning Participants

Participants	Different No. of Individ.	Total Hours	Reported Gender**		Position					
			Males	Females	Admin.	Math Tchrs.	Science Tchrs.	Tech Tchrs.	Combined Subject	Other or Unknown*
Pre-K	97	1,187	1	96	2	1	1	2	30	61
Elementary	4,761	76,192	431	4,276	50	138	171	15	4,169	218
Middle/Jr. High	916	19,445	250	646	22	217	414	4	53	206
High School	1,046	21,220	429	585	19	237	563	5	31	191
Mixed Levels	561	13,197	151	401	69	66	117	7	92	210
Other*	1,150	22,761	215	760	13	92	117	0	11	917
Total	8,533	154,002	1,477	6,764	175	751	1,383	33	4,386	1,805

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

** 3.4% of individuals did not indicate gender.

Table 2: Professional Learning Activities by Subject

	Math	Science	Technology	Engineering	Other	Total
Events	423	758	54	41	138	1,141
Hours	3,901	4,861	261	306	323	9,668
Participants*	4,743	7,351	206	231	499	13,030

*Includes duplicate counts (individual participants enrolled in more than one program)

Table 3: Professional Learning Activities by Grade Level

	Pre-K	Elementary	Elementary & Middle/Jr. High	Middle/Jr. High	Middle/Jr. High & High School	High School	Other**	Total
Events	4	618	71	183	197	88	254	1,414
Hours	12	3,452	992	847	739	871	2,739	9,668
Participants*	46	5,395	1,185	809	724	546	4,323	13,030

*Includes duplicate counts (individual participants enrolled in more than one program)

** Other includes K-12 Mixed Levels and non-responses

For further summative information of professional learning, contact SAMPI (sampi@wmich.edu). For more descriptive information regarding individual Center programming, see individual Center Reports. These can be obtained by contacting individual Center Directors (see page 38). The Network website also gives additional information: www.mimathandscience.org.

Student Services

The professional learning program data above and the student services data on the following page represent a significant decline in the level of activities offered to teachers and students, the number of programming hours offered, and the number of enrollments in programs beginning in 2003-2004. This was the year that Centers received a 75% reduction in their base funding from the Michigan Legislature. **This clearly suggests that the reduction has significantly impacted the quantity and accessibility of mathematics and science programming for Michigan’s students and teachers.**

However, Math and Science Centers have focused their efforts on providing high quality professional learning to ensure teachers are highly qualified and using best practices. Due to leveraged grant monies and a special allocation from the Legislature, professional learning programming hours have only been reduced by over 33%, the lowest number of hours since 2002-03 despite the 75% cut in core funding. **Unfortunately, the number of DIRECT student programming hours since 2002-03 have been reduced by over 92% due to funding cuts. In collaboration with the Michigan Department of Education, the Centers decided to focus their primary efforts on providing professional learning to improve teacher knowledge, skills, and instructional practices, with the intent of improving student learning.**

Table 4: Student Services Activities by Subject

	Math	Science	Technology	Engineering	Other	Total
Events	36	188	28	25	54	331
Hours	441	3,375	601	647	1,056	6,119
Participants*	3,644	23,226	3,198	2,113	5,688	37,869

Table 5: Student Service Activities by Grade Level

	Pre-K	Elementary	Elementary & Middle/Jr. High	Middle/Jr. High	Middle/Jr. High & High School	High School	Other**	Total
Events	0	149	24	43	12	62	41	331
Hours	0	1,063	188	569	92	3,639	570	6,119
Participants*	0	13,453	3,551	6,934	2,509	3,192	8,230	37,869

Table 6: Nineteen Year Summary Data 1999-2018

Professional Learning			
School Year	Total PL Programs Offered	Total PL Program Hours	Total PL Enrollments
1999-2000	2,549	14,059	43,655
2000-2001	2,765	13,067	47,210
2001-2002	3,436	14,757	21,904
2002-2003	3,239	14,563	51,527
2003-2004	1,705	10,507	28,540
2004-2005	1,928	11,057	34,237
2005-2006	1,725	11,109	26,484
2006-2007	2,036	11,933	30,271
2007-2008	1,849	10,254	28,998
2008-2009	2,304	12,049	35,419
2009-2010	2,265	12,592	30,838
2010-2011	1,748	10,825	25,085
2011-2012	1,868	9,845	28,413
2012-2013	1,899	10,871	29,860
2013-2014	2,235	12,301	31,274
2014-2015	1,454	9,802	21,173
2015-2016	1,047	11,400	16,029
2016-2017	1,267	17,287	18,453
2017-2018	1,414	9,668	13,030
Totals	38,733	227,946	562,400

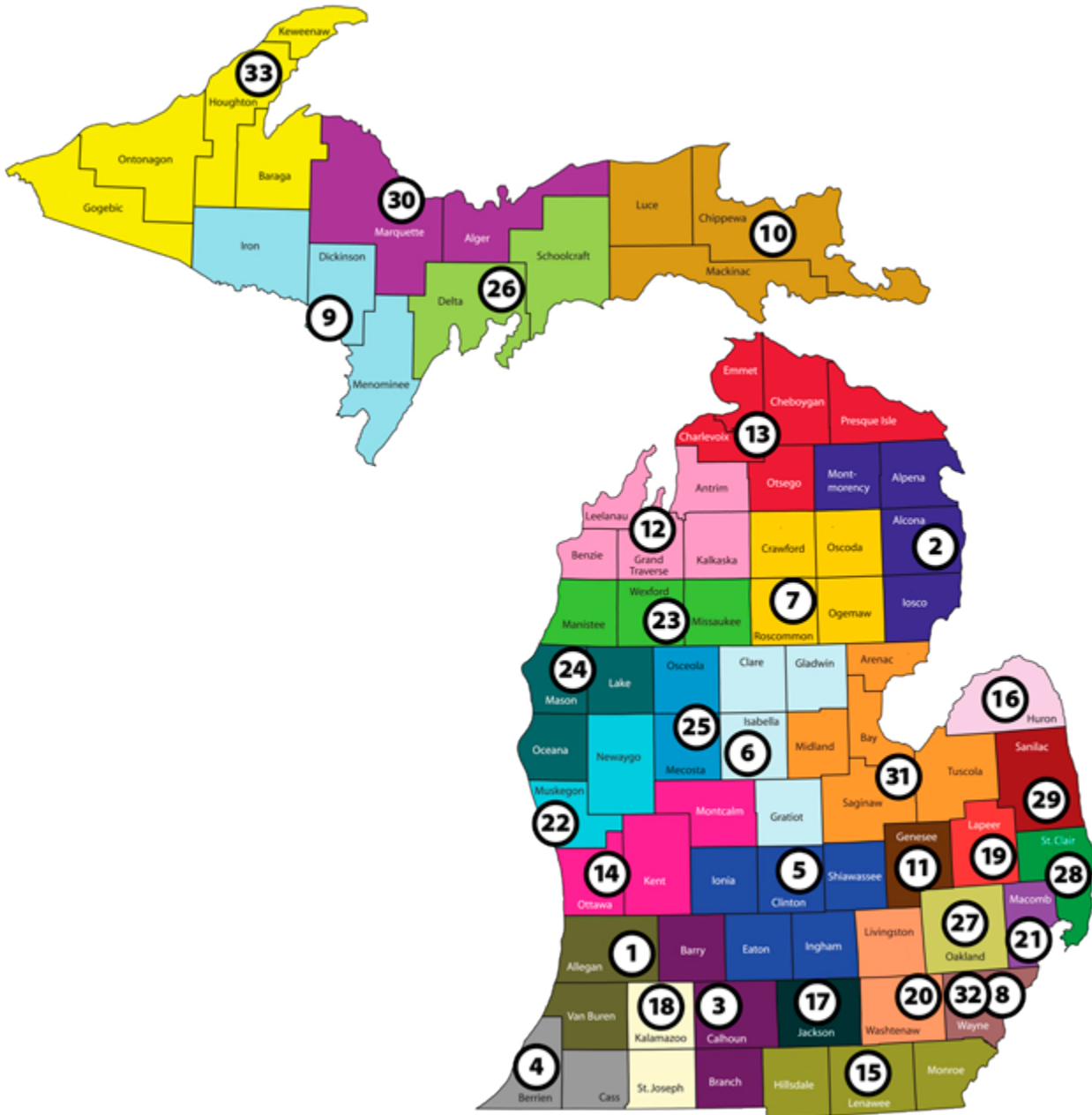
Student Activities			
School Year	Student Outreach Sessions	Student Outreach Hours	Student Outreach Participants
1999-2000	6,763	46,403	251,251
2000-2001	6,514	52,879	263,292
2001-2002	6,990	159,952	309,716
2002-2003	5,024	109,816	374,813
2003-2004	1,252	37,893	239,984
2004-2005	1,579	19,151	206,906
2005-2006	1,112	15,983	287,047
2006-2007	1,119	17,940	160,220
2007-2008	960	13,877	108,875
2008-2009	1,296	11,282	176,421
2009-2010	1,205	7,683	103,310
2010-2011	1,085	7,358	62,169
2011-2012	1,076	9,304	61,720
2012-2013	860	6,579	65,720
2013-2014	768	6,607	77,367
2014-2015	1,075	8,964	78,175
2015-2016	744	699	56,075
2016-2017	614	3,992	50,985
2017-2018	331	6,119	37,869
Totals	40,368	550,167	2,972,635

Total PL activities were positively impacted by a special earmarked allocation from the Michigan Legislature to fund a statewide PL effort. ^Only Engineering PL was recorded by Centers from the 2013-2014 school year to present. For more detailed information regarding subject-focused professional learning activities, contact SAMPI (sampi@wmich.edu)

For more descriptive information regarding individual Center programming, see individual Center Reports. These can be obtained by contacting individual Center Directors (see page 51). The Network website also gives additional information: www.mimathandscience.org.

Location of Michigan Mathematics and Science Centers

There are 33 regional Centers in the Michigan Mathematics and Science Centers Network. These centers provide leadership, curriculum support, professional development, and student services to educators in local school districts. The centers also serve as a resource clearinghouse for educational materials and information, and work to foster community involvement in the areas of mathematics and science. The Mathematics and Science Centers Network supports the delivery of high quality mathematics and science education for the students of Michigan.



Directory of Michigan Mathematics and Science Centers

Map #	Center Name	Contact Person	Email
1	Allegan/Van Buren M/S Center	Amy Oliver	aoliver@alleganaesa.org
2	AMA/IOSCO M/S Center	Mary Christensen-Cooper	christensenm@amaesd.org
3	Battle Creek Area M/S Center	Cindy Older	cindy@bcamsc.org
4	Berrien County M/S Center	Kevin Clark	kevin.clark@berrienresa.org
5	Capital Area S/M Center	Denise Brady	brady@sresd.org
6	Central Michigan S/M/T Center	Julie Anne Cunningham	cunni2ja@cmich.edu
7	COOR ISD M/S Center	Adair Aumock	aumocka@coorisd.net
8	Detroit M/S Center	Kolanda Colston	kalonda.colson@detroit12.org
9	Dickinson-Iron-Menominee M/S/T Center	Tara Hartman	thartman@diisd.org
10	Eastern UP M/S Center	Kevin St. Onge	kevins@eup.org
11	Genesee Area M/S Center	James Emmerling	jemmerling@geneseeisd.org
12	Grand Traverse Regional M/S/T Center	Tom Wessels	twessels@tbaisd.org
13	Great Lakes M/S Center	Judith Falk	falkj@charemisd.org
14	GVSU Regional M/S Center	Kristofer Pachla	pachlkri@gvsu.edu
15	Hillsdale-Lenawee-Monroe M/S Center	Andrea Pisani	apisani@washenawisd.org
16	Huron M/S/T Center	Scott Whipple Jennifer Trusock	swhipple@hisd.k12.mi.us jtrusock@hisd.k12.mi.us
17	Jackson County M/S Center	Andrea Pisani	apisani@washenawisd.org
18	Kalamazoo Area M/S Center	Michael Tanoff	mtanoff@kamsc.k12.mi.us
19	Lapeer County M/S Center	Dawn Mosher	dmosher@lapeerisd.org
20	Livingston/Washtenaw M/S Center	Andrea Pisani	apisani@washenawisd.org
21	Macomb ISD M/S Center	Mike Klein	mklein@misd.net
22	MAISD Regional M/S Center	Kristin Frang	kfrang@muskegonisd.org
23	Manistee, Wexford-Missaukee Regional M/S Center	Jodi Redman	jredman@wmisd.org
24	Mason-Lake Oceana M/S Center	Kathy Surd	ksurd@wsesd.org
25	Mecosta-Osceola M/S/T Center	Larry Wyn	lwyn@moisd.org
26	Northwoods M/S/T Center	Lisa Carley	lcarley@dsisd.k12.mi.us
27	Oakland S/M/T Center	Dana Gosen	dana.gosen@oakland.k12.mi.us
28	St. Clair County RESA M/S/T Center	Jim Licht	licht.jim@sccresa.org
29	Sanilac County S/M Center	Nick Miu	nmiu@sanilac.k12.mi.us
30	Seaborg M/S Center (NMU)	Chris Standerford	cstander@nmu.edu
31	SVSU Regional M/S Center	Tamara Barrientos	tarizola@svsu.edu
32	Wayne RESA's M/S Center	Greg Johnson	JohnsoG@resa.net
33	Western UP Center for S/M and Environmental Education	Shawn Oppliger	shawn@copperisd.org