



Regional Mathematics & Science Center (GVSU)

2015-2016 Annual Report



The Regional Math and Science Center (RMSC) located at Grand Valley State University was established in 1994 to serve as a catalyst for change and improvement of mathematics and science learning. The Center serves approximately 12,000 teachers and 166,000 students in Kent, Ottawa, and Montcalm counties.

Overview of the Year's Accomplishments

Discovering STEM Kit Program: This year, the RMSC expanded the content and usage of our Discovering STEM Kits. These kits, which are loaned to schools for use in family STEM nights, afterschool programming, and classrooms, are designed to incorporate real-world concepts that pique student interests and critical thinking skills while also motivating performance in STEM subjects. With the help of science content faculty, we have added kits to our collection that focused on physical science, earth science and engineering related content including activities using snap circuits.

Working with faculty, we were able to engage more GVSU undergraduate Integrated Science students in the use of the kits for their engagement with elementary students providing them with a high impact learning opportunity. In addition, we assisted the Hope College Step-Up program with the replication of our mathematics kits for use in their after school program with Holland

**Discovering STEM Kits
were used by 4,013
students this year.**

Public Schools. Overall, the kits were used by 4,013 students this year in schools throughout our three county region. For more information on our Discovering STEM kit program may be found on our website at <http://www.gvsu.edu/rmsc/discovering-stem-kits-landing-page-18.htm>

Targeted Professional Learning: Over the course of the 2015-2016 academic year, we were engaged in providing professional learning experiences for teachers in a number of districts in our region that targeted the specific needs of those districts.

- Math Talks with Wyoming Public Schools & Lakeview Community Schools. This workshop, developed and delivered by two GVSU mathematics education faculty through our Math Fellows program, is designed to develop students' abilities to communicate mathematical thinking. Drs. Esther Billings and David Coffey worked with teachers on strategies for developing students' abilities to "construct viable arguments and critique the reasoning of others" [SMP 3].
- Orchestrating Math with Sparta Public Schools. Based on *5 Practices for Orchestrating Productive Mathematics Discussions*, this three-session series provided secondary teachers with concrete guidance for engaging students in meaningful discussion around mathematics in a way that is accessible and manageable for teachers.
- Effective, Engaging Strategies for Writing in Science at Montcalm Area ISD. This workshop series is designed to help teachers learn how to incorporate writing strategies into science instruction. Teachers explore ways that writing can be used in the 6-12 science classroom

that are effective, will engage students, and provide avenues for evaluating student learning.

- **3 Acts Tasks** at Jenison Public Schools, Kent ISD, and OAISD. Three Act Tasks are an engaging framework to bring problem solving to students in a way that makes mathematical modeling a priority in solving real-world problems. This workshop involved teachers in developing 3 Acts Tasks for their own content and classrooms at all grade levels.

sHaPe (Summer Health Activities and Professions

sHaPe camp was made available to 42 urban students in the greater Grand Rapids area.

Exploration) camp:
In the summer of 2015, sHaPe camp was made

available to 42 urban students in the greater Grand Rapids area (primarily Grand Rapids and Wyoming Public Schools, both which have Focus Schools in their districts). sHaPe, a four day summer camp, provides middle school students with the opportunity to explore careers in the health sciences, participate in hands-on science activities that include laboratories and simulations, gain academically challenging scientific knowledge, learn about personal health and fitness, understand and develop compassion for those with disabilities, and have a positive exposure to a college experience in a safe setting. The support from our sponsors allows us to offer the camp at no cost to the participants, and campers from low socio-economic areas of our region are provided with transportation to and from camp.



sHaPe camp 2016



Region 12 Science Olympiad 2016



Discovering STEM it
Amazing Area

Organization of the Report

The Strategic Plan identifies six service areas: Leadership, Professional Learning, Student Services, Curriculum Support, Community Involvement, and Resource Clearinghouse. This report will focus on Professional Learning and Student Services for the entire service area. In addition, there will be a narrative on closing the achievement gap describing services to Priority and Focus School(s) in the area, including successes and challenges.

REGION-WIDE PROFESSIONAL LEARNING

Goal: For educators who participate in Center Professional Learning to reflect best instructional practices in their own settings.

Who participated in the professional learning?

Professional learning opportunities were provided for classroom teachers, classroom support staff, administrators, parents/community members, and others involved in K-12 education. The table below describes who participated.

Table 1: Participants Receiving Professional Learning

| Participants | | | Reported Gender** | | Position | | | | | |
|-------------------|------------|-----------------|-------------------|------------|-----------|------------|------------|-----------|------------|-------------------|
| | | | M | F | Admin | Math Tchr | Sci Tchr | Tech Tchr | Comb Subj | Other or Unknown* |
| Pre-School | 21 | 84 | 0 | 7 | 0 | 0 | 0 | 0 | 1 | 20 |
| Elementary | 293 | 1,446.5 | 8 | 82 | 2 | 2 | 2 | 0 | 236 | 51 |
| Middle/Jr. High | 144 | 856.25 | 24 | 58 | 1 | 46 | 59 | 0 | 4 | 34 |
| High School | 131 | 890 | 38 | 41 | 1 | 59 | 47 | 2 | 1 | 21 |
| K-12 Mixed Levels | 54 | 536 | 15 | 34 | 6 | 7 | 23 | 0 | 8 | 10 |
| Other* | 333 | 2,530.5 | 49 | 135 | 17 | 13 | 3 | 0 | 2 | 298 |
| Total | 976 | 6,343.25 | 134 | 357 | 27 | 127 | 134 | 2 | 252 | 434 |

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

**Gender was not reported by all individuals.

Professional learning was delivered in many ways, depending upon the identified needs. Two primary formats included: (1) **Single events**, lasting for a portion of one day to several consecutive days, focused on a particular topic, skill, or issue; and (2) **Series**, which were a series of sessions (one building on the previous one and conducted periodically over a several week/month period). The goal was to systematically strengthen teaching practices based on local needs and current research.

Teachers who participated in GVSU Regional M/S Center activities received, on average, 6.5 hours of professional learning related to mathematics, science, or other.

Table 2 below details the number of sessions offered for each subject by grade level as well as total hours and total number of participants in the sessions.

Table 2: Professional Learning Activities

| | | Math | Science | Other | Total |
|--|----------------|-------|---------|-------|--------|
| | Activities | 6 | 1 | 0 | 7 |
| | Hours | 18.5 | 1.5 | 0 | 20 |
| | # Participants | 225 | 10 | 0 | 235 |
| | Activities | 4 | 0 | 0 | 4 |
| | Hours | 24.25 | 0 | 0 | 24.25 |
| | # Participants | 81 | 0 | 0 | 81 |
| | Activities | 0 | 0 | 1 | 1 |
| | Hours | 0 | 0 | 14 | 14 |
| | # Participants | 0 | 0 | 13 | 13 |
| | Activities | 6 | 5 | 0 | 11 |
| | Hours | 41 | 25.5 | 0 | 66.5 |
| | # Participants | 113 | 124 | 0 | 237 |
| | Activities | 2 | 9 | 0 | 11 |
| | Hours | 7 | 160.5 | 0 | 167.5 |
| | # Participants | 275 | 282 | 0 | 557 |
| | Activities | 18 | 15 | 1 | 34 |
| | Hours | 90.75 | 187.5 | 14 | 292.25 |
| | # Participants | 694 | 416 | 13 | 1,123 |



Teacher Workshop



Professional Development

Spotlight on Professional Learning

1. **Math Talks:** Drs. Esther Billings and David Coffey and Esther Billings participated with the RMSC in the Math Fellows program at GVSU. This program allots mathematics faculty time in their department workload to work with the RMSC. In the 2015-2016 school year, this collaboration provided the opportunity for them to offer six professional development sessions to Lakeview Community Schools and Wyoming Public Schools surrounding the idea of conversation in the math classroom. The professional learning opportunity included a coaching component for some of the teachers. In a post-workshop survey, the participants agreed that the workshops were well planned, that 'Math Talk' is an important skill for their students to have, and that the workshop was a productive use of their time.

2. **Orchestrating Mathematical Discussions:** This three day workshop highlighted the CCSS Mathematical Practices along with integrating the use of the book, 5 Practices for Orchestrating Mathematical Discussions. Based on PRIME Plus from 2013-2014, workshop activities and discussions highlighted the importance of rich mathematical tasks along with a variety of teaching strategies. On a pre/post Double Likert evaluation, participants indicated the greatest increase (56%) was in their understanding of the 5 Practices. Three other areas, gaining knowledge of different questioning strategies, considering student misconceptions when lesson planning, and seeing the value of solving a problem in a variety of ways experienced an increase of about 30%. These areas align with the goals of the workshop, and the change in teacher knowledge and procedures are encouraging. Also, participants mentioned how the 5 Practices allowed them to grow as instructors and facilitate more productive discussions.

On a pre/post Double Likert evaluation, participants indicated a 56% increase in their understanding of the 5 Practices.

3. **Fall Science Update:** The 2015 conference theme was "*Integrating STEM by Design*". The keynote speakers included Holly McGoran, Jenison Junior High Science Teacher, MSTA Middle School Science Teacher of the year and Ashley Meyer, Hamilton Middle School Science Teacher, MSTA Teacher of Promise award winner. Fall Science Update 2015's sessions focused on how to integrate STEM activities and skills into classrooms, integrate individual STEM disciplines within lessons (like math and science), and/ or integrate lessons between science disciplines. This included integrating real-world applications and data into the classroom experience. Attendance at this conference numbered 249 teachers, preservice teachers, and higher-education faculty.

The theme of Fall Science Update focused on how to integrate STEM activities and skills into classrooms with 249 teachers, pre-service teachers and higher education faculty in attendance.

I was able to understand where the new standards are taking us and how to bring to implement them in my 1st grade classroom.

Engaging and Effective Strategies for Writing in Science: This two-day workshop, offered this year in Montcalm County, was designed to help teachers learn how to incorporate writing strategies into science instruction. Teachers were given the opportunity to look at ways that writing can be used in the grade 6-12 science classroom that are effective, engage students, and provide avenues for evaluating student learning. Participants were provided with pedagogical tools designed to facilitate student learning and deepen conceptual understanding of the NGSS Science and Engineering Practices 7 and 8. On a pre/post Double Likert evaluation, participants indicated a 42% increase in knowledge of resources available to them for use in their classroom to provide opportunities to write with the content of their discipline. The next highest areas of increase (30%) included being knowledgeable about the standards around science and technical writing in the CCSS planning to use digital environments for writing in their classrooms, identifying challenges that students face in dealing with the specialized vocabulary of science and implementing strategies to engage their students in effective writing practice. Participant comments included:

This workshop was designed to help teachers learn how to incorporate writing strategies into science instruction.

"I loved this! It was great to attend a PD with useful tools and that was taught by science teachers and for science teachers."

"The resources and collaboration have made this a positive learning experience."



Student Services

Student services are delivered based on identified needs to improve and enhance science, technology, engineering, and mathematics education. Students who participate in enrichment activities have the opportunity to explore new concepts, develop process skills, cooperate on group tasks, and discuss their findings. Student services include:

- ❖ afterschool and summer enrichment and support programs
- ❖ organization of science and mathematics academic competitions

Table 3 below details the number of student sessions offered for each subject by grade level as well as total hours and total number of participants in the sessions.

Table 3: Student Services Activities Provided in 2015-2016

| | | Math | Science | Engineering | Other | Total |
|--|----------------|-------|---------|-------------|-------|--------|
| | Activities | 11 | 12 | 0 | 1 | 24 |
| | Hours | 19 | 21 | 0 | 24.5 | 64.5 |
| | # Participants | 1,043 | 1,714 | 0 | 48 | 2,805 |
| | Activities | 1 | 0 | 1 | 0 | 2 |
| | Hours | 12 | 0 | 1.5 | 0 | 13.5 |
| | # Participants | 1,559 | 0 | 10 | 0 | 1,569 |
| | Activities | 1 | 2 | 0 | 0 | 3 |
| | Hours | 1 | 1.75 | 0 | 0 | 2.75 |
| | # Participants | 25 | 73 | 0 | 0 | 98 |
| | Activities | 1 | 3 | 1 | 0 | 5 |
| | Hours | 7 | 42 | 3 | 0 | 52 |
| | # Participants | 50 | 1,102 | 23 | 0 | 1,175 |
| | Activities | 0 | 1 | 0 | 0 | 1 |
| | Hours | 0 | 3.5 | 0 | 0 | 3.5 |
| | # Participants | 0 | 179 | 0 | 0 | 179 |
| | Activities | 2 | 0 | 0 | 0 | 2 |
| | Hours | 4 | 0 | 0 | 0 | 4 |
| | # Participants | 26 | 0 | 0 | 0 | 26 |
| | Activities | 16 | 18 | 2 | 1 | 37 |
| | Hours | 43 | 68.25 | 4.5 | 24.5 | 140.25 |
| | # Participants | 2,703 | 3,068 | 33 | 48 | 5,852 |

Closing the Achievement Gap

The GVSU Regional Math and Science Center encompasses a three-county region which includes the largest urban school district on the western side of the state. As Grand Rapids Public Schools (GRPS) contains several high-priority, underachieving schools at all grade levels, the RMSC has worked to engage teachers and students of all grade levels within this district in programs designed to improve teacher efficacy and student engagement in STEM. The RMSC also services rural districts with high free and reduced lunch rates as well as migrant populations and reaches out to those districts as well.

- **sHaPe:** At the middle grades level, students attending Grand Rapids and Wyoming Public Schools were the focus of programming and recruitment for our Summer Health Activities and Professions Exploration (sHaPe). This camp is designed to provide middle school students with the opportunity to explore careers in the health sciences, participate in hands-on science activities that include laboratories and simulations, gain academically challenging scientific knowledge, learn about personal health and fitness, understand and develop compassion for those with disabilities, and have a positive exposure to a college experience in a safe setting.

Strategic recruitment in the greater Grand Rapids area resulted in a racially diverse camp. Over the past five years of the camp, the population attending has included 27% African American, 20% Hispanic, 12% Multi-Racial, 6% Asian, and 1% American Indian. Demographically, the racial diversity of Grand Rapids is 18% lower than our total diversity for the participants in the camp. On a pre/post test on content related to camp experiences around health professions, students showed an increase of 3.7 points (on a scale of 10 items) which is a statistically significant gain.

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- **Discovering STEM Kit Program:** The Discovering STEM Kit Program, developed by the staff at the RMSC and faculty from GVSU, is a kit loaner program that includes a combination of mathematics, science, and engineering activities. The kits were used in a variety of ways: Science/Math/ STEM Family Nights, individual classroom use, Science/Math/STEM Days for students, afterschool tutoring, summer learning, and professional learning. Eighteen different schools/organizations used the kits this past year. Ten of these schools are Priority Schools; two were focus schools. Kits continue to be used for summer learning programs in areas where underrepresented populations are higher such as GRPS LOOP Summer Program, The Hispanic Center of West Michigan and The Grandville Ave Arts & Humanities Cook Library. During the 2015-2016 school year, 4,013 students used the kits. Of these students, 21% were Hispanic, 13% were African American, and 1% were of Asian descent. Comments from kit users include:
 - *These gave teachers a great confidence and ideas to build into their classrooms. Showed them that kids learn while having fun!*
 - *The kits demonstrate that complex skills can be taught in engaging ways (not the typical pencil & paper approach).*
 - *Students were using the observation skills and questioning. It required them to make decisions based on their observation. Hands on, active learning, discovery. Great way for students to explore and participate in hands on activities*

Spotlight on Partnerships

The GVSU Regional Math and Science Center collaborates with a variety of stakeholders in our region. These collaborations occur both internally with colleges, departments, faculty, and staff at GVSU and externally with other educational institutions, businesses, and community organizations in our region. Partnerships of this kind are essential in leveraging both human and physical resources for the work of the Center and the benefit of students and teachers in our region.

Collaborations within GVSU: This year was one of multiple collaborations within the university to provide students and teachers with excellent opportunities around STEM education:

- **Department of Mathematics:**

- **Math Fellows:** Continued this year was the much appreciated allocation of mathematics faculty time provided by the CLAS (College of Liberal Arts and Sciences) Dean to work at the RMSC. As a result, GVSU faculty were instrumental in developing a workshop for elementary teachers on “math talk” and delivering that professional learning to two school districts in our region.
- **Math-Team-Matics:** Also continued this year was this fun and friendly competition for secondary students featuring creative and engaging problems to bring the mathematical practices to life and challenge the knowledge and understanding of competitors. Content for the competition is drawn from K-8 mathematics, high school algebra, and high school geometry. Partners included mathematics faculty and GVSU students.
- **Math in Action:** Each year the RMSC co-sponsors the Math in Action Conference for K-12 educators. This conference presents lively and informative discussions of current issues in mathematics education while providing an opportunity for practicing Pre-K-12 teachers, prospective teachers, curriculum directors, and college and university faculty to share ideas, concerns, and resources.

RMSC co-sponsored the Math in Action Conference for K-12 educators.

- **College of Education:** The Regional Mathematics and Science Center is a critical partner in the professional learning provided by the Groundswell program available to schools in Kent County through grants held from the Great Lakes Stewardship Initiative and the DEQ. Groundswell helps inform teachers and students how to address Michigan watershed and environmental issues while engaging in service learning projects.
- **College of Health Professions:** The faculty and staff of this college devote time and resources each summer for our sHaPe Camp described earlier in this report.

Collaborations External to GVSU:

- **Michigan STEM Partnership:** The RMSC Director served as co-chair of the Lake MI Hub of the Partnership through the end of her term in December 2015. At that point, MDE considered that commitment fulfilled. The RMSC also collaborated with groups in our region in applying for STEM grants made available through the Central Michigan University.
- **RMSC Advisory Board:** The Advisory Board from our Center is composed of stakeholders from various sectors (higher education outside of GVSU, business and industry, ISDs). This group informs the work of the Center and assists in the development of our strategic plan.
- **Business/Industry Partners:** We rely on our business and industry partners to assist us in providing real-world context for students and teachers. For example, our partnership with Mercy Health provides a hospital-based experience for our sHaPe campers. Industry partners also provide funding and event supervisors for the Region 12 Science Olympiad competition. This year, both the Muskegon Foundation and United Bank supported our G3 (Grandparents, Grandkids, Grand Valley) Camp with \$2,000 in scholarships for grandparent/grandchild teams who could not otherwise afford to attend.

Director's 2015-2016 Budget Discussion

During the 2015-2016 fiscal year, the Center staff has brought in approximately \$15,542 in restricted grants. (This is less than last year.) We also received approximately \$414,119 in in-kind contributions of donated time, facilities, and equipment from our University and the community to provide student programs and teacher professional learning. The partnerships, highlighted earlier in this report, allow us to maintain a high level of services for our region. This ability to leverage funds speaks to the efficiency and efficacy of the GVSU Regional Math and Science Center in particular and the Michigan Mathematics and Science Centers Network as a whole.

Funding for the RMSC remains relatively stable, although still at a much lower level than over a decade ago. Since 2004, when state funding of the thirty-three Mathematics and Science Centers was cut by 75%, Grand Valley State University has provided the major portion of the Regional Math and Science Center's budget, making it possible to maintain close to full staffing levels. Until the fall of 2009, participant fees, gifts and donations from individuals and businesses allowed the Center to operate at almost full capacity. However, in 2009-2010 the Mathematics and Science Centers' funding was cut an additional 25%. At that time Grand Valley was not able to assume this portion of our funding. Consequently, we continue to face the challenge of maintaining our teacher professional learning and/or student services programs so that they are self-sustaining.

Over the past several years, there was an opportunity for the Mathematics and Science Centers to receive additional funding for special professional learning programming such as PRIME Plus (an MSP Grant for which Wayne RESA was the fiscal agent on behalf of the MMSCN) and SaM3 (Section 99.6 funds). The additional funding allowed us to provide services included in our strategic plan. However, due to a change in priorities for both of these grant funds at the State level, these funds were not available for our work with teachers as in previous years. Fortunately, at least for this year, we were able to continue work related to these programs with carry-over funding. That will not be the case next year as those funds are now exhausted.

The University provides considerable operating funds for the Center and is greatly appreciated. In addition, our position within the College of Liberal Arts and Sciences provides us connections to with other departments in the college committed to outreach to K-12 teachers in our region.

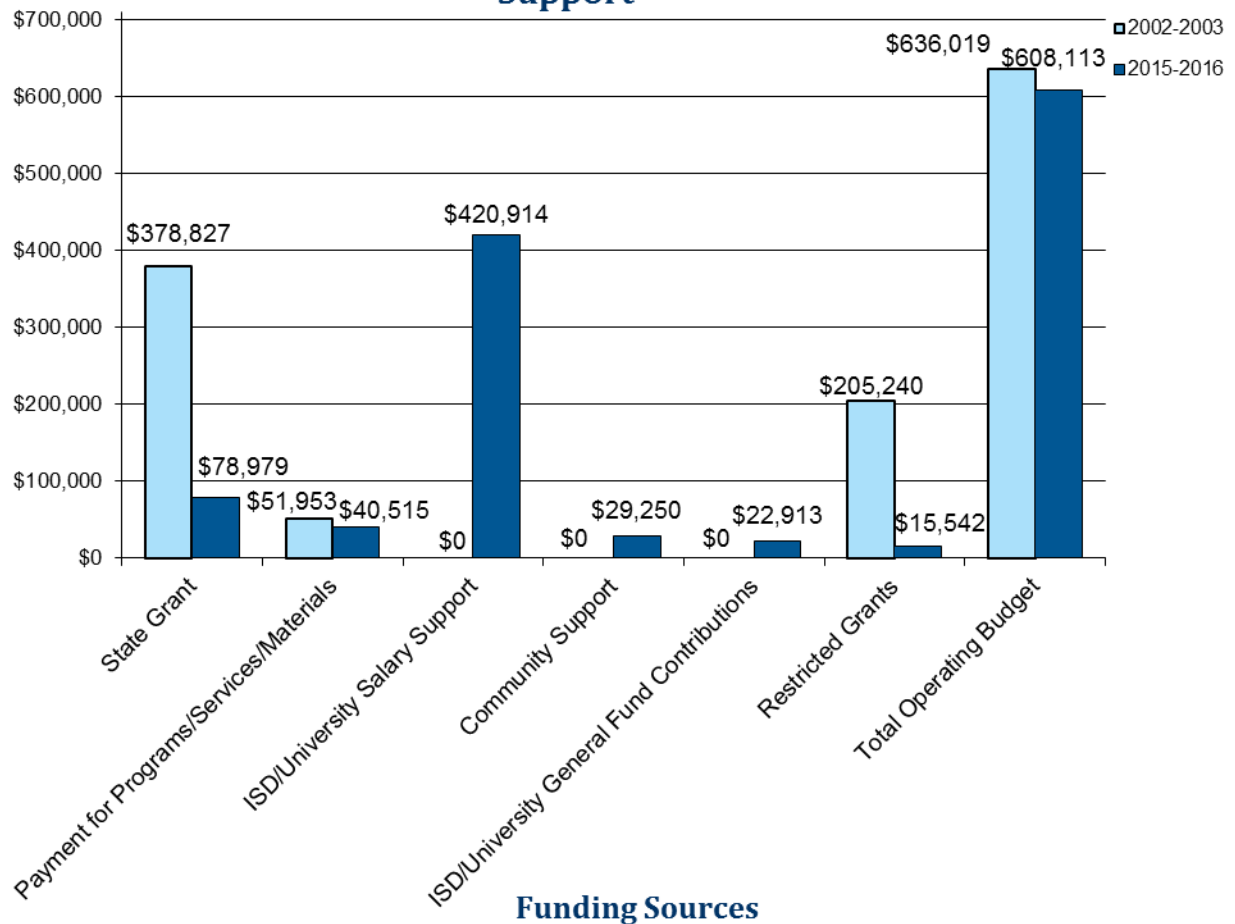


Science Olympiad



Science Olympiad

Changes in Regional (GVSU) M/S Center's Financial Support



In addition to the financial support illustrated in the graph above, “in-kind” services received by the Center (donated time, facilities, or equipment) were valued at \$414,119.

Director's Summary 2015-2016

The 2015-2016 year has been a productive year for the RMSC on the state, regional, and local levels. Both continuing and new initiatives include:

- Providing quality professional learning opportunities for area teachers around the development and implementation of the CCSS (mathematics and science literacy standards).
- Working with area schools and institutions of higher education to support implementation of STEM programming both during the school day and after school.
- Collaborating with GVSU faculty to provide opportunities for both teachers and students in STEM fields.
- Offering opportunities for students to engage in activities that build both excitement for STEM and content knowledge in STEM disciplines such as the Discovering STEM Kit Program, Science Olympiad, sHaPe Camp, and G3 Camp (Grandparents, Grandkids, Grand Valley).

The Director of the Center remained active in the work of advancing STEM at the state level carrying out responsibilities as Secretary for the MMSCN. In addition, the Director of the RMSC served as the Chair of the Lake Michigan Hub of the Michigan STEM Partnership through the end of her term.

Since most of our funding came from Grand Valley in 2015-2016, it has continued to be important that the RMSC clearly serve the mission of the University, in addition to maintaining its commitment and integrity to the work outlined by the Mathematics and Science Center Master Plan, Michigan Legislature, and Michigan Department of Education. During the past academic year, we have maintained our role as the academic office for the Integrated Science major, which is a teacher preparation major. This relationship provides the opportunity for the Center to collaborate with STEM faculty on issues of K-12 education and to provide activities for student teachers to interact with programs aimed at K-12 students.

As the RMSC looks to the future, our current challenge is to continue to meet the needs of our entire local constituency as we endeavor to meet State expectations for increased involvement in statewide programs and give priority to persistently low achieving schools in our region. Our Dean continues to be very supportive of the RMSC by attending our events, providing financial resources, representing the Center to central administration, and promoting opportunities for us to fulfill our mission.

This report was developed through a grant awarded by the Michigan Department of Education.