Regional Mathematics/Science Center (GVSU) 2014-2015 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 10,000 teachers and 180,000 students in Kent, Ottawa, and Montcalm counties.

Overview of the Year's Accomplishments

Super Science Saturday: The Wonder of Light allowed participants to experiment with a variety of activities related to light. Some of the popular activities included: food dyes and instruments that measure the colors of the rainbow; try out communication methods using light throughout history, from ancient signals to modern fiber optic communications; learn about glow sticks, explore glow in the dark materials, and how to write invisible messages; discover why certain minerals light up and fluoresce under short and long wavelength ultraviolet light; and observe the sun's light and take a to-scale walking tour of the Solar System. The audience for this event encompassed the greater RMSC community in West Michigan with over 1,800 persons in attendance. This number does not include the army of GVSU faculty, staff, and students who helped the RMSC to make this day possible. Special effort was made to recruit teachers and students from area high-needs schools to attend.

Over 1,800 persons attended Super Science Saturday: The Wonder of Light.

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. The kits were used by 5,405 students this year which is a 40% increase in usage over last year. In addition, the kits were used by ten Priority Schools, all within the Grand Rapids Public Schools district.

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Our professional staff continued to provide mathematics professional learning for secondary teachers based on the materials developed through **Project PRIME** to over 100 teachers from Ionia, Kent, Montcalm, Muskegon, Newaygo, and Ottawa Counties. Two series were offered during the 2015-2016 academic year: (1) PRIME: Proportional Reasoning – a five-session, sustained professional learning program that builds the understanding of algebra content and pedagogical knowledge of middle and high school teachers to ensure that mathematics classroom instruction meets the learning needs of all students; and (2) Orchestrating Mathematical Discussions in the Secondary Classroom – a three-session series that provided teachers with concrete guidance for engaging students in meaningful discussion around mathematics in a way that is accessible and manageable for teachers. In both series, particular attention was paid to the eight mathematics practices for instruction as delineated in the CCSS.

sHaPe (Summer Health Activities and Professions Exploration) camp was made available to 40 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.

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

			Reported Gender**		Position					
Participants	# of Indiv.	Total Hours	M	F	Admin	Math Tchr	Sci Tchr	Tech Tchr	Comb Subj	Other or Unknown*
Pre-School	7	36	0	5	0	0	0	0	0	7
Elementary	112	694	8	70	1	2	2	0	97	10
Middle/Jr. High	88	1,209	25	51	1	48	29	0	2	8
High School	140	2,093.5	48	59	0	82	53	0	0	5
K-12 Mixed Levels	44	579	7	32	1	18	13	0	0	12
Other*	175	1,048.5	22	67	12	0	3	0	1	159
Total	566	5,660	110	284	15	150	100	0	100	201

*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, 10 hours of professional learning related to mathematics, science, or engineering.

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	Engineering	Total
Elementary	Activities	1	1	1	3
	Hours	1	7	7	15
	# Participants	7	26	8	41
Elementary & Middle/Jr. High	Activities	2	0	0	2
	Hours	6	0	0	6
	# Participants	62	0	0	62
Middle/Jr. High	Activities	4	2	0	6
	Hours	18	14	0	32
	# Participants	56	2	0	58
Middle/Jr. High & High School	Activities	15	9	0	24
	Hours	90	54	0	144
	# Participants	446	148	0	594
High School	Activities	1	0	0	1
	Hours	7	0	0	7
	# Participants	1	0	0	1
Other (includes mixed levels)	Activities	3	4	0	7
	Hours	21	35	0	56
	# Participants	199	96	0	295
Total	Activities	26	16	1	43
	Hours	143	110	7	260
	# Participants	771	272	8	1,051

Spotlight on Professional Learning

Project PRIME Related Professional Learning: This was the fourth year for PRIME, provided entirely on carry-over funding from previous years. Professional learning for secondary teachers was provided through two independent series:

1. **PRIME Proportional Reasoning:** Total attendance for this in-depth, five-session series was over 70 teachers from Kent, Ottawa, Montcalm, Muskegon, and Newago Counties (50% were teachers new to PRIME; 50% were returning). At the beginning and the end of the program the teachers were required to take the Learning for Mathematics Teaching Scale (LMT) which measures content knowledge for teacher mathematics. For the results of this test, teachers from the GVSU RMSC showed an increase from 76.5% correct to 79% correct over the course of the year. Self-reported indicators of teacher pedagogical practices also indicated significant improvement. This year included a component which allowed the opportunity for teachers to collaboratively plan a lesson and then observe one of the teachers on the team teach the lesson to students. This was followed by a critique and discussion of the lesson.

   "PRIME continues to provide me with the professional skills required to promote problem solving and mathematical discussion."

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. Also, participants mentioned how the 5 Practices allowed them to grow as instructors and facilitate more productive discussions.

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Fall Science Update: The conference theme was *"Celebrating Science Education: Past, Present, Future".* The keynote speaker was Larry Fegel, retired professor of Geology from Grand Valley State University. Professor Fegel, known for his high standards and excellent teaching methods with a career that has spanned over 40 years in K-16 education, is dedicated and passionate about science education. Additionally, there were over thirty breakout sessions providing content information and teaching strategies for K-12 teachers in biology, chemistry, earth science, environmental science, physical science, and physics. Sessions featured best practice teaching strategies as well as tools for the classroom. Participant comments about the conference include:

Center hosted 30th annual Fall Science Update with the conference theme of "Celebrating Science Education: Past, Present, Future".

"It brings together different ideas from people who have unique perspectives."

"I came away with several classroom ready ideas that I plan to use in my own classroom."

Engaging and Effective Strategies for Writing in Science: This two-day workshop 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 56% 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 (34-36%) included being knowledgeable about the standards around science and technical writing in the CCSS and strategies to use to engage their students in effective writing practice. Participant comments included:

Participants from the workshop indicated a 56% increase in knowledge of resources available for use in their classroom.

"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 2014-2015

		Math	Science	Engineering	Other	Total
Elementary	Activities	21	19	0	0	40
	Hours	74.5	41.25	0	0	115.75
	# Participants	3,416	2,767	0	0	6,183
Middle/Jr. High	Activities	1	1	1	1	4
	Hours	1.5	1.5	2	31	36
	# Participants	80	100	35	39	254
Middle/Jr. High & High School	Activities	1	2	0	0	3
	Hours	7	18	0	0	25
	# Participants	100	1,340	0	0	1,440
Other (includes Mixed Levels)	Activities	0	1	0	1	2
	Hours	0	6	0	30	36
	# Participants	0	1,200	0	51	1,251
Total	Activities	23	23	1	2	49
	Hours	83	66.75	2	61	212.75
	# Participants	3,596	5,407	35	90	9,128

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.

Closing the Achievement Gap—Students:

- **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. On a pre/post test on content related to camp experiences around health professions, students showed an increase of 2.9 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 combination mathematics and science kit loaner program. 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. Twenty-one different schools/organizations used the kits, 3 schools used the kits more than once, and ten schools were repeat users from the 2013-2014 school year. Ten of these schools are Priority Schools. During the 2014-2015 school year, 5,405 students used the kits which is an increase of 40% from the 2013-2014 school year of 3,250. Of these students, 25% were Hispanic, 23% were African American, and 2% were of Asian descent.

Closing the Achievement Gap—Teachers:

Project PRIME Plus: Through PRIME Plus, the RMSC was able to provide professional learning to over 80 secondary mathematics and special education teachers in several underperforming districts in Kent, Ottawa and Montcalm Counties. Data on teacher pre/post testing was cited earlier in this report. Participants included 12 teachers from Forest Hills Northern High School and Lowell High School (Focus Schools), and 2 middle school teachers that feed into Grandville High School (Focus School).

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 Physics:** This year the RMSC co-hosted Super Science Saturday: The Wonder of Light, a science extravaganza to the West Michigan community with the GVSU Physics Department and College of Liberal Arts and Sciences. This event provided educational activities and opportunities for over 1,800 students, teachers, parents, and community members to experience light as it applies to science, technology, history, art, and more.
- **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:** Over the course of this year, the RMSC Director served as co-chair of the Lake MI Hub of the Partnership. The RMSC also collaborated with groups in our region in applying for STEM grants made available through the Partnership.
- **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, 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.

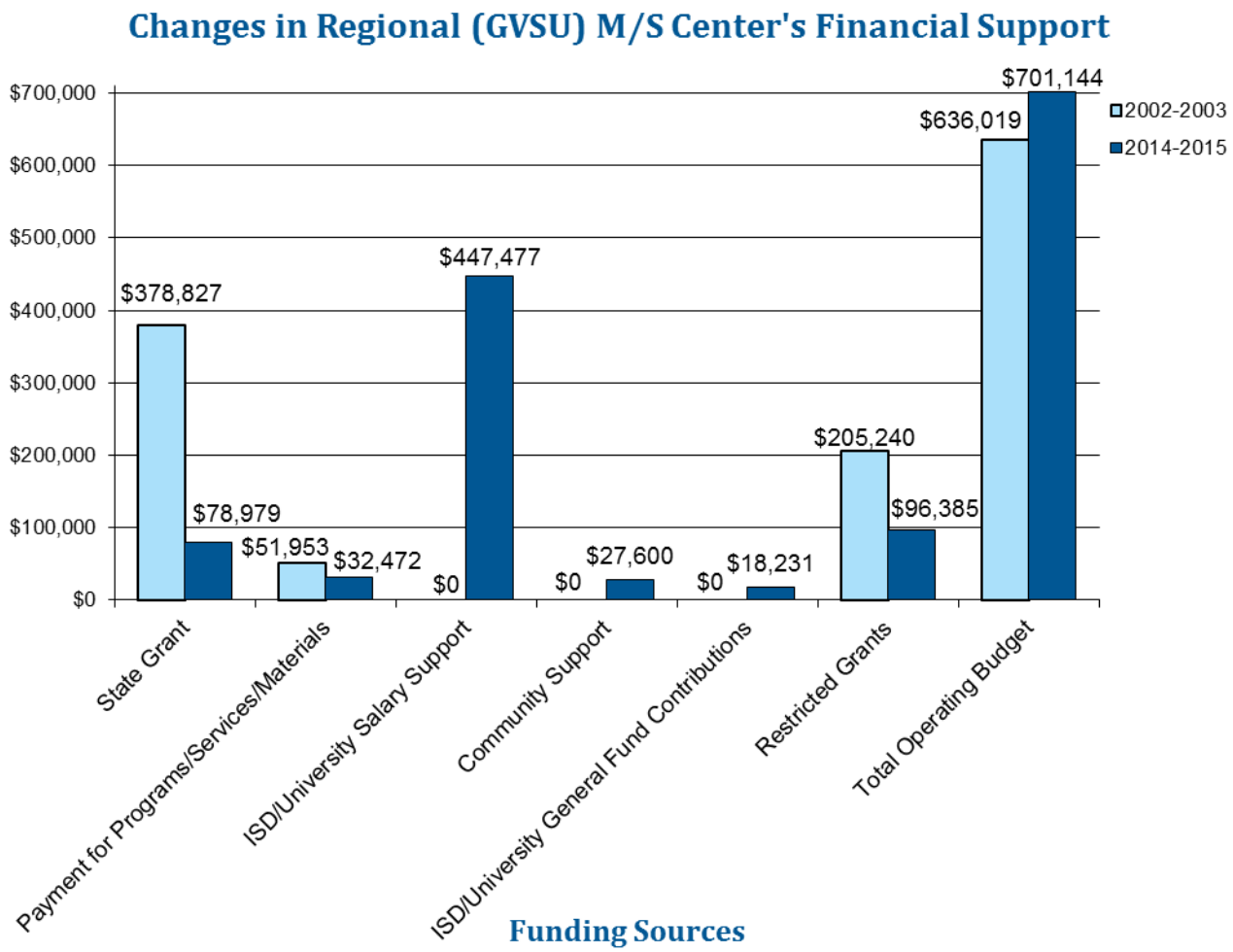
Director's 2014-2015 Budget Discussion

During the 2014-2015 fiscal year, the Center staff have brought in approximately $96,385 in restricted grants. (This is less than last year.) We also received approximately $611,196 in in-kind contributions of donated time, facilities, and equipment from our University and the community to provide student programs and teacher professional learning. (This is more than last year.) 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 SaM^3 (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 is facing major budget constraints itself, and therefore, its current level of support for the Center is not guaranteed indefinitely. If the State of Michigan's support for universities is maintained and/or the funding for the Mathematics and Science Centers program is increased/reinstated, then the RMSC will flourish.



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 $611,196.

Director's Summary 2014-2015

The 2014-2015 year has been a special year for the RMSC as it was our 25th Anniversary as a Mathematics and Science Center at Grand Valley State University (22 years as a part of the Michigan Mathematics and Science Centers Network (MMSCN)) serving students, teachers, schools, and the community at large in West Michigan. To celebrate, we held a community-wide science extravaganza, *Super Science Saturday: The Wonder of Light*. This has also 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).
- 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, Super Science Saturday, 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.

Since most of our funding came from Grand Valley in 2014-2015, 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.

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