

Regional Math and Science Center (GVSU)

2009-2010 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

- Served as a regional hub for the Algebra for All initiative providing professional development for close to 90 teachers from Kent, Montcalm, Muskegon, Newaygo, and Ottawa Counties. Through this eight-session, sustained professional learning opportunity participants learned how to approach the teaching of algebra from the functions perspective outlined by the mathematics High School Content Expectations. The RMSC role as a hub included blended delivery of content with on-site facilitation; classroom and online coaching; distribution of materials and record-keeping related to evaluation; and general workshop facilities and materials arrangements.
- Contributed significantly to the development and delivery of HSMASS-IV: Writing in Science, a three-day workshop series to help teachers learn how to incorporate writing strategies into science instruction. The RMSC Director coordinated the writing team for the project and developed the training for the trainer-of-trainer sessions provided to Center directors and their staff.
- Directed a week-long Science, Technology, and Engineering Preview Summer (STEPS) Camp for 7th grade girls. The camp is sponsored in conjunction with Padnos College of Engineering and Computing. The camp's goal is to foster interest in the sciences, motivate students to take all the basic science and math in high school, and to consider science/engineering careers. This free, week-long experience was supported by donations and grants of \$40,500 and the service contribution of 120 volunteers. This year the camp attracted 23% minority participation.
- Continued our collaborative relationship with Kent, Ottawa, and Montcalm ISDs by periodically meeting to discuss professional development and programming, participating in curriculum councils, and providing joint programs in professional development. New this year, the RMSC collaborated with the Kent ISD and the GVSU College of Education on the Groundswell program. This program, funded by a grant from the Great Lakes Stewardship Initiative seeks to increase environmental stewardship in Kent County through service learning based education within school settings with middle grades teachers and students.

Organization of the Report

The Strategic Plan identifies six service areas: Leadership, Professional Development, Student Services, Curriculum Support, Community Involvement, and Resource Clearinghouse. This report will focus on Professional Development in the entire service area. In addition, there will be a narrative targeting work done with underachieving schools in the area.

REGION-WIDE PROFESSIONAL DEVELOPMENT

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

Who participated in the professional development?

Professional development opportunities were provided for classroom teachers, classroom support staff, administrators, parents/community members, and others involved in K-12 education. The chart and summary descriptions show who participated.

Table 1: Participants Receiving Professional Development

Participants			Reported Gender**		Position					
			M	F	Admin	Math Tchr	Sci Tchr	Tech	Comb Subj	Other or Unknown*
Pre-School	5	25	0	5	0	0	0	0	3	2
Elementary	70	529.5	9	54	0	1	0	0	66	3
Middle/Jr. High	92	1112	20	61	0	44	38	0	5	5
High School	125	2158	49	63	0	53	59	0	3	10
K-12 Mixed Levels	43	271	14	27	4	14	9	0	4	12
Other*	188	2000.5	24	98	1	39	8	0	14	126
Total	523	6096	116	308	5	151	114	0	95	158

*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 development 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 (each building on the previous and conducted periodically over a several week/month period). The goal was to systematically strengthen teaching practices based on local needs and current research. Table 2 on the following page represents a picture of the number of sessions offered and the rate of attendance.

Teachers, on average, spent 11.7 hours on mathematics, science, or technology professional development.

Table 2: Professional Development Activities

		Math	Science	Total
Elementary	Events	3	2	5
	Hours	18	2	20
	# Participants	11	56	67
Middle School	Events	1	0	1
	Hours	2	0	2
	# Participants	19	0	19
Middle School/Jr. High & High School	Events	0	3	3
	Hours	0	19.5	19.5
	# Participants	0	62	62
High School	Events	8	4	12
	Hours	52	23	75
	# Participants	394	73	467
K-12 Mixed Levels	Events	1	1	2
	Hours	5	8	13
	# Participants	201	195	396
Total	Events	13	10	23
	Hours	77	52.5	129.5
	# Participants	625	386	1011



Spotlight on Professional Development

Participation in Statewide Projects:

The RMSC participated fully in statewide professional development initiatives developed and delivered through the MMSCN. These included:

Algebra for All

Eighty (80) middle school and high school teachers took a modified version of the LMT. Those teachers had a pre-test mean score of 17.3 and a post-test mean of 18.43, which is a +1.13 change on the 26 item test. This change is statistically significant at the 0.05 level.

HSMASS-IV: Writing in Science

Twenty-one science teachers attended the three-day training series. Incorporating both Science Inquiry Process and English Language Arts writing and communication content expectations, this training provided teachers with writing strategies and supporting technology to use in their science classroom. Teacher participants completed the Survey of Enacted Curriculum for their class, made a gap analysis of their curriculum, and then were trained to integrate writing and communication strategies into their classroom instruction.

MSU STEM Measurement Project: Developing Powerful Measurers

The RMSC served as a pilot site for this collaborative grant initiative designed to improve and enrich the teaching and learning of measurement starting at the elementary grades. The focus of this year's work (three days of professional learning) was length and area. On a pre/post Double Likkert evaluation teachers indicated:

- An increase of 40% in their understanding of factors that contribute to the challenge of teaching and learning spatial measurement and an understanding of the conceptual core ideas of linear measurement.
- An increase of 36% in understanding, being able to explain, and confidence in using the conceptual core ideas of area measurement.

One teacher commented on the free response portion of the evaluation:

(This experience) made me think. It made connections to what I do in the classroom, but also how I can improve and refine my teaching.

Local Efforts:

Through grant funding from the Michigan Space Grant Consortium and the Great Lakes Stewardship Initiative, the RMSC was able to provide targeted professional development around environmental science and stewardship concerns.

ESS Climate Change: In the summer of 2009, the RMSC offered a 2 ½ day workshop for secondary teachers to foster deeper understanding regarding Earth Systems Science and climate change. The workshop provided the needed background content knowledge for teachers in Earth Systems Science, inquiry-based lessons and activities (including resources) that can be incorporated in classroom curriculum, and field work demonstrating real-world applications of content knowledge.

- On a pre/post content knowledge test, participants, on average, showed an increase from 50% correct to 82% correct (an increase of 32%).
- On a pre/post Double Likkert evaluation, teachers reported a greater than 30% growth on content knowledge of Earth systems, student data collection strategies, and being pedagogically equipped to teach about climate change.

Student Services

Student services are delivered based on identified needs to improve and enhance mathematics and science 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:

- ❖ after-school and summer enrichment and support programs
- ❖ field trips to museums, natural areas, laboratories, and businesses to expose students to practical application of mathematics and science knowledge
- ❖ organization of science and mathematics fairs and academic competitions

Table 3: Student Services Activities Provided in 2009-2010

		Math	Science	Technology	Total
Pre-K	Events	1	0	0	1
	Hours	1.5	0	0	1.5
	# Participants	111	0	0	111
Elementary	Events	6	8	0	14
	Hours	9.5	33	0	42.5
	# Participants	534	1853	0	2387
Elementary & Middle School/Jr. High	Events	0	2	0	2
	Hours	0	24	0	24
	# Participants	0	63	0	63
Middle School/Jr. High	Events	0	12	0	12
	Hours	0	146.5	0	146.5
	# Participants	0	219	0	219
Middle School/Jr. High & High School	Events	0	2	1	3
	Hours	0	15	24	39
	# Participants	0	1579	12	1591
High School	Events	0	2	0	2
	Hours	0	10	0	10
	# Participants	0	333	0	333
K-12 Mixed Levels	Events	1	0	0	1
	Hours	4.5	0	0	4.5
	# Participants	859	0	0	859
Total	Events	8	26	1	35
	Hours	15.5	228.5	24	268
	# Participants	1504	4047	12	5563

Spotlight on Partnerships

The Regional Math and Science Center continues to set a high priority on collaborating with other educational institutions, businesses, government agencies, families, and community organizations to provide students with excellent educational opportunities that prepare them for careers in mathematics, science, and technology. The Grand Rapids area has a long tradition of community and business support for education. We have fostered long term and productive partnerships to support student programs. These partnerships have allowed us to share tremendous human and financial resources with the K-12 community. Some examples of ongoing partnerships are:

- STEPS Camp – Each summer, eighty 7th grade girls attend a free, four day camp to have an engineering design and manufacturing experience and to encourage them to take higher level mathematics and science courses in high school. Generous corporate, community, and foundation support has provided funds totaling approximately \$500,000 since the camp began. This year's major financial supporters were the Alcoa Foundation and the Michigan Space Grant Consortium.

The STEPS Camps also rely heavily on volunteerism. Adult volunteers are used in all the activities. This year's 120 volunteers were from Grand Valley State University engineering faculty, movement science faculty, and instructional technology staff; GVSU engineering students; Alcoa Howmet-Whitehall Facility, female engineers from Whitehall, MI; Blue Air Sun and Rapid Air mechanics and pilots at Gerald R. Ford International Airport; Amway Aviation corporate aircraft mechanic; Warped Wings Radio-Control Club pilots and pit crew; West Michigan Soaring Society radio-control pilots and pit crew; and engineers and technicians from GE Aviation, Discher Design & Development, Nelson Aerodynamix Corporation, Alma College and Forest Hills Central High School.

- Michigan Science Olympiad Tournament – The Regional Math and Science Center in partnership with Grand Valley's College of Liberal Arts and Sciences has hosted 25 regional MSO Tournaments. This tournament has evolved into the largest regional tournament in the nation with over 1800 students in attendance and boasts several national winners at the middle and high school levels. Support comes from the generosity of GVSU and the GE Avionics.
- sHaPe (Summer Health Activities and Professions Exploration) Camp – This new opportunity for middle grade urban students was developed in collaboration with the GVSU Colleges of Health Profession, College of Nursing, units within the College of Liberal Arts and Sciences (Movement Science) and Spectrum Health. The partners developed a 4-day camp which focused on giving inner city students the opportunity to explore the health science professions. In addition the camp designed focused on how healthy living and good habits impact one's ability to achieve their personal goals. Each partner organization encouraged their professional personnel to develop hands-on interactive activities to motivate and encourage students to broaden their understanding of the health science professional. Also included in the collaboration was Meijer Inc. that provided nutritional information and menus for the meals and snacks for this "candy-free" camp experience. Two weeks of camp were scheduled for July 2010.
- Groundswell – New this year, the RMSC collaborated with the Kent ISD and the GVSU College of Education on the Groundswell program. This program, funded by a grant from the Great Lakes Stewardship Initiative seeks to increase environmental stewardship in Kent County through service learning based education within school settings with middle grades teachers and students. Also involved with this partnership are 10 schools in Kent County and more than 25 community partners.
- Michigan Statistics Poster Contest – For eight years the Regional Math and Science Center has partnered with the GVSU Statistics Department to host the Michigan Statistics Poster Contest. Over 400 K-12 students enter the competition. Each year ten Michigan winners are selected and sent to the national competition.

Spotlight on High Priority Schools

The GVSU Regional Math and Science Center encompasses a three-county region which includes the largest urban school district on the west 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 from a variety of grade levels within this district in programs designed to improve teacher efficacy and student engagement in STEM.

Through the Algebra for All project, the RMSC was able to provide professional development for 22 GRPS secondary mathematics and special education teachers. This was 24% of the total participants for our region. In addition, a cadre of seven teachers from GRPS received both individual classroom coaching and facilitated group discussion sessions targeted to their specific needs.

At the middle grades level, students attending GRPS schools were the focus of programming and recruitment for two STEM summer camps. The Science Technology Engineering Preview Summer (STEPS) camp use the concept of airplane flight to help 7th grade girls learn about aviation, physics, aerodynamics, chemistry, assembly, and engineering processes. Summer Health Activities and Professions Exploration (sHaPe) was newly developed over the past year 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.

For both of these camps, recruitment visits were made to three racially diverse middle schools in the greater Grand Rapids Public School District; classroom presentations made to students and interested teachers; and eight parent-teacher conferences attended by RMSC staff to meet and interact with GRPS teachers and parents. As a result, students from GRPS representing 50% of the campers at our sHaPe Camp and 22% of the campers involved with STEPS.

Working closely with the MSU Measurement project, the RMSC provided in-depth professional development for a small group of elementary mathematics teacher leaders in GRPS. This professional development opportunity was focused on helping these teachers develop the conceptual and pedagogical content knowledge to needed effectively teach measurement concepts at their grade level. RMSC funding was used to supplement the minimal grant funding provided by MSU. Plans are in place to continue this work in the upcoming year.

What was the impact of the GVSU Regional M/S Center?

Impact on Students

AFA Student Data

- A total of fifty-nine (59) middle and high school teachers participating in the Algebra for All workshops administered pre/post assessments to their students at this site.
- For total test scores among the fifty-nine classes, forty-nine (49) showed a positive difference score pre to post; of those, twenty-six (26) showed a statistically significant change.
- An analysis of all students from all classes shows a +1.27 pre-to-post change on the nineteen-point test, which was statistically significant at the 0.05 level.

HSMAS-IV/Writing in Science

- A total of 537 students took the pre-test and 472 students took the post-test.
- An analysis of all students from all classes shows a +.27 pre-to-post change on the five-point test, which was statistically significant at the 0.05 level.

ESO Kit Program

The Elementary Science Olympiad Discovery Day kits contain hands-on science activities designed for use with early elementary students. They encourage teachers to find new and exciting ways to teach science to young children and are used by schools for family science nights and/or school-wide science activity days.

In 2009-2010, the kits were used by 10 schools to reach 1,925 students. Strengths of the program as noted by teacher users include:

**The organization and ease of use of the kits. The background information, the directions, the curriculum it covers (with alignment to GLCEs, and the simplicity are all strengths.*

**All students can practice their predicting, observing, experimenting and making conclusions.*

HS Symposium

The Michigan High School Math and Science Symposium is organized to give high school students a forum to present their math and science research findings in a professional setting. Presentations are critiqued by peers and adults, but not judged. Student research projects are done in their home schools under the mentorship of teachers, college professors and industry professionals. Experience is gained in research methods, public speaking, time management, and organization. Successful completion of a research project also demonstrates a level of achievement not attained by most high school students. Abstracts are published and shared with selected Michigan colleges and universities. Fifty-four presenters and observers attending the symposium were asked to rate themselves on a 1 - 5 scale (5 is high) on the following items:

- "I believe I could be successful in a STEM career." The average answer was 4.55.
- "I have more interest in studying more STEM subjects in the future." The average answer was 4.47.
- "I think I will major in college in a STEM-related field." The average answer was 4.51.

Impact on Schools

Communication with Schools

In RMSC participates in the electronic network for teachers, *Science Matters*, with 23 Key Leaders and over 335 schools having a Point of Contact. We also communicate with our constituents through the *InterChange*, an electronic newsletter that carries science and mathematics education news for teachers and students. We provide six issues per year of the *InterChange* in which teachers learn about professional development opportunities and students are made aware of special programs, such as camps and contests that broaden their science and mathematics experiences.

What was the impact of the GVSU Regional M/S Center?

Impact on Teachers

AFA Teacher Data

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Earth Systems Science: Climate Change Workshop

- On a pre/post content knowledge test, participants, on average, showed an increase from 50% correct to 82% correct (an increase of 32%).
- On a pre/post Double Likkert evaluation, teachers reported a greater than 30% growth on content knowledge of Earth systems, student data collection strategies, and being pedagogically equipped to teach about climate change.

MSU Measurement

On a pre/post Double Likkert evaluation teachers indicated:

- An increase of 40% in their understanding of factors that contribute to the challenge of teaching and learning spatial measurement and an understanding of the conceptual core ideas of linear measurement.
- An increase of 36% in understanding, being able to explain, and confident in using the conceptual core ideas of area measurement.
- One teacher commented on the free response portion of the evaluation: *(This experience) made me think. It made connections to what I do in the classroom, but also how I can improve and refine my teaching.*

Impact on Communities

Community Support

Business and industry, foundations, and private individuals have been involved in the support of the Regional Math and Science Center programs. They have provided in-kind and monetary support. Their numbers indicate a commitment to K-12 education in science and mathematics. Over 377 individuals volunteered for *Science Olympiad* and 120 helped during the *STEPS* camps this summer. This level of involvement increases community awareness of the importance of STEM education.

GVSU Support

The RMSC has built a strong link to the STEM faculty at GVSU. The STEM faculty supports our student and teacher programming with their time and expertise. Faculty and community members work hard to develop the specific events of the tournament. This year alone 83 faculty from the sciences (biology, chemistry, geology, physics, biomedical sciences, AWRI, and cell and molecular biology), mathematics, engineering, computer science, statistics, health professions, education, nursing, art and design, and library gave their time and expertise to this event.

Similarly, 18 GVSU faculty and students presented at the Fall Science Update. As a result of their activities and the orientation to K-12 education we provide, they are aware of the Michigan science and mathematics content expectations and consider them when designing courses, especially those taken by pre-service teachers.

One participant attending the Fall Science Update commented: *"This is a great thing that GVSU (RMSC) does for the community. I'm very impressed!"*

Spotlight on the Value of Statewide Projects

- Statewide projects have connected local teachers to a network of teachers focused on common issues, strategies, and assessments. We have been able to garner the experiences and activities from many Michigan teachers and share them throughout the state. This year that networking was extended through the social networking afforded through Algebra for All.
- Teachers have been very responsive to participating in a statewide research project that allows us to collect data from teachers and students in multiple classrooms and provide some feedback as to the impact of the projects.
- The statewide nature of the projects has lent credibility and urgency to the nature of the content presented in the workshops in science and mathematics. Districts see the relevancy of the project content to the curriculum they need to deliver to students. This has resulted in very good teacher attendance and participation.
- The financial support provided that pays for substitute teachers and materials for the workshop has been valuable.



Director's Budget 2009-2010 Discussion

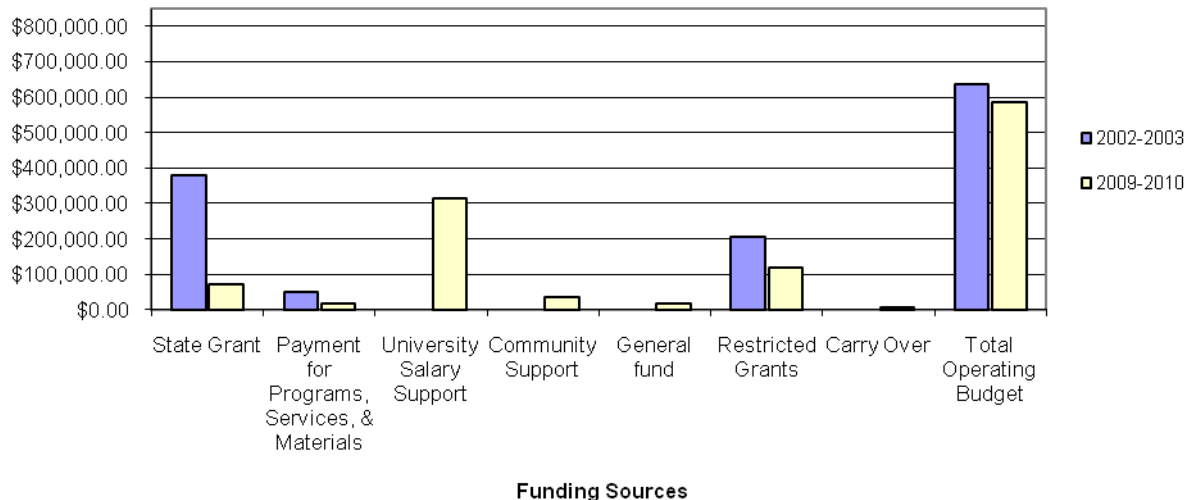
Since 2004, when state funding of the thirty-three Mathematics and Science Centers was cut by 75%, Grand Valley State University has provided the major portion of the Regional Math and Science Center's budget, making it possible to maintain close to full staffing levels. Until the fall of 2009, participant fees, gifts and donations from individuals and businesses allowed the Center to operate at almost full capacity. During the 2009-2010 fiscal year, the Center staff has brought in approximately \$120,000 in restricted grants. We also received approximately \$256,310 in in-kind contributions from college faculty and science and mathematics professionals in the community to provide student programs and teacher professional development. This ability to leverage funds speaks to the efficiency and efficacy of the Mathematics and Science Centers.

However, in 2009-2010 the Mathematics and Science Centers' funding was cut an additional 25%. This time Grand Valley was not able to assume this portion of our funding. Consequently, we are now considering a reduction of our teacher professional development and/or student services programs.

Again, this past year there was an opportunity for the Mathematics and Science Centers to receive additional funding for special professional development programming, but the funds were not available for general operations or to pay staff. The additional funding required us to provide services over and above those included in the strategic plan. These services require extensive effort and time commitment that added to the work load of an already stretched staff.

The University is facing major budget constraints itself; and therefore, its current level of support for the Center is not guaranteed. If the State of Michigan's support for universities is maintained and/or the funding for the Mathematics and Science Centers program is reinstated, then the RMSC will continue to provide much needed services.

Changes in the Regional (GVSU) Mathematics/Science Center's Financial Support



In addition to the financial support illustrated in the graph above, “in-kind” services received by the Center (donated volunteer time, facilities and equipment) were valued at \$256,310.

Director’s Summary 2009-2010

The Regional Mathematics and Science Center went through its five-year external review in 2008 and received a satisfactory recommendation. In light of funding challenges, the Center still strives to:

- (1) Maintain quality programs for teachers and students while serving the directives of the Michigan Department of Education and
- (2) Support the mission, vision, and goals of GVSU as the University provides over 80% of our funding.

The RMSC participated in several statewide initiatives developed through the Michigan Mathematics and Science Centers Network. The RMSC was one of the professional development hubs for the Algebra for All project coordinating eight blended learning sessions for 90+ teachers. This provided facilitators and coaches, in addition to arranging for space, materials, food, and technology, to meet the requirements of the program directors. In addition, the Center Director served as one of the primary writers of the HSMAS-IV: Writing in Science professional development program which was highly successful. Other Network-wide programs that the RMSC was involved in included the MSU-based “Developing Powerful Measurers” project and the ELAR/Assessment Item Bank trainings.

Since most of our funding came from Grand Valley in 2009-2010, 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 Centers Master Plan, Michigan Legislature, and Michigan Department of Education. During the past academic year, we have also maintained our role as the academic office for the Integrated Science Program, which is a teacher preparation major for elementary and middle school science. 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. This year we were able to receive University approval to synchronize our GVSU and MDE strategic plans and assessment requirements to eliminate duplication in the areas of self-study (needs assessment), evaluation plans, and documentation of progress toward goals.

As the RMSC looks to the future, our current challenges exist in the area of staffing as we endeavor to meet expectations for increased involvement in statewide programs and continue to meet the needs of our local constituency. At this time the Center is in the process of searching for a mathematics program coordinator position. 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.