

# **Western Upper Peninsula Center for Science, Mathematics and Environmental Education 2011-2012 Annual Report**

The Western Upper Peninsula Center for Science, Mathematics and Environmental Education provides services to 19 school districts and their communities in Baraga, Keweenaw, Houghton, Ontonagon, and Gogebic counties. The Center strives to develop scientifically literate and environmentally committed citizens, scientists, and community leaders for the 21<sup>st</sup> century by providing innovative and quality programming for students, teachers and the community.

## **Overview of the Year's Accomplishments**

### **Family Science and Engineering Nights**

During 2011-12, eighteen Family Engineering and Science Nights were held at elementary schools in Houghton, Baraga, Gogebic and Ontonagon counties. Students and their parents attend two 40-minute inquiry-based activities led by Michigan Tech students. Elementary student solved a problem, did an experiment, tackled an engineering challenge, or conducted an investigation. The Michigan Tech student presenters are enrolled in an MTU Department of Education 2-credit semester-long course titled "Communicating Science", which provides training in teaching methods, classroom management, lesson plan development, and presentation skills. The program is conducted in collaboration with Michigan Technological University's Departments of Education and Civil & Environmental Engineering.

### **Outdoor Investigations Field Trip Program**

This program provides students with an opportunity to explore forests, fields, wetlands, and streams where they can apply scientific concepts and gain new skills through a variety of hands-on activities. Teachers select field trips from a brochure that gives descriptions of each field trip and the Michigan Grade Level Content Expectations addressed. A member of the Western UP Center's staff travels to the school site or a natural area near the school to conduct the field trip. This program is funded by a grant from the Kinship Foundation.

### **Rethinking Elementary Math Instruction – Teacher Leader**

The goal of this professional development program is to change the instructional practices of teachers on a school-wide level through a teacher leader model. The entire staff of five elementary schools were involved: Barkell Elementary, Chassell Elementary, Calumet Laurium and Keweenaw Elementary, All Saints Academy and Ironwood Elementary. Ninety-eight teachers from these schools participated in 24 hours of professional development focused on strategies to engage students in meaningful mathematical tasks, communication of their thinking and justification of their answers. Professional development sessions were led by thirteen teacher leaders from the participating schools. These leaders receive intensive training during the summer of 2011 on how to plan and lead professional development sessions.

### **Lake Superior Stewardship Initiative**

The major goal of this initiative 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. The initiative provided sustained professional development for teachers, mini-grants to fifteen schools, assistance with stewardship projects, facilitation of school-community collaborations and community events. The Lake Superior Stewardship Initiative (LSSI) is one of eight funded hubs that comprise the Great Lakes Stewardship Initiative (GLSI) funded by the Great Lakes Fishery Trust and the Wege Foundation. For more information, visit [www.lakesuperiorstewardship.org](http://www.lakesuperiorstewardship.org).

### **Global Watershed Program**

This program is a collaborative effort of the Western UP Center and Michigan Tech Center for Water and Society and it is funded by a National Science Foundation grant. It provides two-year fellowships for Michigan Tech Ph.D. students (GK-12 Fellows) to work with middle and high school teachers to engage students in research on watershed science topics through lessons and field experiences. This project placed five graduate fellows in science classrooms during the 2011-12 school year and will place eight graduate fellows in science during the 2012-13 school year in the Western UP Center service area.

## 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 and Student Services for the entire service area. In addition, there will be a narrative targeting work done with high-priority 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 table below describes 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	1	43.25	0	1	0	0	0	0	1	0
Elementary	104	2448.25	19	85	0	3	1	0	95	5
Middle/Jr. High	18	406	5	13	0	4	9	0	0	5
High School	39	1167	18	21	0	11	14	1	3	10
K-12 Mixed Levels	32	813.5	13	19	1	1	7	0	5	18
Other*	39	1395.25	14	24	0	0	24	0	0	15
<b>Total</b>	<b>233</b>	<b>6273.25</b>	<b>69</b>	<b>163</b>	<b>1</b>	<b>19</b>	<b>55</b>	<b>1</b>	<b>104</b>	<b>53</b>

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

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 (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. Table 2 on the following page represents a picture of the number of sessions offered and the rate of attendance.

**Teachers, on average, spent 26.9 hours on mathematics, science, or technology professional development.**

**Table 2: Professional Development Activities**

		Math	Science	Total
<b>Elementary School</b>	Events	4	0	4
	Hours	96	0	96
	# Participants	98	0	98
<b>Middle/Jr. High &amp; High School</b>	Events	2	3	4
	Hours	42	30	96
	# Participants	39	42	98
<b>K-12 Mixed Levels</b>	Events	0	7	7
	Hours	0	145.25	145.25
	# Participants	0	136	136
<b>Total</b>	Events	6	10	16
	Hours	138	175.25	313.25
	# Participants	137	178	315

## *Spotlight on Professional Development*

### **Lake Superior Stewardship Initiative (LSSI) Professional Development**

LSSI is part of the Great Lakes Stewardship Initiative (GLSI), a larger statewide effort launched by the Great Lakes Fishery Trust in 2006, with major support from the Wege Foundation. LSSI was one of first GLSI hubs. LSSI brings together innovative and dedicated teachers, their students, and community partners in the design and implementation of environmental stewardship and community service projects that address needs in local communities. Since 2007, LSSI has provided \$205,700 in mini-grant funds to 16 school community teams to conduct a wide range of projects that benefit students, teachers, schools, communities, and the Lake Superior watershed. During the 2011-12 school year, 2,236 students and 80 teachers in 15 schools together with 50 community partners have made significant impacts on their communities.

Teachers and community partners participated in professional learning communities both on the initiative and at the team level. These communities focused on how to engage students in relevant learning experiences through stewardship projects that address Grade Level Content Expectations. Scientists from Michigan Tech, professionals from community partner organizations, and teachers served as workshop facilitators. Topics of professional development offered at the initiative level were management of invasive species, global climate change, creation of interpretative signs, Great Lakes research, school-yard ecology, assessing student stewardship behaviors and attitudes, and conducting oral histories. At the team level, members participated in book clubs or worked consistently with practicing research scientists through the Global Watershed Program. This program places graduate fellows with LSSI school-community teams for two years to engage students in scientific research concerning the Great Lakes watershed, work with teachers to develop teaching units and assist with the teams with their stewardship project. The LSSI hub secured additional funding from the NOAA B-WET program to give each school-community team a \$2,000 mini-grant to expand the work of their professional learning communities in the 2012-13 school year.

LSSI provided many community activities at the initiative and local level to foster stewardship attitudes in the local communities. At the initiative level, the Green Film Series consisted of six events that provided a forum for community members to watch a film about an environmental issue and then participate in a facilitated discussion focused on positive actions that can be taken. At the local level, each school community team conducted a community event to highlight the stewardship work in their community.

## *Spotlight on the Value of Statewide Projects*

**What has been the value and usefulness of the statewide projects on the districts, students, schools, and teachers you serve?**

The Algebra for All and Project PRIME program addressed a pressing need to improve student achievement in Algebra I for all students. Many of the math high school teachers in the Western UP Center service area are the only high school math teacher in their district. These programs provide a valuable opportunity for these teachers to collaborate and share with other teachers in the Western UP Center service area and statewide, specifically about how to teach the content in the Common Core State Standards to all students. Thirteen high school math teachers (approximately 35% of high school math teachers in the Western UP Center's service area) have participated in two years of Algebra for All and one year of Project PRIME. These teachers make participation in these programs a priority in their professional development.

These programs have made a valuable impact on participating teachers' instructional practice, as indicated by these comments from workshop reflections:

"Thank you, These workshops were well worth my time."

"I enjoyed working together, trying out lessons, and getting ideas from others."

"This program helped me learn more about the Common Core Standards and gave me time to write lessons aligned to the CCSS."

"I enjoyed having the time to look at the Common Core resources in depth."

"It is good to look at a variety of activities to teach the CCSS and think about how to use them in my classroom."

"I enjoyed the examples of what the mathematical practices look like in the classroom."

## 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:

- ❖ Family Science and Math Nights
- ❖ Environmental stewardship projects to address needs in local communities
- ❖ Field trips to natural areas to promote environmental stewardship.
- ❖ Science fairs and TiViTz Math tournament

**Table 3: Student Services Activities Provided in 2011-2012**

		Math	Science	Other	Total
<b>Elementary School</b>	Events	0	215	0	215
	Hours	0	335	0	335
	# Participants	0	6351	0	6351
<b>Elementary &amp; Middle/Jr. High</b>	Events	1	12	0	13
	Hours	4	23.75	0	27.75
	# Participants	236	577	0	813
<b>Middle/Jr. High</b>	Events	0	34	1	35
	Hours	0	56.25	1	57.25
	# Participants	0	912	15	927
<b>High School</b>	Events	0	6	0	6
	Hours	0	12	0	12
	# Participants	0	80	0	80
<b>Total</b>	Events	1	267	1	269
	Hours	4	427	1	432
	# Participants	236	7920	15	8171

## *Spotlight on Innovative Student Services*

### Family Science and Engineering

During the 2011-12 school year, eighteen Family Engineering and Science nights were conducted at elementary schools in Houghton, Baraga, Gogebic, and Ontonagon Counties. At each grade level, students and their parents had the opportunity to attend two 40-minute inquiry-based activities. Elementary students and their parents did experiments, tackled an engineering challenge, or conducted an investigation. The activities were led by Michigan Tech students, faculty, and community professionals. The Michigan Tech student presenters were trained in an MTU Department of Education 2-credit semester-long course titled "Communicating Science." As part of the course, the university students receive training in teaching methods, classroom management, lesson plan development, and presentation skills.

Presenters used activities from the Family Engineering Book. This book was a collaborative effort of Michigan Technological University, Foundation for Family Science and American Association of Engineering Education with funding from a National Science Foundation grant. Western UP Center staff were instrumental in the development of the Family Engineering Book.

The Western UP Center staff and Michigan Tech faculty provided training to directors of the Michigan Math and Science Centers Network in September 2011 to facilitate the implementation of Family Engineering nights on a statewide level. They receive funding from the Square One Education Network to provide Family Engineering Kits to all participating directors.

The program is sponsored by the Western Upper Peninsula Center for Science, Mathematics and Environmental Education, with funding from the Wege Foundation, National Science Foundation, and School of Forest Resources and Environmental Science. The program is conducted in collaboration with Michigan Technological University's Departments of Education and Civil & Environmental Engineering.

## *Spotlight on Partnerships*

The Western U.P. Center for Science, Mathematics and Environmental Education is a partnership of the Copper Country and the Gogebic-Ontonagon Intermediate School Districts and Michigan Technological University (MTU) Center for Science and Environmental Outreach. Western UP Center's staff spent a considerable time and expertise fostering a wide variety of partnerships to provide quality programming to the 19 school districts in their service area. These partnerships are crucial to the continued operation of the Center. The Center collaborated with various entities during the 2011-12 school year to secure funding to maintain math and science programs for the 2012-2013 school years.

The Western U.P. Center brought together businesses, community organizations, local educators and MTU faculty to secure continuation funding through June 30, 2013 from the Great Lakes Fishery Trust to implement the Lake Superior Stewardship Initiative, which will engage schools in community-based learning opportunities. In addition, through this partnership, the Western UP Center secured funding from NOAA B WET program, Michigan Department of Natural Resources, and Michigan Space Grant Consortium to expand the work of LSSI.

The Western U.P. Center collaborated with faculty from various departments at Michigan Tech to secure funding for a wide variety of student and teacher programs.

- Five years of funding was secured from the National Science Foundation to implement the *Global Watershed* project. This project involves teachers and their students in scientific research of the human impact on local watersheds and the far-reaching impacts on the global watershed. It started in the 2010-11 school year.
- Funding was secured from the National Science Foundation to implement the Environmental Cyber-Citizen program for the 2011-12 and 2012-13 school years. This program brings together a multidisciplinary team of scientists and undergraduate students from Michigan Tech to collaborate with citizen scientists and high school students to develop and deploy data collection and visualization tools on smart-phones.
- Funding was secured from the Mathematics and Science Partnership Grant program to expand the Rethinking Elementary Mathematics program to include 98 more teachers. This program provided teachers with strategies to build students' mathematical understanding of the concepts in Grade Level Content Expectations for grades K-7 through June 2012.

The Western U.P. Center collaborated with the five Math/Science Centers in the Upper Peninsula and faculty from Michigan Tech, Northern Michigan University and Lake Superior State University to secure funding from Mathematics and Science Partnership Grant Program to implement the Greater Proficiency in Math Program. This program gets teachers involved in the Intel Math professional development program and professional learning communities through June 2013.

Students and faculty from Michigan Tech and Finlandia University provide a tremendous volunteer resource for conducting student programs such as Western U.P. Science Festival, TiViTz tournament, family science nights and community programs. In addition, the expertise of MTU faculty is a crucial component to the success of the Western UP Center's summer institute program. Staff worked closely with MTU faculty to provide the teachers with relevant ways to present cutting edge technology to their students.

## *Spotlight on High-Priority Schools*

Schools in the Western U.P. Center's service area are located in Houghton, Baraga, Keweenaw, Gogebic, and Ontonagon counties of Michigan. The only schools in the service area that did not make AYP in mathematics were BRIDGE Alternative High School In Hancock and LL Wright High School in Ironwood. According to the Statewide School Report Card, two schools in the service area have been identified as Focus School: Washington Elementary School in Bessemer and Houghton Elementary. The Western UP Center offered comprehensive professional development in K-12 mathematics for schools through Rethinking Elementary Math Instruction (REMI) and Project PRIME. The entire mathematics teaching staff of the Ironwood School District participated in REMI or Project PRIME. The entire mathematics teaching staff of BRIDGE High School participated in Project PRIME. Teaching staff from Houghton Elementary will be participating in a new mathematics professional development project offered by the Western UP Center called Greater Proficiency in Math (GPM). GPM is based on the Intel Math professional development program.

The goal of Rethinking Elementary Math Instruction is to change the instructional practices of teachers on a school-wide level through a teacher leader model. The entire staff of five elementary schools were involved: Barkell Elementary, Chassell Elementary, Calumet Laurium and Keweenaw Elementary, All Saints Academy and Ironwood Elementary. Ninety-eight teachers from these schools participated in 24 hours of professional development focused on strategies to engage students in meaningful mathematical tasks, communication of their thinking and justification of their answers. Professional development sessions were led by thirteen teacher leaders from the participating schools. These leaders receive intensive training during the summer of 2011 on how to plan and lead professional development sessions.

**Project PRIME** is two-year project providing 7<sup>th</sup>-12<sup>th</sup> grade teachers with a deeper understanding of mathematics content in the Common Core State Standards (CCSS) for Algebra and Geometry, pedagogical knowledge of the mathematical practices in the CCSS and evidence-based approaches to instruction. Project PRIME was developed by the Michigan Mathematics and Science Centers Network, the University of Michigan – Dearborn's Center for Mathematics Education, Wayne Regional Educational Service Agency and the Michigan Department of Education, and it is funded by a Mathematics and Science Partnership grant.

The professional development sessions focused on helping teachers understand and incorporate into their practice:

- the Common Core State Standards (CCSS) for Mathematics;
- the CCSS Eight Standards of Mathematical Practice;
- the SMARTER Balanced Assessment process and the types of items on the test;
- the developmental process involved in Mathematical Thinking;
- the use of "Inquiry" as a means to help students construct their understanding; and
- the importance of "collaboration" with other professionals to enhance practice.



***What was the impact of the  
Western Upper Peninsula Center for Science, Mathematics  
and Environmental Education?***

<b>Impact on Students</b>	<b>Impact on Teachers</b>
<ul style="list-style-type: none"> <li>• Elementary students who participated in Family Engineering activities on average improved their score by 1.6 points on a 10 point scale on the engineering pre/post test.</li> <li>• There were significant gains in 3<sup>rd</sup> grade math MEAP scores of students of teachers who had been involved in REMI for 2 or more years.</li> </ul>	<ul style="list-style-type: none"> <li>• Analysis of pre and post SAMPI Classroom Observations of teachers involved in REMI indicated significant growth in implementation and content of lessons.</li> </ul>
<b>Impact on Schools</b>	<b>Impact on Communities</b>
<ul style="list-style-type: none"> <li>• Five elementary schools received school-wide professional development in mathematics led by REMI teacher leaders that was rated high quality in all six dimension of the Horizon Research Professional Development Observation Protocol.</li> </ul>	<p>LSSI has resulted in the following positive improvement to local communities:</p> <ul style="list-style-type: none"> <li>• Community garden in Calumet</li> <li>• Nature trail at Lake Perreault</li> <li>• Nature trail on the grounds of L'Anse Area Schools.</li> <li>• Bird and Butterfly Garden in Pelkie.</li> <li>• Interpretative signage and trail improvements at Keweenaw Land Trust preserves and Calumet Township Beach.</li> <li>• Stewardship of various natural areas in the Lake Superior Watershed.</li> <li>• Collection of environmental monitoring data for various communities, national parks and government agencies.</li> <li>• Nature trail and disc golf course in Lake Linden.</li> </ul>

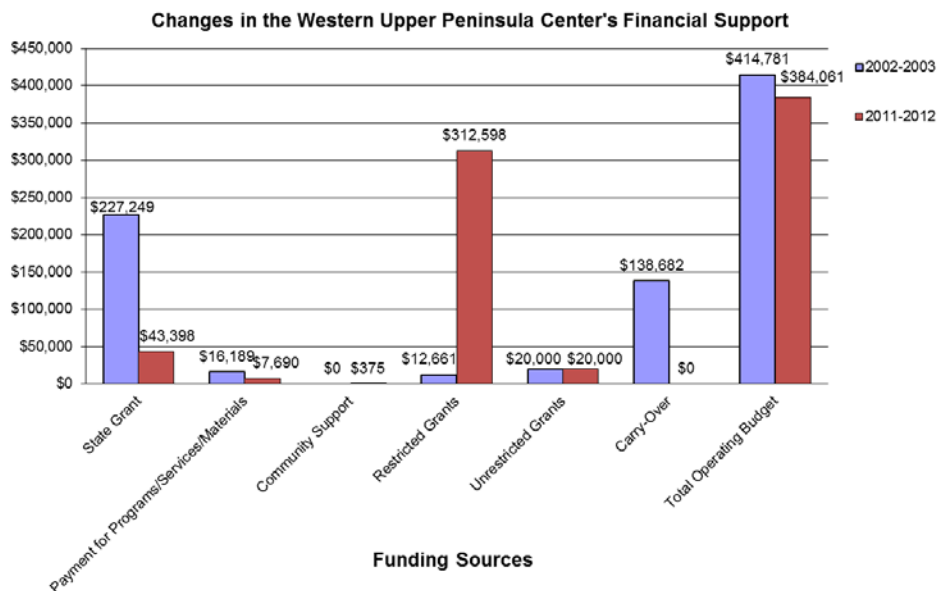
## Director's 2011-2012 Budget Discussion

The Western UP Center provided a wide variety of student programs and professional development opportunities by combining funds from Section 99 with twelve grants, program fees and community donations during the 2011-12 school year. The Section 99 allocation to the Center does not provide enough funding for one full time person or to maintain programming. As in previous years, the Center staff were very aggressive in pursuing other grant funds to maintain programming and staff for the 2011-12 school year. A substantial amount of staff time was spent pursuing grant opportunities and building collaborative partnerships.

The school districts in the CCISD and GOISD paid a fee for family science nights, assembly programs and field trips offered through the Western UP Center in the 2011-2012 school year. These fees paid for materials, travel and a small portion of staff time. A majority of staff time for these programs was covered by grant funds. These programs are valued by the school districts and they are willing to pay the fees, even in the atmosphere of reduced school budgets.

Section 99 funding for the 2011-12 accounted for 11% of the revenue of the Western UP Center. A rest of the Center's operating budget was based on other grant monies. Many grants are for one to three year projects and do not provide sustained support for Center staff. Currently the Western UP Center has five staff members and an AmeriCorp worker. A majority of staff salaries are covered by grants funds other than Section 99 funds. In addition, Western UP Center staff must take on other responsibilities and duties outside of the Center activities to maintain their salary and benefits.

The Western UP Center budget for the 2012-13 school year will be comprised of Section 99 funds, eleven restricted grants and program fees. Currently, Section 99 funding will contribute of 13% of the revenue for the 2012-13 school year.



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 \$22,700.

## Director's Summary 2011-2012

The Western UP Center for Science, Mathematics and Environmental Education is a partnership of the Copper Country Intermediate School District (CCISD) and Gogebic-Ontonagon Intermediate School District (GOISD) and the Center for Science and Environmental Outreach at Michigan Technological University (MTU) and provides services to schools in the CCISD and GOISD. This crucial partnership gives the Western UP Center the ability to provide student and teacher programming to the districts in our service area. It gives the Center flexibility in securing grants funds and resources to implement these programs. The Western UP Center is the main provider of professional development in math and science for teachers in our service area. Center staff spent a substantial amount of time cultivating partnerships and pursuing grant opportunities to provide programming during the 2011-12 school year and into the 2012-2013 school year. The efforts of Center staff resulted in successfully securing grant funds from Michigan Space Grant, National Science Foundation, Michigan Department of Education, Great Lakes Fishery Trust, Wege Foundation, Mathematics and Science Partnership, National Oceanic and Atmospheric Administration, Department of Natural Resources, US Forest Service and the Kinship Foundation.

The Western UP Center's professional development programs continue to focus on providing resources, strategies, and assistance to teachers as they implemented the Common Core State Standards in their classroom and improve their classroom practices. The Western UP Center provided comprehensive professional development in math and science through Rethinking Elementary Math Instruction, Project PRIME and Lake Superior Stewardship Initiative. These programs focus on strategies that help teachers improve student achievement in their classroom and meet their school improvement goals.

The Western UP Center's student and community programs focused on fostering stewardship of the communities in the Lake Superior Watershed and providing meaningful learning experiences for students and the larger community. The Lake Superior Stewardship Initiative, Outdoor Investigation Field Trip Program, and Green Film Series focused on individual and community actions to preserve the unique ecosystem of the Lake Superior Watershed. Family Science and Engineering nights engaged elementary students and their parents in innovative activities to teach math, science and engineering concepts.