

Western Upper Peninsula Center for Science, Mathematics and Environmental Education 2008-2009 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 21st century by providing innovative and quality programming for students, teachers and the community.

Overview of the Year's Accomplishments

Lake Superior Stewardship Initiative (LSSI): The major goal of this two-year initiative was to prepare K-12 students to become knowledgeable citizens, concerned about the quality of life in their community, and actively engaged in stewardship of the health of Lake Superior and its watershed. The initiative provided sustained professional development for teachers, mini-grants to eleven schools, assistance with stewardship projects, and facilitation of school-community collaborations and public forums. The Lake Superior Stewardship Initiative (LSSI) is one of five 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.

Community Energy Program: The Western U.P. Center received funding from the Michigan Community Energy Project Grant program to implement the *Education to Promote Energy Efficiency and Renewable Energy Options* project. This project trained teachers and high school students to conduct home energy audits to evaluate building energy efficiency. Students conducted home energy audits and insulation projects for senior citizens in their community. Five community energy education programs focusing on conservation and alternate energy sources were held at Ontonagon Elementary School, Portage District Library, Sacred Heart School and the Keweenaw Bay Indian Community.

Family Engineering: Michigan Tech's Civil and Environmental Engineering Department in partnership with the Western U.P. Center, the Foundation for Family Science, American Society of Engineering Education, and Engineering is Elementary received funding from the National Science Foundation to implement the three year *Family Engineering* project. This project is bringing together scientist and educators to create a manual of family engineering activities. This manual will engage children and their parents in inquiry-based activities that build a foundation of science, math and design concepts that are essential in engineering.

Western U.P. Science Fair and Festival: Three hundred and sixty students in grades 4-8 participated in the science fair at the Michigan Tech in March 2009. Students in grades four through eight submitted projects on experiments they conducted. For more information see page 6.

A teacher workshop was conducted in January 2009 for how to engage students in scientific inquiry through the creation of a science fair project. Teachers explored how the construction of science fair projects in their classroom can be a valuable part of their science curriculum and address Grade Level Content Expectations in science, math and language arts. Funding from a Michigan Space Grant made the fair and festival possible.

Outdoor Science Investigations Field Trips Program: Elementary and middle school teachers and students participated in naturalist-led field trips at a site near their school. The field trips consisted of hands-on activities that teach the K-7 science Content Expectations using the forest, field, streams, and wetlands as the classroom. Different standards-based field trips were conducted for each grade during each season: fall, winter, and spring. 117 field trips were conducted during the 2008-09 school year. This program is funded by a grant from the Kinship Foundation.

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 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?

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	# of Individ.	Total Hours	Reported Gender**		Position					
			M	F	Admin	Math Tchr	Sci Tchr	Tech	Comb Subj	Other or Unknown*
Pre-School	4	77	2	2	2	0	0	0	2	0
Elementary	141	2946.5	23	118	6	0	1	0	127	7
Middle/Jr. High	34	1184	13	21	1	3	18	2	0	10
High School	72	2117	32	40	3	12	37	0	2	18
K-12 Mixed Levels	51	1123.5	16	34	10	4	7	1	8	21
Other	61	1587	28	32	1	0	0	0	1	59
Total	363	9035	114	247	23	19	63	3	140	115

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

**Gender was not reported by all participants.

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 24.9 hours on mathematics, science, or technology professional development.

Table 2: Professional Development Activities

		Math	Science	Technology	Other	Total
Elementary	Events	6	0	0	1	7
	Hours	36	0	0	1.5	37.5
	# Participants	63	0	0	14	77
Elementary and Jr. High	Events	2	1	0	0	3
	Hours	62	6	0	0	68
	# Participants	35	18	0	0	53
Middle School	Events	0	1	0	0	1
	Hours	0	6	0	0	6
	# Participants	0	24	0	0	24
Jr. High and High School	Events	0	1	2	0	3
	Hours	0	6	20	0	26
	# Participants	0	12	26	0	38
High School	Events	2	2	0	0	4
	Hours	30	18	0	0	48
	# Participants	10	11	0	0	21
K-12 Mixed Levels	Events	0	12	0	6	18
	Hours	0	214	0	115	329
	# Participants	0	232	0	134	366
Total	Events	10	17	2	7	36
	Hours	128	250	20	116.5	514.5
	# Participants	108	297	26	148	579



Spotlight on Professional Development

Rethinking Elementary Mathematics Instruction: The Western U.P. Center in collaboration with Michigan Tech's mathematics and education departments received funding from the Michigan Mathematics and Science Partnership program to initiate an innovative professional development project for teachers in grades 4-7. This two-year project consists of twelve school year workshop sessions, three-day summer institute and participation in a lesson study cycle. The project focused on developing the teachers' pedagogical and mathematical content knowledge to effectively teach the mathematics in the 4th-7th Grade Level Content Expectations (GLCEs) in a way that builds on students' prior knowledge and develops mathematical understanding. A learning community of participating teachers was maintained to focus on how to engage 4th through 7th grade students in relevant learning experiences that develop mathematical understanding. In August of 2009, the Western U.P. Center was awarded funding to conduct a similar two-year professional development project for grades K-3 teachers.

The Western U.P. Center partnered with Michigan Tech to offer these four summer institutes to Michigan teachers. Funding for these institutes was made possible through grants from Michigan Department of Environmental Quality, Michigan Forest Foundations and the National Science Foundation

Great Lakes Watershed Investigations Teacher Institute ~ June 15-19, 2009

This Institute focused on the physical, chemical, and biological components of the Great Lakes ecosystem, using the Lake Superior watershed as the classroom. This 5-day course engaged educators in a wide array of Great Lakes topics including watershed dynamics, stream monitoring, evaluating the health of the Great Lakes, amphibian & salamander monitoring, tracking Great Lakes fisheries, invasive species, land use and shoreline development, establishing school-community partnerships, student-led stewardship activities, and careers.

Forest Ecology & Resources Institute ~ June 21-26, 2009

This institute provided teachers (grades 3-12) with a basic understanding of forest ecology and management. Topics presented: forest management, biodiversity, silvicultural prescriptions, forest health, and multiple uses of forests.

Future Fuels From Forests Teacher Institute ~ July 6-10, 2009

This institute engaged middle/high school educators in an interdisciplinary investigation of forest-based ethanol production integrating silviculture and landscape ecology, GIS, and chemical engineering through lecture, field trips, and computer investigations.

Global Change Teacher Institute ~ July 13-17, 2009

This institute focused on how to engage your middle and high school students in a real-world study of the effects of global change on ecosystems, including the impacts of climatic change, elevated carbon dioxide and ozone levels, nitrogen saturation, acid rain, and invasive species. Participants visited the FACE research site (<http://aspenface.mtu.edu/>) in northern Wisconsin where the effects of elevated CO₂ and ozone on forest productivity are clearly observable.

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 Center for Science and Environmental Outreach at Michigan Technological University (MTU). Center staff contributed time and expertise to 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 2008-09 school year to secure funding to maintain math and science programs for the 2008-09 and 2009-10 school years.

The Western U.P. Center collaborated with faculty at Michigan, Boston Museum of Science, American Society for Engineering Education, and the Foundation for Family Science to secure funding from the National Science Foundation (NSF) for the Family Engineering Program.

The Western U.P. Center brought together businesses, community organizations, local educators and MTU faculty to secure funding through March 2011 from the Great Lakes Fishery Trust to implement the Lake Superior Stewardship Initiative, which will engage schools in community-based learning opportunities.

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.

- Secured five years of funding from the National Science Foundation to implement the *Global Watershed* project. This project will involve teachers and their students in scientific research of the human impact on local watersheds and the far-reaching impacts on the global watershed.
- Secured funding from the Improving Teacher Quality grant program to implement the Educators Professional Development Institute Series in Physical Science. This professional development program will provide middle and high school physics and chemistry teachers with instructional strategies and technology to teach the content expectations using an inquiry approach.
- Secured funding from the Michigan Community Energy Project Grant program to implement the *Education to Promote Energy Efficiency and Renewable Energy Options* project. This project provided teacher workshop and community programs on energy conservation and alternate energy resources.
- Secured funding from the Mathematics and Science Partnership Grant program to implement the Rethinking Elementary Mathematics program, which will provide teachers with strategies to build students' mathematical understanding of the concepts in Grade Level Content Expectations for grades K-7 through June 2011.

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 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.

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
- ❖ After-school enrichment opportunities that engage students in the practical applications of mathematics and science knowledge
- ❖ Field trips to natural areas to promote environmental stewardship
- ❖ Science fairs and TiViTz Math tournament

Table 3: Student Services Activities Provided in 2008-2009

		Math	Science	Total
Elementary	Events	20	119	139
	Hours	40	219	259
	# Participants	1425	2929	4354
Elementary and Jr. High	Events	1	1	2
	Hours	4	6	10
	# Participants	250	370	620
Middle School	Events	0	19	19
	Hours	0	31	31
	# Participants	0	1230	1230
Jr. High and High School	Events	0	3	3
	Hours	0	3	3
	# Participants	0	96	96
High School	Events	0	12	12
	Hours	0	48	48
	# Participants	0	178	178
K-12 Mixed Levels	Events	0	1	1
	Hours	0	1	1
	# Participants	0	100	100
Total	Events	21	155	176
	Hours	44	308	352
	# Participants	1675	4903	6578

Western U.P. Science Fair and Festival: Three hundred and sixty students in grades four through eight participated in the science fair at the Michigan Tech in March 2009. Students in grades four through eight submitted projects on experiments they conducted. The science fair project consisted of a written report, display board and an interview with a practicing scientist or a science teacher. A student planning guide criteria distributed to all participants provided a clear process that guided the development of a science fair project. The projects were judged on originality, scientific approach, presentation of recorded data and explanation of findings. Approximately 75 Michigan Tech faculty, students and staff, and community volunteers served as judges. During the fair, all participating students and their families had the opportunity to participate in fun, hands-on activities conducted by Michigan Tech and Finlandia University students in the Michigan Tech Memorial Union Commons area.

Spotlight on Innovative Student Services

The Lake Superior Stewardship Initiative (LSSI) focuses on helping students assume the role of contributing citizens in their community. Teachers, students, parents and community organizations partner to address a stewardship need in their community. Students, with the guidance of teachers and community partners, design and implement projects that enhance the quality of life in their community and have a positive impact on the health of the Lake Superior watershed. Students contribute their talents and hard work to their project and develop an appreciation and understanding of how a community of individuals can work together.

LSSI was established in 2007 with grants from the Great Lakes Fishery Trust, Wege Foundation, Kinship Foundation, and the Michigan Department of Environmental Quality. Since then, approximately 1,300 students and 43 teachers in 11 schools together with community partners have explored characteristics of healthy lakes, rivers, streams, and wetlands. This has motivated students to develop projects that address needs in their community. In July 2009, the Western UP Center received a continuation grant from the Great Lakes Fishery Trust to expand the initiative to 15 schools during the 2009-2010 academic year.

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. The GLSI's goal is to increase awareness and understanding of the ecology of the Great Lakes so that Michigan's students become active stewards and advocates for strategies that support the long-term sustainability of the Great Lakes fisheries. To date, five regional hubs have been established in Michigan and LSSI is the only hub located in the Lake Superior watershed.

School-community teams design a wide variety of stewardship projects to address the needs of their own communities. Elementary students are initiating a community garden using organic practices, a school wide program to compost food waste from their cafeteria and developing a three-mile nature trail. Middle and high school students are serving as active stewards of the Keweenaw Land Trust's Preserves, community beaches, township parks and Michigan Nature Association's sanctuaries.

LSSI gave teachers and students the opportunity to study the environmental challenges of Lake Superior watershed and possible solutions to those challenges. In May 2009 teachers and students attended the 8th Biennial Lake Superior Youth Symposium for grades 8-12 students and educators from Michigan, Minnesota, Wisconsin, and Ontario. The symposium took place on the campus of College of St. Scholastica in Duluth, MN. Students explored current and future challenges to Lake Superior and its watershed through hands-on investigations, presentations, field trips, and leadership-building activities, in addition to experiencing some of the history and Native American culture of the Lake Superior region. In March 2009, high school students and teachers participated in day-long visits to Michigan Tech to examine the multiple issues associated with the development of transportation fuels from forest-based biomass in the UP. Students attended presentations, lab tours, and hands-on activities with scientists and graduate students engaged in cutting-edge research.

The focus of the Lake Superior Stewardship Initiative (LSSI) is to prepare K-12 students to become knowledgeable citizens, concerned about the quality of life in their community, and actively engaged in stewardship of the health of Lake Superior and its watershed. For more information about LSSI, visit www.lakesuperiorstewardship.org

Spotlight on High-Priority Schools

All of the schools in the Western U.P. Center's service area made AYP for the 2008-09 school year. The decline in student achievement in Algebra 1 across all districts is a major need. The Western U.P. Center received funding from the Michigan Math and Science Partnership Grant program to implement the Rethinking Elementary Mathematics Instruction professional development program. The focus is to provide teachers with instructional strategies to teach for deep understanding and engage students in meaningful mathematical tasks addressing the content expectations in Number and Operation strand. Research shows that a working knowledge on the concepts in this strand is essential before students can master the more abstract concepts in Algebra.

The Western U.P. Center provided teachers and administrators with professional development that helped school districts meet the federal and state mandates and improve teaching and learning.

- *High School Content Expectations.* Through the Inquiry in Instruction, multiple workshops were conducted at Copper Country ISD and the Gogebic Ontonagon ISD to help teachers address the High School Content Expectations in science and math using an inquiry approach.
- *New Teacher Mentor Workshop Series.* A series of seven workshops provided new teachers and their mentors with the resources and knowledge to help new teachers create an effective learning experience for their students. This professional development offering helped teachers and their districts meet the professional development requirements for new teachers.
- *School Improvement Workshop Series.* A series of four workshops guided administrators and school improvement teams on the School Improvement Framework and associated rubrics. There was intense focus on how to use student achievement data to formulate school improvement goals. In addition how to use that student achievement data to change instructional practice in the classroom.

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

Impact on Students	Impact on Teachers
<p>I³ Mathematics Results:</p> <ul style="list-style-type: none"> • A total of eight (8) middle and high school <i>mathematics</i> teachers participating in the Inquiry in Instruction (I³) workshops administered pre/post assessments to their students. • For total test scores among the eight classes, two (2) showed a positive change score pre to post. • An analysis of all students from all classes shows a -0.3 pre-to-post change on the five-point test, which was statistically significant. <p>I³ Science Results:</p> <ul style="list-style-type: none"> • A total of three (3) middle and high school <i>science</i> teachers participating in the Inquiry in Instruction (I³) workshops administered pre/post assessments to their students. • For total test scores among the three classes, two (2) showed a positive change score pre to post. • Average student confidence in their answers, on a scale from 1 to 3, increased significantly for zero classes. The overall Center average confidence increased from 2.2 to 2.4, a statistically significant increase. 	<p>The Rethinking Elementary Mathematics Instruction impacted teacher’s attitudes about their practice as indicated by the following comments on the year end evaluation:</p> <ul style="list-style-type: none"> • “I was really pressed to think about my current practices. I feel ready to make changes to improve my teaching.” • “This workshop really made me reevaluate my own teaching strategies. I will incorporate many of these ideas.” • “I was challenged to rethink the way I teach mathematics.” <p>Teachers who participated in the Western U.P. Center’s Teacher Institutes created standards-based teaching units to implement in their classroom.</p>
Impact on Communities	Impact on Schools
<p>Lake Superior Stewardship Initiative (LSSI) brought together 40 community partners to work with school districts to implement 10 stewardship projects to enhance communities in the Lake Superior Watershed.</p>	<p>In 2006, 5 high schools did not make AYP due to their special education population. The Center implemented three years of High School Math and Science Success workshops that addressed effective ways to teach the High School Content Expectations to all students. In 2008-09 school year, all high schools made AYP.</p>

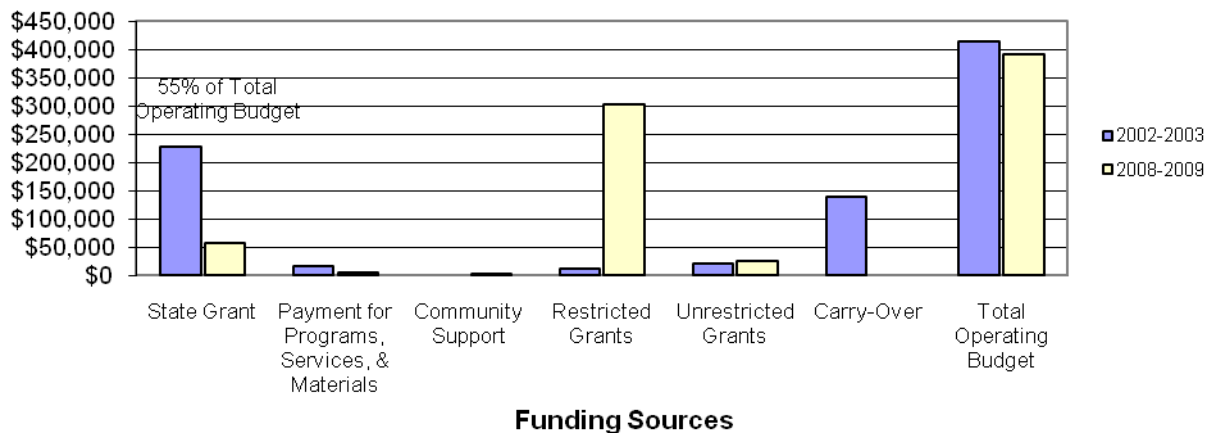
Director's 2008-2009 Budget Discussion

The Western U.P. Center provided a wide variety of student programs and professional development opportunities by combining funds from Section 99 with ten restricted grants during the 2008-09 school year. The Section 99 allocation to the Center does not provide enough funding for salary for one full time person or to maintain programming. As in previous years, the Center staff was very aggressive in pursuing other grant funds to maintain programming and staff for the 2008-09 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 minimal fee for family science nights, assembly programs and field trips offered through the Western U.P. Center in the 2008-09 school year. The fee paid for materials and travel but did not pay for staff time. 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.

Since Section 99 funding remains at 25% of full funding, a majority of the Center's operating budget was based on grant monies. Many grants are for one to three year projects and they do not provide sustained support for Center staff. Center staff must take on other responsibilities and duties outside of the Center activities to maintain their salary and benefits.

Changes in the Western Upper Peninsula 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 \$22,700.

Director's Summary 2008-2009

The programs offered by the Western U.P. Center are essential to the districts in our service area. The Western U.P. Center is the main provider of professional development for teachers in our service area. Center staff made a commitment to continue to provide programming that addresses the needs of school districts in our service area and engages students in real-world, relevant learning experiences. Section 99 does not provide adequate funding to provide this programming. The Center spent a substantial amount of time cultivating partnerships and pursuing grant opportunities to provide programming during the 2008-09 school year and into the 2009-10 school year. The efforts of Center staff resulted in successfully securing grant funds from Michigan Department of Environmental Quality, Michigan Space Grant, National Science Foundation, Michigan Department of Education, Great Lakes Fishery Trust, Michigan Community Energy Program, Mathematics and Science Partnership and the Kinship Foundation.

The Center's professional development programs focused on providing resources, strategies and assistance to teachers as they implemented the content expectations in their classroom and improve their classroom practices. When planning professional development, the focus is on can we help teachers improve student achievement in their classroom and meet their school improvement goals.

The Western U.P. Center's student and community programs focused on fostering stewardship of the communities in the Lake Superior Watershed and providing meaningful learning experiences for families. The Lake Superior Stewardship Initiative, Field Trip Program, and Community Energy program focused on individual and community actions to preserve unique ecosystem of Lake Superior Watershed. Family Science, Math and Engineering nights engaged elementary students and their parents in innovative activities to teach math and science concepts.

The governance of the Western U.P. Center has remained the same. The Center 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. The CCISD acts as the fiscal agent and the CCISD Board of Education reviews fiscal records.