

MSTA Newsletter



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Thoughts from your Executive Director

By Robby Cramer, MSTA Executive Director

I want to thank many of you who took the time to participate in the MSTA survey that SAMPI conducted on our behalf. At the September MSTA Board meeting, both the Executive Committee and the full Board of Directors spent a number of hours analyzing the data you provided to determine what kind of programming to have on our web site and at our annual conference next March. The conference committee designed several new strands, including one on technology based upon your advice. MSTA is working on a new website design. Your needs regarding technology, current information, and professional development will be major considerations in our decisions regarding that website.

As your executive director I thought it would be wise to let you know what I have been working on in your behalf:

Executive Director Report September 2011

Budget Meetings - Assisting in the development and analysis of the MSTA budget for 2011-2012

MSTA Website Redesign - Worked with Keith Bretzius, from AMR to help him understand the scope of the MSTA website needs. Provided several sites for him to analyze and then assisted him in the

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From the President's Desk: STEM Education Is Hot...and It Should Be

By Mike Klein, MSTA President

STEM is everywhere. It is linked to K-12 education, job creation, grant funding, and college and career readiness. There are STEM coalitions, partnerships, networks, and caucuses. STEM education is what's hot right now and as science educators we are truly at the forefront of the movement that focuses on improving opportunities for students to become involved with subjects and careers in Science, Technology, Engineering and Mathematics.

It has been a long time coming, but just this month Congress forwarded a draft bill that would rework the Elementary and Secondary Education Act, more frequently referred to as No Child Left Behind. And it should come as no surprise that it contains a section on STEM education. The draft from Senator Harkin of Iowa highlights four primary goals for STEM education:

- Improve instruction in STEM subjects kindergarten through high school;
- Increase student engagement in STEM courses and make them more accessible to students;

- Enhance teacher quality and effectiveness in classroom instruction through better recruiting, training and support systems for capable teachers;
- Closing the achievement gap for minority students and increasing the number of students prepared to pursue STEM degrees and careers.

This educational focus on STEM is welcomed and all of these goals deserve our attention and support. However, one aspect jumps out at me more than the others and hints at what the real power of STEM related subjects. That goal is the emphasis on student engagement and accessibility to science, technology, engineering and mathematics. This particular aspect speaks to the nature of science and to the reason most of us became science teachers... to engage kids in science exploration and help them develop a better understanding of the scientific world around them.

It is this goal that is at the heart of STEM. It is this goal that helps us visualize the bigger picture of integrating meaningful learning opportunities around science exploration. Science becomes the vehicle that drives elements of technology, engineering and

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Thoughts from your Executive Director - *continued from front page*

analysis of the site he began designing. Process involved phone calls and email as well as face to face meetings.

State Committee Participation representing MSTA

- *Michigan Advocacy Consortium - The purpose of the consortium is to advocate for policy related to curriculum, assessment, and instruction based on the needs of the whole child. Given the current political and educational climate in our state, it is imperative that we consider providing a collective, unified voice with a broad perspective on issues that impact quality teaching and learning. We need to maximize our resources, advocating for sound education policies, and the need to educate legislators on key educational issues to ensure we continuously have an informed legislative body.*
- *Michigan STEM Partnership - The Michigan STEM Partnership is using a systems lens to coordinate STEM educational efforts around the state of Michigan to encourage and improve quality, global competitiveness and increase impact.*
- *Michigan's committee for creating standards based upon the framework released by the National Academies July 19, 2011 (standards due for release end of 2012) - The 20 Lead State Partners will guide the standard writing process, gather and deliver feedback from state-level committees and come together to address common*

issues and challenges. The Lead State Partners also agreed to commit staff time to the initiative and, upon completion, give serious consideration to adopting the Next Generation Science Standards. In order to be considered, states had to submit a letter with the signature of the Chief State School Officer and the chair of the State Board of Education.

MSTA Membership Survey - Worked on analysis of results of the MSTA membership survey. Communicated with Kristin Everett, SAMPI-MS 5442, Western Michigan University.

NSTA - Continued correspondence with NSTA leadership regarding our conference and the NSTA conference in Indianapolis, Indiana

MWEA - Worked with Mary Jane Robinson on the MWEA partnership. Collaborated to update the award given yearly to a Michigan Teacher for water quality resources and opportunities.

Publications - Newsletter article, Journal article

General Assistance - Collaborated with MSTA leadership and AMR personnel as needed.

As you can see, I've been busy working to make Michigan science teachers among the best in the nation! Thanks for the opportunity to serve!

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- Courses aligned with the Michigan Curriculum Frameworks and Benchmarks for Science and the DI (Integrated Science Endorsement).

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MSTA Survey 2011 Thanks For Your Participation!

Cheryl Hach (MSTA Executive Editor) and Robby Cramer (MSTA Executive Director)

Several months ago SAMPI surveyed members about their impressions of MSTA as a professional organization and needs for professional development. The results were released to the board last month and include information that will help us continue to provide the highest level of value to our members. Some highlights of the data follow.

Did you know:

- that fewer than 20 percent of the respondents are young teachers (ages 20-30), having less than five years experience?
- that more than 30 percent of you report that you co-teach?
- that more than five percent are definitely interested in leadership opportunities within MSTA and another 20 percent are interested, but need more information?
- that an overwhelming majority (over 80 percent) value the conference (...no surprise there), but over 60 percent report that they value our MSTA publications! Thanks for the pat on the back!!

Many of you reported that you value the professional development you receive from MSTA. Your responses will make it easier for us to continue to provide the services you have come to expect. Some of the areas cited for specific sessions include:

- new ways to collaborate across disciplines and grade levels
- strategies that will foster success in diverse learning populations
- methods of instruction that challenge students to be more metacognitive
- plans that use real world strategies to stimulate learning

You identified a need for sessions that target uses of technology in classroom settings. Look for a technology strand at the upcoming conference as we hope to be able to provide assistance for teachers wanting to podcast in their classrooms and post them online as well as use handheld devices to deliver instruction. We will also try to feature some sessions that use simulation software to challenge students in new ways.

Again, we continue to work hard to be the “go to” place for science instruction in Michigan. Thanks for your continued support of your professional organization!

Presidential Awards for Excellence in Mathematics and Science Teaching



Do you know or are you an exemplary math or science teacher in **kindergarten through sixth grade**? Please consider nominating him/her/them for the PAEMST Awards. The Presidential Award for Excellence in Mathematics and Science Teaching is the highest recognition a K-12 teacher can receive for outstanding science or mathematics teaching in the United States.

Why apply? Recipients of the award receive the following:

- A certificate signed by the President of the United States.
- A paid trip for two to Washington, D.C., to attend a series of recognition events and professional development opportunities.
- A \$10,000 award from the National Science Foundation.

In addition to recognizing outstanding teaching in mathematics or science, the program provides teachers with an opportunity to build lasting partnerships with colleagues across the nation. This growing network of award-winning teachers serves as a vital resource for improving science, technology, engineering, and mathematics education and keeping America globally competitive.

Awardees are recognized for their contributions to teaching and learning and their ability to help students make progress in mathematics and science. In addition to honoring individual achievement, the goal of the award program is to exemplify the highest standards of mathematics and science teaching. Since the program's inception in 1983, more than 4000 outstanding teachers have been recognized for their contributions to mathematics and science education. If you know great teachers, nominate them to join this prestigious network of professionals.

Nominations are now being accepted online (www.paemst.org) for the 2012 Presidential Awards for Excellence in Mathematics and Science Teaching. Teachers may nominate themselves or someone else (e.g., principals, teachers, parents, or other members of the general public) may nominate them for this award. **The PAEMST Online Application is now available.** To apply, teachers must first be nominated for the award. Once nominated, teachers will receive an email with a login and password to access the online application. The application deadline for K-6 teachers (Grades kindergarten through sixth) is May 1, 2012. Secondary teachers (Grades 7-12) are eligible to apply in 2013.

The Michigan Department of Education has asked the Michigan Science Teachers Association to oversee this program for the State of Michigan. We are honored to be the host of this awards program. If you have any questions, please feel free to contact, Betty Crowder, our State Coordinator, at betty_crowder@msta-mich.org. In the meantime, please visit the Presidential Awards website to find the nomination form for the teacher of your choice! Why not you? (www.paemst.org) The rewards are worth the effort! You deserve it!

President's Letter - *continued from front page*

STEM, it asks kids to utilize technology, analyze engineering concepts and designs, and evaluate data for conclusions. Engaging students in meaningful science inquiry is not just about content expectations or MEAP/MME testing. It is about authentic learning and the application of other core disciplines. Nowhere in K-12 education are STEM concepts so well integrated as in the science classroom.

It really doesn't even need to stop there. When students are active in authentic science activities, they integrate literacy, elements of art, career awareness and issues of societal concern. A rich science inquiry lesson might require students to conduct internet research, evaluate data, apply mathematical formulas, engage in substantive conversation, design and engineer lab procedures, make adjustments and re-engineer lab set-ups, utilize technology to collect and analyze new data, draw conclusions, and write and respond to questions about those conclusions. No other subject can offer this complete and authentic an approach to so many differing fields and subjects. It truly makes science special, but only if we allow ourselves to move learning outside the traditional confines of textbooks and lecture. It is special only if we allow students to engage in authentic and meaningful science projects and activities.

A focus on STEM education is what is hot right now and I hope it stays that way for quite a while. I know that much of the interest is centered on issues of competitiveness in a global economy and I agree with that emphasis. However, I also know that this is a perfect opportunity for science teachers to grab on to this movement and redefine what a quality science education experience looks and feels like in our classrooms. After all, we may call ourselves science teachers, but when we are at our best, aren't we really providing opportunities for students to interconnect with all of the elements of STEM?

Accept the Biology Challenge: Become part of the USA Biology Olympiad

The USA Biology Olympiad (USABO) is the premiere US biology competition for high school students. After two rounds of challenging exams, 20 students are invited to a residential training program at Purdue University where they experience labs and lectures with advanced biological concepts and exacting lab skills. The top four students go on to represent the USA at the International Biology Olympiad (IBO) in Singapore July 8 to 15, 2012. Online registration opens October 24, 2011 at <http://www.usabo-trc.org>. For more information on how your students may participate in the USABO, please contact Kathy Frame at kframe@cee.org. See us on facebook.



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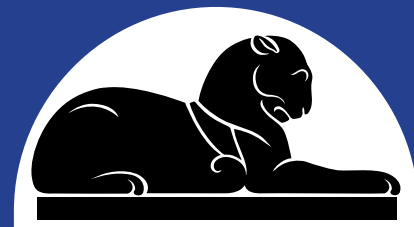
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The Great Lakes Bowl Regional Competition of the National Ocean Sciences Bowl (NOSB)



Hello MSTA members! I hope the school year has started off well for all of you!

The Great Lakes Bowl regional competition of the National Ocean Sciences Bowl (NOSB) will take place February 4, 2012 at the School of Natural Resources and Environment (SNRE) on the University of Michigan's central campus. The National Ocean Sciences Bowl tests student knowledge about marine and freshwater science, policy, and economic issues.

The Great Lakes Bowl is based out of Ann Arbor, and is one of the 25 competing regions from around the country that also participates in the finals competition at a new location every year. (The 2012 finals competition will take place sometime in late April in Baltimore, MD. Exact dates will be given once decided.)

If you have never competed in the NOSB, **please take a look at our no-cost program** on our regional site: <http://www.glerl.noaa.gov/pr/nosb/cur/>, which includes a hotel stay, food, give-aways, and information on college programs. Also check out the national site: <http://www.nosb.org/>, and, in particular, **how to prepare for a competition:**

<http://www.nosb.org/teams/form-a-team/>

<http://www.nosb.org/teams/7-tips-to-forming-a-successful-nosb-team-tip-1/>

<http://www.nosb.org/teams/study-resources/>

<http://www.nosb.org/teams/sample-questions/>

<http://www.nosb.org/competitions-2/competition-rules/>

Please seriously consider bringing a team to Ann Arbor and the University of Michigan campus. Teams consist of 5 students (4 members, 1 alternate) and the coach (and sometimes assistant coach). With our venue and bracket set-up, **the Great Lakes Bowl can accept up to 16 teams. Team slots will be filled on a first-come, first-serve basis.**

If you cannot attend, please recommend other teachers or schools that might be good contenders for this competition venue.

Again, the 2012 competition will be held on February 4. More details about the agenda will be coming in the following months.

The Cooperative Institute for Limnology and Ecosystems Research (CILER), SNRE, Michigan Sea Grant, and NOAA's Great Lakes Environmental Research Lab will co-host the event. In the past, other local sponsors, donors and volunteers have included the Michigan Technological Research Institute, the USGS-Great Lakes Science Center, the Great Lakes Fishery Commission, Barry Bagels, Chipotle, and Domino's Pizza.

The winning team of the regional competition will enjoy an all-expense paid trip to the national competition.

The NOSB theme for this year is: "A Sea of Change: Development and Evolution," which includes not only biological evolution, but also the adaptations of humans to a changing ocean.

To register for the Great Lakes Bowl, please contact the Great Lakes Bowl Regional Coordinator: sanderdr@umich.edu as soon as possible. Registration forms are due by December 2, 2011. This deadline is also posted on our regional website.

Also, check out the NOSB website regarding the "Living on the Ocean Planet" video contest. Students that enter do NOT have to be bowl participants. Student teams highlight their view of biological evolution, but also the adaptations of humans to a changing ocean, which is based on this year's theme. Also, bowl participants are eligible for scholarships through NOSB. Check out the "Careers and Scholarships" tab on the national website for information on the National Ocean Scholar Program: <http://www.nosb.org/ocean-careers/national-ocean-scholar-program/>

From the President's Desk - *continued from front page*

mathematics. Science is the critical cornerstone of the STEM movement. Good science teaching and learning integrates all of the elements of STEM, it asks kids to utilize technology, analyze engineering concepts and designs, and evaluate data for conclusions. Engaging students in meaningful science inquiry is not just about content expectations or MEAP/MME testing. It is about authentic learning and the application of other core disciplines. Nowhere in K-12 education are STEM concepts so well integrated as in the science classroom.

It really doesn't even need to stop there. When students are active in authentic science activities, they integrate literacy, elements of art, career awareness and issues of societal concern. A rich science inquiry lesson might require students to conduct internet research, evaluate data, apply mathematical formulas, engage in substantive conversation, design and engineer lab procedures, make adjustments and re-engineer lab set-ups, utilize technology to collect and analyze new data, draw conclusions, and write and respond to questions about those conclusions. No other subject can offer this complete and authentic an approach to so many differing fields and subjects. It truly makes science special, but only if we allow ourselves to move learning outside the traditional confines of textbooks and lecture. It is special only if we allow students to engage in authentic and meaningful science projects and activities.

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National Ocean Sciences Bowl

◆ Great Lakes Bowl ◆



What is it?

The National Ocean Sciences Bowl is a nationwide academic competition among teams of high school students. Regional competitions are held around the U.S. in February and March with the final national competition held in April.

The NOSB will test students' math and science skills as applied to topics on ocean (and Great Lakes) biology, chemistry, geology, physics, technology, history, and economics. Information about NOSB is available online to help students and teachers prepare for the competition: <http://www.nosb.org/>. You can also visit the Great Lakes Environmental Research Laboratory's NOSB web pages at <http://www.glerl.noaa.gov/pr/nosb/cur/>.

When / Where will it be held?

The Great Lakes Bowl of the NOSB will be held on **February 4, 2012** at the University of Michigan in Ann Arbor, Michigan.

Who competes?

High school teams of four students, one alternate, and a coach will compete in question and answer matches during the day-long competition. The competition format will be a 6 minute buzzer round, 2 team challenge questions, and another 6 minute buzzer round. The Team Challenge Questions require analysis of data presented and synthesis of several scientific and mathematical concepts. The students work as a team, and each team has the opportunity to win 20 points.

What are the prizes?

The Great Lakes Bowl will award cash prizes, trophies, medals, and other prizes to top-finishers. The overall winning team of the regional competition wins a paid trip to compete in the National Ocean Sciences Bowl finals. Top prizes for the winning team of the finals competition has included cruises on oceanographic research vessels, visits to oceanographic research laboratories, computer hardware/software for the winning team's school, scientific equipment and laboratory supplies, scholarships, endowments, t-shirts, trophies, and medals.

How do I enter?

The Great Lakes Bowl will be limited to 16 teams. Team entry in the event will be approved on a first-come first-served basis. Teams must complete and submit all required forms to be approved for entry into the event. Entry forms will be accepted through

December 2, 2011.

Registration forms can be obtained from the Regional Coordinator:

Sander Robinson, Cooperative Institute for
Limnology and Ecosystems Research
4840 S. State Rd.
Ann Arbor, MI 48108
TEL: 734-741-2172 ~ FAX: 734-741-2055
sander.robinson@noaa.gov or sanderdr@umich.edu



Schools that competed in the 2011 Great Lakes Bowl

- Berkley High School, Berkley, MI (2 teams)
- Center for Advanced Studies, Oak Park, MI
- Dexter High School, Dexter, MI (2 teams)
Team 1 (1st Place), Team 2 (2nd Place)
- Greenhills High School, Ann Arbor, MI (2 teams)
- Jeffers High School, Painesdale, MI (Quagga Mussel Award)
- International Academy West, White Lake, MI
- Lake Orion High School, Lake Orion, MI (3rd Place)
- Okemos High School, Okemos, MI (3 teams)
Team 1 (Sportsmanship Award)
- Milan High School, Milan, MI
- Sault Area High School, Sault Ste. Marie, MI (4th Place)
- Standish-Sterling High School, Standish, MI

“The National Ocean Sciences Bowl provides a unique opportunity to help promote literacy in science and mathematics through gaining a fundamental understanding of our greatest natural resource, the world’s oceans.

This educational project will also, for the first time, begin to forge a stronger link between the oceanographic research institutions and their neighboring communities of K-12 teachers and students.”

*ADM James D. Watkins,
U.S. Navy, Retired*

Who hosts/coordinates it?

Regional Hosts

- NOAA, Great Lakes Environmental Research Laboratory (GLERL)
- Cooperative Institute for Limnology & Ecosystems Research (CILER)
- Michigan Sea Grant

Regional Sponsors

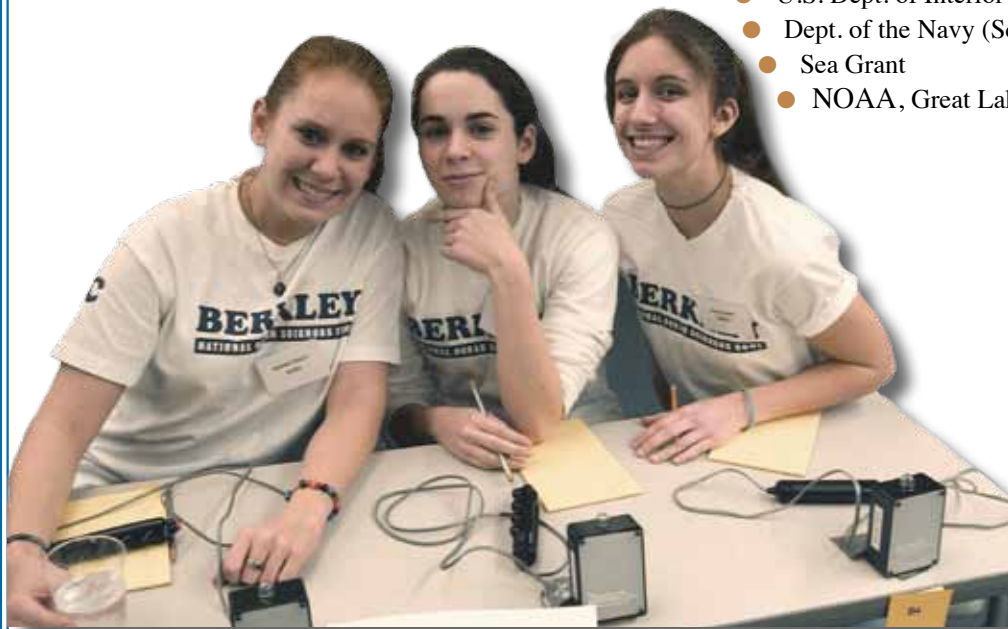
- NOAA, Great Lakes Environmental Research Laboratory (GLERL)
- Cooperative Institute for Limnology & Ecosystems Research (CILER)
- Michigan Sea Grant
- University of Michigan, School of Natural Resources and Environment
- USGS, Great Lakes Science Center
- Great Lakes Fishery Commission
- Michigan Tech Research Institute
- Barry Bagels
- Dominos Pizza
- Chipotle

National Hosts/Coordinators

- Consortium for Ocean Leadership
- National Marine Educators Association (NMEA)

National Sponsors

- National Oceanographic Partnership Program
- National Oceanic and Atmospheric Administration (NOAA)
- National Science Foundation (NSF)
- NASA
- U.S. Geological Survey (USGS)
- Oceanographer of the Navy
- U.S. Dept. of Interior
- Dept. of the Navy (Science and Technology)
- Sea Grant
- NOAA, Great Lakes Environmental Research Lab



BOB and FLO Go To Middle School (A Student Water Initiative in Michigan)

By Alexandra Beels, MSU Education Student, MSTA Member

Michigan is most commonly known as “The Great Lake State”, a nickname that refers to the fact that the shores of Michigan meet four of the five Great Lakes: Superior, Michigan, Huron, and Erie. Throughout Michigan there are more than 11,000 inland lakes, and any one of these lakes is never more than six miles from another inland lake or more than 85 miles from one of the Great Lakes.

It is a privilege to live in a state where one of the most dynamic, evolving Earth systems operates and it is critical that education emphasizes the importance of maintaining water resources. There are several issues of water quality, preservation, pollution, etc... that are not well understood by many, including students.

As a MSU student in the College of Education, I’m working with June Teisan, a teacher at Harper Woods Middle School and Michigan’s 2008 Teacher of the Year, on a place-based water quality initiative with her 7th graders. Funded by a TAPESTRY grant, this project involves bringing BOB “Basic Observation Buoy” into her classroom. BOB is a floating buoy platform that has the ability to carry sensors that measure and collect temperature, pH, and conductivity data. A different version of BOB is a FLO- “Fixed Local Observation” platform. The BOB and FLO systems were created by a researcher at NOAA, the National Oceanic and Atmospheric Agency. The BOB and FLO systems have been successfully implemented in marine studies by schools on the Atlantic Coast. However, they have not been installed in our fresh waters. Teisan’s grant has the opportunity to expand research outside of marine waters and explore our nation’s largest freshwater preserve.

Throughout the month of October, BOBs will be placed at two different shores of Lake Erie. On the eastern shore of Lake Erie, a middle school colleague in Buffalo will deploy a BOB system with her 7th grade students, while on Erie’s western shore, the Harper Woods students will launch a BOB at Erie Metropark. This will allow the students of Teisan’s classroom to collaborate with the students in the other 7th grade classes and compare data.

With grant funds, Teisan was able to purchase Pasco Xplorer GLX Dataloggers. Different sensors will be attached to the Dataloggers; these sensors include a water quality sensor and two temperature sensors. The water quality sensor has the capability of measuring pH, conductivity, dissolved oxygen and temperature. For the

month of October measurements of pH, conductivity, and three different temperature readings will be collected. These temperatures include: air temperature, surface temperature of the water, and the temperature at the water’s depth where the BOB is located. BOB will be placed in an area where the water is no deeper than 3 feet and is out of reach from shore to ensure no disturbances. The GLX dataloggers are set up to grab data every hour for 6 days. At the end of the six days, the Harper Woods Student Water Initiative in Michigan Team (HW SWliM Team) will collect the data.



It is our goal to offer rigorous, authentic science for students, and Mrs. Teisan works to create programs and secure the funds for unique STEM experiences. The HW SWliM Team will provide guidance to young student-scientists, providing a greater understanding of lake and watershed observations as well as numerical data. The main objective of this project is not only to get students excited about science, but also to give them a deeper appreciation for our lakes. By the end of the program, it is our hope that they will have a sense of empowerment based on a belief that they can investigate science issues and that their knowledge can make a difference in the world. Thanks to this project, we are literally bringing the watershed into the classroom!



Dr. Armstrong-Hall, Larson Middle School , Troy, MI



Formula Science Writing:

There are many types of formats for writing in science. As the school year proceeds I will to include some of the most common formulas for you.

Make sure you designate which type of hypothesis you are talking about;

- Directed Hypothesis, where there is a prediction (you can have multiple directed hypotheses)
- Null Hypothesis, where there is no prediction, because you are saying there will be no difference.

Abstract Format:

Problem: State the problem you are trying to test.

Hypothesis: State your prediction in a complete sentence. Include the problem.

Methods: Put into paragraph form the following information:

1. Where are you going to do your experiment?
2. What are you going to do?
3. How are you going to present your data (table, line graph, etc.)?
4. How long will the experiment last and how many times will you repeat it?
5. What are you measuring?

You must have three references, only one from the Internet.

Talking to Someone: Dr. Armstrong-Hall, Science Teacher (in communication) May 3, 2011

Writing to Someone: Barack Obama, President (in written communication) May 3, 2011

Books: Go to Write Source 2000 to get complete reference guides for books and encyclopedias

Net Reference: www.minerals.com; Keywords: gold, silver

Writing a Conclusion: (in paragraph form)

First, state if your hypothesis was supported or not supported.

Then, state the hypothesis you originally supported.

Present your data (this usually means some sort of concrete numbers) and state which hypothesis was supported.

Talk about the significance level of your data, not all support is the same; some are weak while other support is strong.

Restate the hypothesis that was supported. Copyright @ 2011 J. G. Armstrong-Hall



brain bēe at michigan state university



register at www.brainbeemsu.com

brainbeemsu@gmail.com for questions

What is the Brain Bee?

The Brain Bee at MSU is an exciting, live Q & A competition that challenges high school students on their knowledge of neuroscience facts. Topics covered include: intelligence, memory, emotions, sensations, movement, stress, aging, sleep, addiction, Alzheimer's, and stroke.

Who Can Participate?

All high school students are invited to participate. The competition, coaching sessions and laboratory experiences are free to all participants.

How Do I Prepare?

- Read *Brain Facts*, free on our website
- Come to our weekly coaching sessions and learn from neuroscientists
- Participate in exciting laboratory experiences

Prizes

First Place

All-expenses-paid trip for two to the National Brain Bee in Baltimore, Maryland

Paid summer fellowship to work in the laboratory of an MSU Neuroscientist

Purves' *Neuroscience*, a medical school textbook

Second and Third Place

winners will be awarded a cash prize of \$200 and \$100

All Participants

will receive a certificate of completion and t-shirt

brain bēe at
michigan state university

Happenings at the Michigan Assessment Consortium

By Rochelle Rubin, MSTA Curriculum Chairperson



As a founding member of the Michigan Assessment Consortium Board, representing MSTA, I attended the 4th Annual MAC Retreat. Our weekend began by revisiting the MAC Mission and Vision (see below) analyzing both evidence of progress and focus areas that need attention this coming year.

For example, the Professional Development Committee of the MAC has amassed an impressive body of work.

- Over 2000 coaches have been trained in Formative Assessment Literacy through the FAME initiative (Formative Assessment for Michigan Educators) over the past 4 years. Each learning team was provided professional development as well as support materials and resources to deepen their understanding of the formative assessment process. Materials on topics such as feedback for learning, self-assessment, and using assessment to adjust instruction, were provided. Teams received continued support as they began to apply what they learned with fellow educators in their home regions and districts.
- Three additional professional development video conferences were sponsored by MAC this past school year. These include the following:
 - “Engaging Students as Assessors” with Dr. Tammy Heflebower, Marzano Research Laboratory
 - “Everything School Leaders Need To Know About Assessment,” with Dr. Jim Popham, Professor Emeritus, UCLA
 - “Engaging Teachers in Formative Assessment Practices to Improve Learning,” Ms. Sara Bryant, Measured Progress.These, along with copies of past programs, are available for use in schools or districts. The programs, along with accompanying discussion guides, can serve as an excellent basis for professional development on formative-assessment practices. Sessions include a reflection journal with bibliography to assist in local PD efforts. These sessions can be viewed in the archive for up to a year at <http://www.mistreamnet.com>. A DVD of each of these sessions can also be purchased for \$10 plus \$4 shipping from Brenda Hose at hoseb@resa.net.
- 24 modules describing how to build high quality common assessment have been written, piloted and revised through the collaborative effort of seven ISD’s and a University. Look for “Building and Using Common Assessments” at MISStreamNet.com (Video on Demand - Assessments) These modules explain the major steps in the assessment development process. Each has a script and accompanying PowerPoint. Several modules also include handouts, worksheets, and/or software templates for use by local educators.

During the retreat, board committees set additional ambitious goals, targeted at its mission, for the coming school year. One of the key goals is to continue to encourage collaboration with and among professional organizations, including MSTA.

Mission

The mission of the Michigan Assessment Consortium is to improve student learning and achievement through a system of coherent curriculum, balanced assessment and effective instruction. We do this by collaboratively:

- Promoting assessment knowledge and practice.
- Providing professional development.
- Producing and sharing assessment tools and products.

Vision for Michigan Educators includes the following...

Formative assessment and a balanced assessment system are valued components of Michigan education.

All Michigan educators understand and implement a system of coherent curriculum, balanced assessment and effective instruction.

A network of assessment coaches and partners, function effectively, to support the implementation of sound, balanced assessment practices.

All teachers and administrators graduating from Michigan institutions of higher education are adequately prepared in formative assessment practices and balanced assessment systems.

Michigan educational entities (e.g. districts, ISDs, educational organizations, universities, etc.) actively seek to collaborate with other entities on the development of assessment products and services.

Information on assessment products and services is readily available, in an organized manner, to Michigan educators.

You can learn more about the MAC by visiting the website: <http://michiganassessmentconsortium.org/>

MSTA Mini-Grant Application



The Michigan Science Teachers Association announces a \$1000.00 mini-grant for its current MSTA members.

- Up to 4 awards of \$1000.00 each will be given to current MSTA members.
- The grant deadline is May 11, 2012
- As part of the Grant process, award winners are required to write a narrative of their project to be published in the MSTA Newsletter or Journal.
- Award winners will be notified by September, 2012.
- Projects MUST be completed by June 8, 2013.
- Grant money is released upon demonstration of expenses.
- A final report must be submitted that includes evaluation of outcomes.

Grant Narrative:

- Begin with a summary of your project. (Maximum one page).
- Describe how this project relates to the MSTA mission statement, (“...to stimulate, support, and provide leadership for the improvement of science education throughout Michigan.”) the Michigan Curriculum Framework and authentic assessment in Science. (Maximum one page).
- Purpose of Grant: Give your statement of needs or problem to be addressed. Describe the target audience and how they will benefit. (Maximum one page).
- Describe the Project: Include a description of project goals, expected outcomes and how they will be evaluated. Indicate timelines when appropriate. (Maximum one page).
- Budget Details: Describe costs involved with the project. Give complete item descriptions and costs of purchases to be made. Indicate in-kind support.
- Payment: Winners will receive \$900 of the \$1,000 grant up front. Winners MUST submit an article for publication in one of MSTA’s 4 Newsletters or 2 Journals. The last publication is the May Newsletter and is the final publication with which an article must be submitted. Once the article and receipts of expenses has been received, the final \$100 will be paid to winner(s). Request for payment of the \$100 must be received no later than June 8, 2013.

Name: _____

Home Address: _____

City: _____ State: _____ Zip: _____

Phone Number: _____ Email Address: _____

School District: _____ School Name: _____

School Address: _____

City: _____ State: _____ Zip: _____

Position/Title: _____ Grade Level(s): _____

Completed application MUST be postmarked by May 11, 2012.

Mail to: Mr. Thomas P. Waclawski, 5975 Donna Court, Traverse City, MI 49684,

Phone: 231-943-4804, Email: ka8ylktom@chartermi.net



Making Thinking Visible: Using Whiteboards in the Chemistry Classroom

One of the most fascinating aspects of student learning is the way in which information is processed in a student's mind. Teachers, and students alike, cannot fully appreciate how a student ascertains a set of given facts, a new concept, or solves a problem. This is because thinking takes place 'behind the scenes' in the human brain.

When a student demonstrates that they have learned something, or comprehend an idea, it almost seems magical how the learning took place. It can be as if understanding suddenly *appeared* within a student. Some might call this an "ah-ha!" moment, but in reality understanding does not simply manifest out of thin air. Conceptual understanding, memorization of a string of facts, and recall of information for use in solving a problem are all demonstrations of student learning. Sometimes teachers, who are rushed by curriculum maps and other factors, focus on the ends (the learning) and not the means (how learning took place) Although the learning is in itself important, the process by which learning takes place is far more important.

Essential to improving teaching is an understanding of student learning; similarly, essential to student learning is an understanding of how students themselves perceive and process information. Critical to these understandings is an awareness of how students organize the information in their brain, connecting it through associations with other things they know (Levine, 2002). To reveal the thinking processes that take place in students' brains when they learn or problem solve, thinking must be made visible to thinkers themselves and others as well. Students can develop understanding in their minds much more effectively if the thinking process that leads to understanding is elucidated for them. Teachers and students alike can support novice learners in developing their reasoning abilities by making expert thinking in a subject area visible (Collins, Brown, & Holum, 1991). Thinking can be made visible in a classroom in three ways: when teachers make their thinking visible to students; when students make their thinking visible to other students; and when students make their own thinking visible to themselves.

Each of these modes of making thinking visible help students to develop expert strategies for thinking about subject area content and problem solving within a subject area. Not only will scaffolding students to expert thinking help them to attain conceptual understanding, but making thinking visible will enhance students' critical thinking, metacognition and non-linguistic representations of ideas and processes (Marzano, 2004).

In the chemistry classroom, where abstract concepts abound and algorithmic problem solving processes are ubiquitous, students must be scaffolded and coached to develop expert thinking; otherwise, students are left to their own devices to fend for themselves in attaining an understanding of chemistry. Scientific practice involves the construction, validation and application of scientific models, so science instruction should be designed to engage students in making and using models (Reif, 1995).

When a teacher asks students to "show their work," this is an attempt to peek 'behind the scenes' of student thinking. Showing work does not fully make thinking visible, because it is a one-directional pathway for showing thinking patterns; instead, creating an awareness of the strategies that students are using intuitively can help them call on these strategies more purposefully as well as *develop* these strategies and other metacognitive skills (Darling-Hammond, Low, Rossbach, & Nelson, 2003). Whiteboarding is simply a method of making thinking visible to students and between students. For years, teachers have used chalkboards, paper, dry-erase boards, and interactive whiteboards to make their own thinking visible to students, but rarely are students given a strategic way to make their own thinking visible with their classmates. These whiteboarding techniques facilitate making thinking visible in the chemistry classroom.



Techniques

Board Meeting

- **Description:** Students or student groups form a large circle in which they stand and hold their boards facing the inside of the circle. Each student should be able to see all of the boards "meet" in the circle from where they stand; each student should be part of one continuous circle. Do not allow students to stand outside of the circle. The teacher stands outside of the circle.
- **Key Features:** Students can see all the information on all of the whiteboards easily and quickly; students are all on the "same level" by being in a single continuous circle; students are less likely to try to opt-out of discourse when standing in the circle.
- **Major Functions:** View all boards at once, compare data, generate non-linguistic representations, abstract relationships and patterns, or display problem solving strategies; students interact with entire class

Gallery Walk

- **Description:** The boards are positioned on easels, on a chalkboard ledge, or on top of a table/desk propped against a wall. All boards are displayed like artwork in a gallery. Groups walk around the room to view all the boards; groups draw conclusions or answer questions based on groups' boards. One member of the group that created the board should remain near their board to answer questions.
- **Key Features:** Students can reflect on the content of a whiteboard one at a time; smaller number of students interacting with content at any given time; teacher can interview individual groups in front of a board, observe interactions between board creator and viewers, and teacher can address individuals' understandings or group questions.
- **Major Functions:** View boards one at a time; teacher can perform formative assessment; teacher can remediate as needed or address students' thinking; students can compare different problem solving strategies; students interact with their own group members and board creator.

Floor Display

- **Description:** The boards are laid on the floor adjacent to one another like pieces of a floor puzzle. Students sit in chairs in a single continuous circle around the boards. Students should be able to see all of the boards; but due to difference in board orientation relative to seat position, only some students will be able to easily read some boards. Students should not sit in front of their group's board. Boards should be oriented so the bottom edge of the board is closest to the circle of chairs.
- **Key Features:** Like a *board meeting*, students are all on the same level as part of one large group discussion. Students have the individual responsibility of reporting the information contained on the board directly in front of them to the rest of the class.
- **Major Functions:** View all boards at once, compare data, generate non-linguistic representations, abstract relationships and patterns, or display problem solving strategies; students interact with entire class.

Poster Presentation

- **Description:** Class remains seated while one group at a time goes to the front of the class and shows/presents their board to the class and teacher. Groups hold boards or position them on easels. Simulates poster presentation session that would happen at a professional research conference.
- **Key Features:** Performance assessment centered on each group; students can model their thinking to the rest of the class; teacher can ask questions of one group that may be pertinent to the entire class; students can ask presenters questions about their board; class can take notes based on board content
- **Major Functions:** View boards one at a time; presentation of homework questions; guided practice; formative assessment

Questioning

Types of Questions:

Informational – the questioner seeks knowledge concerning a particular fact, circumstance, or conclusion derived through observation or experimentation:

- What happened?
- What is it?

Interpretive – the questioner seeks to understand the meaning of an observation or a conclusion:

- What do you mean by that?
- What is the significance of that?

Explanatory – the questioner seeks clarification; asks for things to be made understandable:

- What is the reason for that?
- Why does it work that way?

Procedural – the questioner seeks clarification of methods or processes:

- How is/was that done?
- What was done?

Relational – the questioner seeks clarification of the connections between various elements:

- Which is the most important?
- How do these compare or contrast?

Verificational – the questioner attempts to confirm the validity of an observation or procedure:

- What is the reasoning?
- How do you know that?

Heuristic – the questioner attempts to stimulate interest as a means of furthering investigation:

- What would happen if?
- How could we find out?

Evaluational – the questioner attempts to determine the worth of an observation or conclusion:

- What difference does it make?
- So what?

Examples of Good General Questions:

Early in the year, teachers can ask questions to individual students and groups during whiteboard sessions, demonstrating to students how to ask good questions; in later sessions, questioning should be student-led.

- "I heard you say _____; is this what you meant?"
- "How did you know that?"
- "What evidence did you have for _____ (a claim or conclusion)?"
- "Explain to us how you _____"
- "How would your results change if you had _____ (example: changed a variable)?"
- "What led you to select this (approach/model application/way of calculating...)?"
- "Remember when we _____? How is this related to what we saw then?"
- "How do your results compare with Group 6? Can you explain (the difference)?"
- "Does this observation/conclusion support our model? In what way?"
- "Can you explain how that happened in terms of our model?"

Examples of Good Chemistry-Specific Questions:

Questions to ask when helping students think clearly about the structure of matter & chemical change:

- "How have you defined your system?"
- "How are you depicting matter in this situation "
- "Which features of our model apply to this situation?"
- "How does it behave in this situation?"
- "What is the role of energy?"
- "How are your representations related to what you observed?"



Gary G. Abud, Jr., MA
Grosse Pointe North High School
<http://bit.ly/abudsite> | @mr_abud

Resources

- The Harvard Education Visible Thinking Project - <http://bit.ly/visiblethinking>
- Information on Whiteboards - <http://bit.ly/p2MpbP>
- Melamine Sheets (4' x 8') - Available at Home Depot/Lowe's ~\$10-12/sheet & they can cut the sheets
- Where to Buy Pre-Fabricated 24" x 36" Dry-Erase Whiteboards (\$11 ea.) - <http://bit.ly/w2bdeb>
- Carl Wenning's Whiteboarding Article - <http://bit.ly/q9nxLf>
- Arizona State University Modeling Instruction Program in Chemistry - <http://bit.ly/qvqs2m>

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Pure Michigan *Science*

MSTA Registration Form

MSTA 59th Annual Conference - March 8-10, 2012
Lansing Center - Lansing, Michigan



Note: Early Bird Deadline Ends February 14, 2011

Please use ONE FORM for each registrant (photocopy if necessary).
*All confirmations and communications will be done via e-mail. You MUST provide a valid e-mail where this information can be sent.



Registration Information:

Print first and last name here as you wish it to appear on your name badge.

First Name Last Name _____

Full Name of School/Institution/Business Name _____

Preferred Address: Home School Business

Street Address _____

City State Zip _____

County Daytime Phone _____

E-mail* _____

Primary Responsibility:

- School District/Central Administration Lower Elementary (K-2)
 Upper Elementary (3-5) Middle/Junior High School (6-8)
 High School (9-12)

Discipline:

- Biology Chemistry Earth Science Physics
 General Science Other: _____

Payment Information:

No Purchase Orders Accepted! Note: Billing address and name on card has to be *as it appears on the credit card billing statement or card will not be processed.*

- Credit Card: Visa MasterCard Check/Money Order: _____
 Make checks payable to Michigan Science Teachers Association (MSTA)
 (Tax ID# 38-2320469)

Card Number CVV Code* Exp. Date _____
*3 or 4 digit code on back of card

Name on Card _____

Billing Address _____

Billing City/State/Zip _____

Signature Date _____

Member Type:
 Member Non-member Joint Member Institutional Member

MSTA Membership Dues*:	Fee	Total
MSTA New Member	\$45**	\$ ____
MSTA Emeritus (Retired) Membership Renewal	\$30**	\$ ____
MSTA College Student Dues (Full-time Undergrad or Graduate)	\$30**	\$ ____
MSTA Individual Membership Renewal	\$45**	\$ ____
MSTA Family Membership Renewal	\$50**	\$ ____

*By paying MST A Dues you are eligible to pay member rates for conference registration.
 **You may deduct \$10.00 from the Membership fee if you choose NOT to receive Journals via the mail. You will receive an e-mail when Journals and Newsletters are available on-line.

Joint Membership Dues†:	Fee	Total
Joint Membership	\$60†	\$ ____
Joint Institutional Membership	\$175†	\$ ____

†By paying Joint Membership dues you automatically become a member of MST A, MCSS, and MCTM and are eligible to pay member rates for conference registration.

Member Registration Specials:	Fee	Total
<i>All registrations MUST be sent in the same envelope.</i>		
1 Day "Team" Registration Class A&B Schools (Must send at least 5 registrations) - Save \$10 per person!	\$80 x ____	\$ ____
1 Day "Team" Registration Class C&D Schools (Must send at least 3 registrations) - Save \$10 per person!	\$80 x ____	\$ ____
2 Day Registration 1st Year Teacher OR 1st Time Conference Attendee	\$80 x ____	\$ ____



Registration Options:	Fee	Total
Members:		
Registration One Day: <input type="checkbox"/> Friday or <input type="checkbox"/> Saturday (*\$105 after February 14, 2011)	\$65*	\$ ____
Registration Two Day (*\$115 after February 14, 2011)	\$90*	\$ ____
Student** and Emeritus Registration One Day: <input type="checkbox"/> Friday or <input type="checkbox"/> Saturday (*\$45 after February 14, 2011)	\$20*	\$ ____
Student** and Emeritus Registration Two Day: **Must be a FULL time undergrad student. Grad students need to pay regular registration rate. (*\$60 after February 14, 2011)	\$35*	\$ ____
<input type="checkbox"/> Non-teaching Spouse	\$35	\$ ____

Non-Members:		
Registration One Day: <input type="checkbox"/> Friday or <input type="checkbox"/> Saturday (*\$160 after February 14, 2011)	\$125*	\$ ____
Registration Two Day (*\$185 after February 14, 2011)	\$150*	\$ ____
Student* and <input type="checkbox"/> Emeritus Registration One Day: <input type="checkbox"/> Friday or <input type="checkbox"/> Saturday (*\$85 after February 14, 2011)	\$65*	\$ ____
Student* and <input type="checkbox"/> Emeritus Registration Two Day: *Must be a FULL time undergrad student. Grad students need to pay regular registration rate. (*\$100 after February 14, 2011)	\$80*	\$ ____
Non-teaching Spouse	\$35	\$ ____

Other Registration Options:	Fee	Total
Friday Luncheon (11am-1pm)	\$25	\$ ____
SB-CEUs	\$15	\$ ____
Total	Grand Total	\$ ____

For early registration rates, registration and payment MUST be received by February 14, 2011. Submit your registration by mail to: MST A, 1390 Eisenhower Place, Ann Arbor, MI 48108 or FAX to (734) 677-3287 when paying by credit card. On-line registration is also available at the MST A website - www.msta-mich.org. Registrations after February 14th are subject to late registration rates and MUST be done on-site at the conference. Payment must accompany each registration. No refunds will be made after February 10, 2011 (request must be made in writing). Substitutions may be made on or before February 10, 2011. MST A is a professional conference. Attendance for Friday and Saturday is designed for attendees 18 years and older. No children will be allowed to attend (EXCEPT for Friday evening Vendor Open House).

MAKE A TRIBUTE TO MSTA

Has a special science educator touched your life? Do you have fond memories of a special teacher or student? Is a colleague getting ready to retire? Please consider a tax-deductible donation in their honor to support the mission and values of the Michigan Science Teachers Association.

Would you like to express your sympathy to a grieving family? A donation made to the Michigan Science Teachers Association in memory of an educator or family member would be a lasting and valued tribute that will link the past to the future.

A tax-deductible donation (minimum of \$10) may be made to MSTA by printing and completing the form below. The honoree or family member of the deceased will receive notification of your gift.

MAKE A TRIBUTE TO MSTA

I would like to make the following donation to the Michigan Science Teachers Association:

IN MEMORY OF: _____

IN HONOR OF: _____

Birthday Anniversary Speedy Recovery Retirement Appreciation

Other: _____

Amount of Contribution Enclosed: _____
(Please make checks payable to MSTA)

Here is a list of funds to which contributions may be made:

- Mini-grant Fund – Support special member projects
- Outstanding Teacher Awards – Grant monies for awardees
- Membership Fund – To sponsor new members
- Conference Stipend Fund – To sponsor conference attendees
- MSTA Board Discretionary Fund

Fund to which you would like contribution made: _____

SEND ACKNOWLEDGEMENT TO:

Name: _____

Address: _____

Donor's Name: _____

Address: _____

Please send to: MSTA Office, 1390 Eisenhower Place, Ann Arbor, MI 48108.

Dan Wolz Clean Water Education Grant

The Michigan Water Environment Association (MWEA) is pleased to announce the "Dan Wolz Clean Water Education Grant" for this year. The Dan Wolz Clean Water Education Grant was established five years ago to heighten public awareness of the career opportunities our industry has to offer and to improve the quality and quantity of Clean Water community education in Michigan's public schools. Dan Wolz was a true environmental steward of the earth. Thus, in recognition of the passion Dan had for education, this award continues to reach hundreds of Michigan students.



The MWEA partners with the Michigan Science Teachers Association to identify those teachers who have a great program and are in need of financial assistance to execute a project within a curriculum focused on water environment issues.

As grant recipients, each teacher will be provided with:

- Complimentary conference registration and one night stay in a hotel for both the MSTA Annual Conference (to accept the award in the year given and to attend/present at the following year's conference).
- Your school employer's cost for substitute pay will be covered both years.
- Complimentary conference registration and one night stay in a hotel for attendance at the Michigan Water Environment Association's Annual Conference, the year following award. Mileage for travel to this conference is reimbursed.
- \$1000.00 cash award for purchase of classroom and project supplies.

Following the use of the Dan Wolz Education Funds and implementation of classroom projects the following school year, the recipient is expected to:

- Give a 30-40 minute presentation as a featured speaker at the MSTA Annual Conference.
- Give a 15-20 minute presentation at the MWEA Annual Conference.
- Write an article for both the MSTA newsletter and the MWEA magazine describing your experiences implementing the classroom project.

Grant applications are published in the fall issue of the MSTA newsletter, with a January 31, 2012 submittal deadline. Determination of the award recipient will be made by the end of the first week in February. The award is presented at the MSTA conference in March 2012 at the awards banquet. This award will be given to a middle/high school MSTA science teacher.

Process and Procedures for Applying:

1. The Dan Wolz Clean Water Education Grant application is available in this newsletter.
2. Submit the application by January 31, 2012. Email or fax the award application to Robby Cramer
Email: robby_cramer@msta-mich.org
Fax: 616 726 6348
3. The MSTA Awards Committee and MWEA will make determination jointly.
4. Determination of the award winner will be made by end of the informing them of the selection decision. Applications can be considered for at least two years.
5. The Award recipient will be announced at the MSTA Conference at the awards banquet in March 2012.

Expectations of the award recipient:

- Be available to accept this award at the MSTA State Conference Award's Banquet March 2012
- Attend the MWEA state conference in June, 2012
- Write an article for both the MSTA and MWEA newsletters
- Give presentations at both the MWEA and MSTA state conferences in 2013

Past Recipients of the Dan Wolz Education Grant:

- 2007 - Mary Lindow, Battle Creek
- 2008 - Emily Curry, Jackson Public Schools
- 2009 - John Martin, Waterford School District
 - Randy Cook, TriCounty Schools
- 2010 - Gary Cousino, Rochester Community Schools
 - Douglas Morrison, Manistique Middle School
- 2011 - Susan Tate, Whitehall Middle School

Need more Information?

- For more information about the award go to:
<http://www.mi-wea.org/danwolz.asp>
- For more details regarding the grant itself, contact MJ Robinson at 616-261-3552.
- For more information about the Michigan Water Environment Association go to <http://www.mi-wea.org/main.asp>

Dan Wolz Clean Water Education Grant Application

The mission of the Michigan Water Environment Association:

The Michigan Water Environment Association will be a recognized authority on and advocate for preserving, restoring, and enhancing Michigan's water resources

Grant Narrative:

- Describe your project and share how this project relates to your curriculum and teaching practice with students and or science teachers (Maximum one page.)
- Purpose of Grant: Give your statement of how you can share with others in your community as well as other educators in the state of Michigan what you have implemented with your students. (Maximum one page.)
- Provide a summary of why you are interested in Michigan's water resources Identify the locations and contact information for the nearest water treatment plant(s) in the school district where you teach. Do these facilities offer tours? (Maximum one page.)
- Rubric used in the selection process will be available on the MSTA web site <http://www.msta-mich.org/>



Contact Information:

Name: _____

Home Address: _____

City: _____ State: ____ Zip: _____

Phone Number: _____ Email Address: _____

School District: _____

School Name: _____

School Address: _____

City: _____ State: ____ Zip: _____

Position/Title: _____ Grade Level (s): _____

Completed Applications must be received by Robby Cramer by January 13, 2012.
Email to: Robby Cramer: robby_cramer@msta-mich.org or Fax to Robby Cramer at 616-726-6348

Dan Wolz Clean Water Education Grant Rubric

Criteria	Unsatisfactory (0 - 9 points)	Basic (10 - 14 points)	Average (15 - 19 points)	Above Average (20 - 25 points)	Distinguished (26 - 30 points)
Project Description	Project not clearly defined	Project description is marginal.	Adequate project description.	Proficient project description.	Superior description of project
Dissemination Plan	Does not articulate a dissemination plan	Marginal evidence of dissemination plan	Adequate evidence of dissemination plan	Proficient evidence of dissemination plan	Detailed dissemination Plan
Links to Grant Goals and Results	Application does not have a link to the stated goal and intended results of the grant	Poor attempt to link to the goal and intended results of grant	Adequate attempt to link to the stated goal or intended results of the grant.	Application is linked to the stated goal and intended results of grant.	Distinguished link to the stated goal and intended results of grant.
Sustainability	No evidence of sustainability	Marginal evidence of sustainability	Adequate evidence of sustainability	Evidence of sustainability is proficient	Details evidence of Sustainability
Connection to GLCES and/or HSCES	No Connection to GLCES and/or HSCES	Marginal reference to GLCES and/or HSCES	Adequate reference to GLCES and/or HSCES	Reference to GLCES and/or HSCES is proficient.	Detailed connection to GLCES and/or HSCES

The goal is to enable Michigan teachers to be aware and promote careers in water environment, water quality, and wastewater management not only to their students but also to the science community.

The results we are seeking would be students throughout Michigan who will have a much greater awareness and appreciation of the contribution this great industry makes to our society and maybe even become inspired to choose a career path that would make them a part of that contribution.