

MSTA Newsletter



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From the President's Desk

By Jen Arnsward, MSTA President

I had the privilege of facilitating the 2016 MSTA Board Retreat in April. At the retreat we had an opportunity to reflect on the past year and plan for the future of MSTA. I am proud to report that the MSTA Conference was well attended. Feedback from attendees was reviewed and we will be making adjustments for next year's conference. A big thank you to everyone that presented and volunteered at the conference!

Later at the retreat committees were asked to create goals based on the MSTA mission, vision, and values for the 2016-2017 school year. Each committee created actions plans to:

- Organize MSTA Presents sessions around the state to support the new Michigan Science Standards.
- Continue providing members information through social media.
- Analyze data from the 2016 conference to plan strands and professional development institutes at the 2017 MSTA conference in Novi.
- Improve the MSTA website to support teachers with the transition to the new Michigan Science Standards.
- Utilize technology to enhance the MSTA newsletter and journal.

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From The Desk of Your Executive Director

From Robby Cramer, MSTA Executive Director

On March 3-5, 2016 over two thousand science educators gathered in Lansing for the 63rd state science conference. There were over 320 professional development opportunities focused on the new *Michigan Science Standards* and its implementation. The preconference offered a variety of workshops on the implementation and instructional strategies for science leaders and building administrators. Friday and Saturday sessions focused on how to begin implementing the new science standards in Michigan. Michigan educators across our state shared ideas with teachers, pre-service teachers, science leaders, and administrators.

This year the conference committee used strands to help organize sessions. This strategy enabled MSTA members to explore a big idea or concept. For example, the MSTA Regional Directors developed a block for elementary teachers. This strand included sessions on topics such as blending science and social studies lessons, writing in science, and current science trade books for informational reading. The MSTA 2017 conference committee has decided to continue the practice of strands for the 64th State Science Conference March 24 and 25, 2017.

The MSTA Mini-Grant Applications are being accepted! The deadline is June 27, 2016. Two grants will be awarded to teachers for resources to support innovative ideas. Consider applying for these \$1000.00 grants for that unique MSS project for your classroom!

At the MSTA Board Retreat in April the Board of Directors spent time thinking about the events of last year and how we need to move our organization forward to continue to fulfill our mission. Our mission statement helps us to keep in mind our role and our focus.

The mission of the MSTA is to stimulate, support and provide leadership for the improvement of science education throughout Michigan.

Our Board of Directors discussed how we can effectively serve our members and their needs as we move forward with the implementation of the Michigan Science Standards across our state.

Stephen Best from the Michigan Department of Education shared that currently MDE has a focus on Early Literacy in Science. MSTA was asked to share additional needs with MDE.

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From the President's Desk

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In addition to creating goals we had the opportunity welcome new MSTA board members.

April Holman, Central Montcalm High School -
Director at Large

Linda Bradlin, Benjamin Carson High School -
Regional Director 3

Terry Grabill, Fremont Middle School -
Regional Director 7

Larry Kolopajlo, EMU -
Special Education Director

I am very excited to be your president and look forward to enhancing benefits for MSTA members. As we move through the next school year I hope to share with you how we are progressing toward our goals.

Don't forget to save the date, March 24th & 25th for the 2017 Conference in Novi!

From the Executive Director

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MSTA board members spent time brainstorming the needs of our membership moving forward with the MSS implementation in districts across our state. We would like to gather more input from our members. Please contact your regional director, our new President Jen Arnsward (arnswald.jen@gmail.com) or Executive Director Robby Cramer (robby_cramer@msta-mich.org) with suggestions.

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The NRC Framework: An Important Resource Not to be Overlooked in the Transition to the Michigan Science Standards

By Holly McGoran, Jenison Public School science teacher & STEM instructional specialist, MSTA Curriculum Director

Throughout the transition process to the newly adopted Michigan Science Standards, I have found myself pulling out one resource over and over. This resource was one that I first read in 2013, but at that time, I hadn't fully recognized the role its contents would eventually play in science classrooms around the state. Now, I have come to the realization that the book I was fascinated by a few years ago has become the focus of the next generation of science teaching and learning. Which book, you ask? The National Research Council's *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*. The purpose of this article is to provide an overview of the Framework and demonstrate what a valuable resource this truly is as we transition to the Michigan Science Standards.

Many science teachers in Michigan know that our new *Michigan K-12 Science Standards* (https://www.michigan.gov/documents/mde/K-12_Science_Performance_Expectations_v5_496901_7.pdf) are based on the *Next Generation Science Standards* (NGSS). However, what many don't realize is that the *Framework* served as the basis for the creation of the NGSS. During the public comment meetings held before adoption of the new Michigan Standards, many people asked, "Where is the research showing that NGSS works?" That research is cited in the *Framework*, along with thorough descriptions of all three dimensions: science and engineering practices, crosscutting concepts, and disciplinary core ideas that were integrated to produce the performance expectations (standards). So, if you are looking for a better understanding of the new Michigan Science Standards, then the *Framework* should be at the top of your summer reading list!

The research-based *Framework* begins by providing "A vision for K-12 science education." In the first two chapters, an introduction and rationale for three-dimensional learning and K-12 learning progressions are discussed, and many lines of research are cited. According to the *Framework*, "Science is not just a body of knowledge that reflects current understanding of the world; it is also a set of practices used to establish, extend, and refine that knowledge" (NRC, 2012, p. 27). In addition, "the *Framework* emphasizes developing students' proficiency in science in a coherent way across grades K-12 following the logic of learning progressions" (NRC, 2012, p. 33). The *Framework* expands on these guiding assumptions throughout the chapters that follow.

Some science educators may be wondering, what exactly does it mean when the practices state that students are to develop and use models? Or how exactly does the work of an engineer compare to that of a scientist? Chapter three provides an in-depth look at the eight science and engineering practices. The descriptions and examples provide guidance in engaging our students in the work of scientists and engineers. One component of this chapter I really appreciate is how the *Framework* distinguishes the practices of a scientist from those of an engineer in an easy-to-reference table found on pages 50-53.

The next chapter of the *Framework* focuses on the seven crosscutting concepts. In chapter four, you will find a description of each crosscutting concept as well as examples of

how each applies to different phenomena and problems. And true to the vision of the *Framework*, a discussion of the progression from early elementary grades through high school accompanies each crosscutting concept.

Science educators are reminded in the *Framework* that "an important role of science education is not to teach all the facts but rather to prepare students with sufficient core knowledge so that they can later acquire additional information on their own" (NRC, 2012, p. 31). The overall goal of learning physical sciences, life sciences, earth and space sciences, and engineering, technology, and applications of science is presented in chapters five through eight. An outline of science knowledge from each disciplinary core idea is followed by a description of what students should understand at the end of grade 2, grade 5, grade 8, and grade 12.

As our classrooms transition to three-dimensional learning, the *Framework* acknowledges there are topics in need of serious consideration. Some of these important topics include teacher development, instruction, assessment, and equity in science education. The remaining chapters provide support in these areas (and others) for all those involved in making the vision of the *Framework* become a reality.

As an educator, I understand how limited and precious our time is. However, I would highly recommend spending some time with the *Framework* to gain a deeper understanding of three-dimensional learning. After all, our Michigan Science Standards are built on the National Research Council's *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*.

You can purchase a hard copy, read online, or download a free pdf of the Framework by visiting <http://www.nap.edu/catalog/13165/a-framework-for-k-12-science-education-practices-crosscutting-concepts>

References

National Research Council (NRC). (2012). *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*. Washington, DC.



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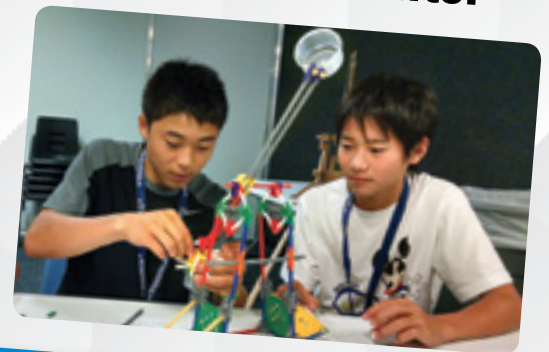
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REFLECTIONS FROM THE 63RD MSTA CONFERENCE



A session put on by the DNR about invasive species was especially informative and interesting. The presenters brought in real live lampreys, and I was able to bring back a picture to show my students. This was a very practical session because we teach about invasive species in our curriculum. The presenters were well informed and prepared. I really enjoyed this session and the conference as a whole. I am interested and excited about the new science standards and teaching new things!

– *Trischa Buseth, 4th grade teacher, Concord Community Schools*

As a new high school science teacher, I am realizing how easy it is to get caught up in the day-to-day concerns of my own classroom and lose sight of the big picture. Much of my time is spent addressing short-term concerns such as: How will I assess students' understanding later this week? Heck, what are we doing tomorrow? How can I keep Mikey off his cell phone? Does the lizard have enough food for the weekend? However, the "big picture" is more important than ever, especially as Michigan makes the transition to a new set of science standards that emphasize three-dimensional learning through integrating science and engineering practices, crosscutting concepts, and disciplinary core ideas.

Attending the Michigan Science Teachers Association Annual Conference helped refresh me both professionally and personally, as I was able to connect with science

teachers from around the state to hear what they were doing in their own classrooms. From implementing the new MSS, to reevaluating grading practices, to collaborating with colleagues, I was so grateful to have the opportunity to step out of my own classroom and see what others have been doing in their schools. I cannot wait to start incorporating ideas from this year's conference into my own classroom in a way that will not only improve my students' daily learning but will undoubtedly have a lasting impact on their scientific understanding. Thank you MSTA!

– *Michelle Vanhala, chemistry and physics teacher at Tecumseh High School*

Imagine my surprise when, during my Christmas break, I opened an email from Sue Campbell congratulating me on being awarded the 2016 Meemic Foundation Scholarship to attend my first ever MSTA conference. I had an awesome experience at the conference. The session that is most vivid in my memory and will be utilized with my students this spring was called "NGSS Meets the Outdoors: Teaching Elementary Science Outside" by Renee Bayer, and Kara Haas from Michigan State University.

True to the description, we went outside! Although cold, the sun was brilliant and it was so refreshing to step outside and put their ideas into practice. Renee and Kara were delightful and engaging. Their love for learning and for interacting with their students within nature in meaningful ways was obvious. I am excited to try the picture taking method we learned with my elementary students as we study our local ecology this spring.

I believe my biggest take away from my experience at the MSTA conference was meeting and sharing with other passionate teachers from our state. I ate lunch with several teachers I had not met before. I also spent time sharing with College Science Teacher of the Year,



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REFLECTIONS FROM THE 63RD MSTA CONFERENCE *continued from page 5*

Dr. Mark Francek from Central Michigan University during our session together and was excited to see the Teacher of Promise winner was Dakota Bahlau from George Long Elementary School in Grass Lake. I met Dakota at a Nova Now conference in Grand Rapids just shortly before MSTA. She is for sure a teacher of promise! All were inspiring and encouraging. I am fortunate to have spent time with these fellow educators.

– Lori Barr, Jenison Public Schools

As a young teacher, I always went to the MSTA Annual Conference. That was before budget cuts, pay freezes, increases in bills, and who knows what else. Suffice it to say, I hadn't attended a conference in years. Restlessness set in and while surfing the web – a scholarship opportunity to attend the MSTA Annual Conference popped up. What? No way. Really? A scholarship opportunity to attend the MSTA Annual Conference? Well, it wouldn't hurt to apply. I probably wouldn't get it but, what could it hurt? So, I applied and was thrilled when I actually got one of the scholarships!

Friday, I hit the ground running while listening to ways to create and get involved with community partnerships. That was followed by a success story with standards based grading. Then, it was time to hit the Interactive Science Notebooks session, which I desperately needed. My work with ISN's has met with mixed success. What were these teachers doing differently that made their experience more successful? Aha!!! Answers found. New hope for next year! Then, it was time to race to the vendors. Everyone who has ever been to the MSTA Annual Conference knows to get to the MESTA tables early in the game to pick up kits, samples and buy tickets for the auction and raffle. For the first time ever, I actually got the desired kits and samples before

they sold out! Unfortunately, I was so mesmerized by the vendors tables (lots of grant opportunities), that I missed lunch, and it was time to start conferencing again. Off to two Common Core workshops sharing immediately practical ways to implement Common Core standards in writing and reading without missing a beat and taking time away from teaching Science. And finally, another session on how to document student work and progress. As a "lone wolf," the only 7th grade science teacher in my district, these workshops more than validated that I'm on the right track. What encouragement! Every teacher needs encouragement. After finishing with sessions, I ran into someone I haven't seen in awhile and the conversation quickly turns to standards-based grading and robotics. Soon, it was time to meet and greet the people who sponsored the scholarship winners. At last, time to head out for dinner and my hotel room.

On Saturday I started the day with excited chemistry teachers. Their enthusiasm and hands-on workshop solidly hooked me. Then, on to building an actual working hovercraft, followed by an adventure behind the scenes at the Smithsonian Institution. Did I mention the MSTA Garage Sale where items could be picked up, sometimes, for FREE? Or, that we were acting out best practices while discussing graphs? Or, that Lab Aids, during a workshop on Climate Proxies, gave out a wonderful tool to help students understand indirect evidence better?

So much to do . . . so much to learn . . . and I am so grateful for the opportunity to have once again attended the MSTA Annual Conference. Time to start planning for next year!

– Kathy Jenkins, Beaverton Rural Schools



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REFLECTIONS FROM THE 63RD MSTA CONFERENCE *continued from page 6*

When I'm extremely excited about something—or incredibly nervous, but that's another story—I tend to ramble on... and on... and on. That's exactly what I did when I returned home from the 2016 MSTA Conference. My dear husband sat with me at the kitchen table while I unloaded pamphlets, notes, books, and models while rambling the whole time! As a new member of MSTA, a recent graduate of GVSU, and a first time attendee at the conference, I walked away from this experience feeling reassured and eager. I knew, without a doubt, that I had chosen the right career path. I AM a science teacher, I thought to myself. I simply could not wait to have a classroom of my own and begin applying all that I had learned.



I would like to share with you just a few highlights from my experience at the conference, and I'd like to begin with David Mastie. This is a man who's been teaching longer than my parents have been alive (Sorry, Mr. Mastie!), yet his enthusiasm and energy for science education is uncontainable. I attended his Friday morning session, and then immediately added his Saturday morning workshop to my schedule. Mastie engaged my own love for learning through introducing creative, affordable science models and experiments and a wealth of knowledge.

The title of this next session caught my eye was "I Quit Grading Homework (and Lived to Tell About It)". To no surprise, this session was absolutely packed with teachers eager to hear more. Thankfully, this session lived up to and even surpassed my expectations. Alaina Sharp of Western High School shared her own unique form of standards-based grading. I was captivated by her story, beginning with how she first attempted this new grading system and how, through thorough reflection, her standards-based grading evolved to something that would hold her students accountable for their own learning. In the end, isn't that what we all want to achieve?

Last, but not least, I could hardly wait to hear Joe Krajcik speak on the Next Generation Science Standards. I've explored the standards, and even morphed a few of them into a unit plan in college, but I was missing something. How could I make the most of these standards each and every day? Very simply, Krajcik explained that the difference with the NGSS is that they recognize that knowing and doing science cannot be separated. Bingo! He went on to explain that with the NGSS, students don't just explore science ideas. Rather, they use science ideas

to make sense of phenomena. That is science, my friends.

This brings me to my final point, and easily my most significant takeaway from attending this conference. I called my husband during my lunch break on Saturday and said to him, "Do you know what the best part of being here is? I'm surrounded by people just like me—hundreds of like-minded educators—who are all here for the same reason. We're here for our students and to become better teachers of science. That's something."

— *Christina Scott, preservice teacher from Grand Valley State University*



What a Capital Time I had at the MSTA Conference

By Kathy Mohr, Barhitte Elementary, Bentley Community Schools

As a teacher it is sometimes difficult to attend conferences due to the cost. And let's be honest, sometimes you're worried they won't be worth the time! This year I received word of a scholarship opportunity and thought, why not? Much to my surprise and delight, I was awarded a scholarship for MSTA's conference and membership. I was thrilled!

I attended the conference both Friday and Saturday in order to take advantage of as many different sessions as possible. There were so many good choices that I was disappointed when I had to give up one to attend another. I did my research ahead of time in order to find sessions that were of interest to my grade levels, the new standards, and me. I was happy to see that very session I attended was aligned to the new Michigan K-12 Science Standards!

One of my favorite sessions was called, "Invasive Monsters of the Deep" and was presented by the DNR's Kevin Frailey and Tori Frailey. The attendees of the session were treated to not only the history of how the sea lamprey ended up in Michigan lakes and the steps that are now being taken to curb their populations, but to see (and touch) an actual lamprey! The session brought to light the environmental impact this invasive species has in our Great Lakes ecosystem and a wonderful way to bring engaging phenomena to our Michigan students.

I also attended a great session called "Climate Literacy-Climate Solutions" by June Telsan from NOAA. Joan had a plethora of information

to give! I really appreciated her insights on further science opportunities and grants. She demonstrated the amazing amount of information and resources available through the NOAA website. This session helped me find the place to start to look for information and find some really great lessons.

When one of the sessions I wanted to attend was full, I spent the time walking through the exhibitor area. This trip is not for the faint of heart! Inside this area attendees were met with a beautiful kestrel, a couple of bats, MSTA raffles, exhibitors with the newest and coolest scientific equipment, and (in my opinion) the best part: MESTA's Rock Shop.

On the Rock shop tables are the gems that drive Earth Science phenomena- fossils! Picking up a fossil here, a mineral there, it wasn't long before I had a small load. Keeping track of what I bought was easy- there were baggies for samples and labels that were preprinted with the sample name and information. A paper was located at the entry to the booth to write down what you bought and the price. The prices were very reasonable, but the biggest challenge for most Earth Science enthusiasts was that the bags were so darn heavy when you left!

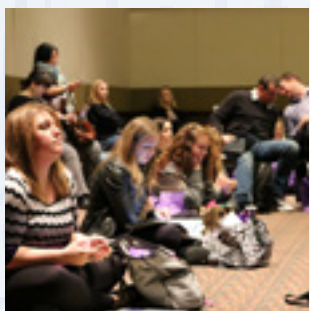
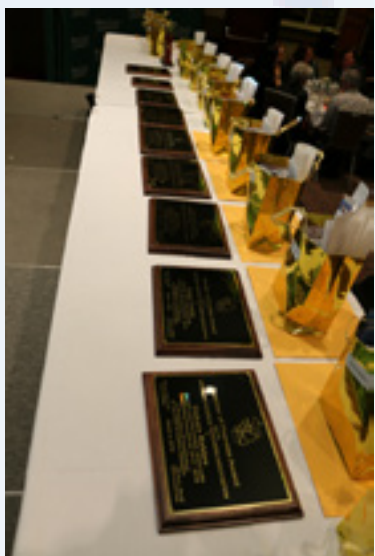
If at all possible, I highly recommend that you attend the MSTA conference. The price is quite reasonable for the

abundance of information that you are able to receive. Go with a friend or bring a spouse so that you can split up and go to different sessions and then share the wealth.



2016

MORE MOMENTS FROM THE 63RD MSTA CONFERENCE



MSTA Mini-Grant Application



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

- Up to 2 awards of \$1000.00 each will be given to current MSTA members.
- The grant deadline is June 27, 2016
- 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, 2016.
- Projects MUST be completed by June 9, 2017.
- 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 2017 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 9, 2017.

Name: _____

Home Address: _____

City: _____ State: _____ Zip: _____

Phone Number: _____ Email Address: _____

School District: _____ School Name: _____

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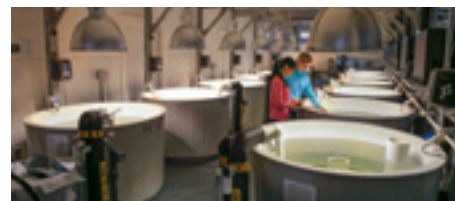
Position/Title: _____ Grade Level(s): _____

Completed application MUST be postmarked by June 27, 2016.

Mail to: Lynn Thomas
8949 Stagecoach Ave.
Gladstone, MI 49837
Email: lynnthomas@esky.com

OR

Rachel Badanowski
47818 W. Huron River Drive
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Call for 2017 MSTA Awards Nominations

Look around you! Are you working with someone whom you consider an excellent science educator? Does this person do an outstanding job in the classroom and/or in your school district? Does this person contribute to the profession by taking leadership roles within the educational community and show a willingness to share ideas with colleagues by presenting seminars and workshops, and by publishing science related articles in professional journals?

If you know someone who exhibits these attributes, then please NOMINATE HIM/HER for one of the following categories

- ▶ Elementary Teacher of the Year
- ▶ Middle School Teacher of the Year
- ▶ High School Teacher of the Year
- ▶ College Teacher of the Year
- ▶ Teacher of Promise
- ▶ Administrator of the Year
- ▶ Informal Science Educator of the Year

Nomination deadline: July 1, 2016

Awards are issued based on the following criteria:

The winning Elementary, Middle School, High School, and College Science Teachers of the Year will be chosen for using or modeling best practices, inspiring their students, demonstrating innovative teaching strategies, being excellent role models for students and other teachers, demonstrating leadership, exhibiting a passion for science and teaching, and who have taught for five or more years. There has been some confusion about fifth grade teachers. If the teacher works in an elementary school, nominate him/her for the Elementary Award. If the teacher works in a middle school or junior high school, nominate him/her for the Middle School award.

The winning Science Teacher of Promise will be chosen for inspiring students, demonstrating innovative teaching strategies, demonstrating the potential for science leadership, and exhibiting a passion for science and teaching. Eligible nominees must have taught fewer than five years.

The winning Administrator of the Year will be elected based on dedication to and support of science education in the district and community, and for being a strong advocate of science teaching and curriculum. Eligible nominees include all levels of district administrators, curriculum directors, ISD/RESA chairs, Math/Science Center people, and higher education administrators.

The winning Informal Science Educator will be chosen for unique and extraordinary accomplishments, active leadership, scholarly contributions, and direct and substantial contributions to the improvement of non-school based science education over a period of time.

- Please be advised that no member of the current MSTA Board of Directors is eligible to receive one of these awards while serving on the Board.

Once the nomination is received the nominee will be contacted and sent the appropriate material. If you have any questions, please contact Marlenn Maicki, Awards Chair at mmaicki@dcds.edu.

2017 MSTA Awards Nominations Form

To nominate an educator, please fill out the form on the following page.

Award: (select one)

- Elementary Teacher of the Year Middle School Teacher of the Year High School Teacher of the Year
 College Teacher of the Year Teacher of Promise Administrator of the Year Informal Science Educator of the Year

Grades or Subject Taught _____

Nominee

Nominee Name: _____

School: _____

School Address: _____

District: _____

School Telephone: _____

School E-mail Address: _____

Home E-mail Address (for summer contact): _____

Home Phone: _____

Cell Phone: _____

Home Address: _____

Nominated By:

Name: _____

Address: _____

Home Phone: _____

Cell Phone: _____

E-mail Address: _____

Professional relationship to nominee: _____

To Submit: Scan and email to : mmaicki@dcds.edu & scampbell@managedbyamr.com or fax to 734-677-2407.



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- Science content developed by Lawrence Tech in partnership with the Detroit Zoological Institute, Cranbrook Institute of Science, Aquinas College, and the University of Detroit Mercy.
- Courses aligned with the Michigan Department of Education requirements for Science and the DI (Integrated Science) Endorsement.

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MASTER OF EDUCATIONAL TECHNOLOGY

- \$1,320 per course scholarship for all participants covers nearly 42 percent of tuition.
- 100 percent online and asynchronous format.
- This practice-oriented program is offered by Lawrence Tech in partnership with Marygrove College. Courses cover up-to-date technologies in instruction, Web-based learning tools, streaming video, electronic communication, and software and hardware options.
- Complete the seven required courses of the Master of Educational Technology degree and be eligible for the NP endorsement on your existing teaching certificate.
- Some curriculum requirements will be tailored individually based on the candidate's goals. Instructional Technology graduate certificates (12 credits) are also available.



For more information on these and other science programs, visit: www.ltu.edu/sciences
Waive your application fee at www.ltu.edu/applyfree



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Getting Students Outdoors

By Lauri Davis, Houghton High School

The new Michigan Science Standards call for real-world inquiry experiences. Many science teachers are willing to try, but may not feel completely prepared to hand the reins over to their students to do science, or may not know where to start. Additionally, many students do not have enough experience engaging in the practices of science. They come out of a year of science classes knowing facts, but still not really understanding the process of science. We also have an issue today of kids not getting enough time out-of-doors. Recently two articles (National Geographic, Jan. 2016 and Mother Earth News, Dec. 2015/Jan. 2016) detailed the psychological effects, on both adults and children, of the lack of time in nature. Science is finally acknowledging that our psyche and our overall wellbeing are intimately linked to the natural world. We need to spend time outside!

Four years ago I decided to address these issues by developing a program that would get students out in nature and engage them in an authentic science research project. I am lucky to have a school forest within walking distance of school. I start the year by having students visit the forest to observe and brainstorm ideas about what they could study. Over the next week, we discuss research methods, different approaches to doing field research, what equipment is available to work with, and they decide on a topic to research. From this point, students work in small teams of 2-4 individuals. After several days of literature review, they come up with a testable question and a tentative procedure. The following week, the students set up their projects and start collecting data. Data is collected during the fall until snow prevents us from entering the forest. During the winter students work on the scientific research paper that accompanies their research project. In the spring data collection continues until the end of the semester.

Some examples of questions that students have pursued through this project include:

- Does tree species affect the pH of the soil beneath the trees?
- Does the chemistry of the pond change from fall to spring?
- Is there a difference in the water chemistry in the inlet stream, pond, and outlet stream?
- Are worms more plentiful further away from the pond?
- How does the observable health of the forest change as you go inland from the bordering roads?
- Is there a difference in the water chemistry of precipitation caught in the school forest versus the

field next to the forest?

- Is there a difference in the biodiversity of aquatic microorganisms in the middle of the pond versus the road-side or the forest-side of the pond?
- When does complete leaf fall in autumn and leaf out in spring occur?
- Is there a difference in soil chemistry in different habitats within the school forest?
- What microorganisms are found in the autumnal and vernal ponds in the school forest and is there a seasonal difference?

The culmination of the project is a presentation. Student teams present in a standard conference-style format (although for time sake, presentations are limited to 15-20 minutes). The presentations are performed onstage in our auditorium and are open to the public. Each quarter, students fill out a self and peer evaluation form to assess their own and their team-member's contributions to the project, receive participation points (subjectively given by me), and a grade for any written work during that quarter. The entire project grade for each quarter makes up 15% of the students overall class grade.

This project sounds like a lot, but it changed the way I taught my General Biology classes. There is a strong emphasis now on research and what science really means. From what I observe and feedback from the students, I know they are coming out of the class with an understanding of how science is really is conducted in the real world. They also finish the year with improved oral and written communication skills. I feel this makes them better students in all classes, but especially as they move on to some of the more challenging science classes during their junior and senior years.

Rearranging my General Biology classes to fit in this research project and the regular curricular information was not an easy task. I am not a young teacher with unlimited energy. First, I came late to teaching; I was 35 when I started. It wasn't until my 12th year of teaching when this idea to change my class struck me. So, back to the title of this article: If a tired, middle-aged, high school science teacher can do this, so can you!

Joan Chadde from the Western U.P. Center for Science, Mathematics & Environmental Education prodded me to present my authentic research methods at conferences. I have now given presentations at four conferences in the last two years, including this past March at MSTA. As an educator, I think one of the best resources for learning new tools and ideas for the classroom comes from other

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CLASSROOM ACTIVITIES

Getting Students Outdoors *continued from page 15*

teachers. We may teach in isolation, but when we come together at workshops and conferences, no one leaves without a new activity or idea to use in their classroom.

Spreading the word didn't end at conference presentations. I had the unique opportunity to share my experience and once again, it came through Joan Chadde. During spring 2015, Joan asked me to help develop a Summer Teacher's Institute focusing on helping teachers learn how to implement authentic science research in their classrooms. Although I received a small stipend (the institutes are funded primarily through grant monies) for my assistance, I accepted the challenge of co-designing this institute because I think any teacher has the ability to engage their students in authentic science, if they have the desire. The Engaging Students in Authentic Science Research Institute was held for one week during July 2015. We started with an in-depth discussion of how science works and how to approach the topic in the classroom. Next were several days of field trips to different research labs and sites. We designed the institute to offer a broad array of research topics. I might love field research, but a chemistry teacher might not. So, we wanted the participants to be exposed to a diversity of research themes so it met everyone's needs. Topics covered included material sciences, chemistry, atmospheric sciences, aquatic and terrestrial invasive species, insect diversity, transportation issues, and stream monitoring. Additionally, participants conducted their own "mini-research" project right on the campus of Michigan Technological University, where the institute was held, and designed a poster presentation to share their project at the end of the institute.

When the institute was over, I received great feedback. However, I must confess that I learned just as much, if not more, from the participants, than perhaps what they learned from me. Collaborating

with like-minded, dedicated educators is one of the most powerful incentives for me to continue with this institute. I hope to once again be involved this coming summer. Any teachers interested should check out the website at <http://wupcenter.mtu.edu>, it is well worth the trip to the U.P.!



Top: Authentic Research Institute - Examining Soil pH at a local Houghton Beach.



Middle: Authentic Research Institute - Fruits and Flowers - Chromatography as Inquiry.



Bottom: Authentic Research Institute - Insect Collection Techniques.

CLASSROOM ACTIVITIES

Energy Saving Methods: Combatting Heat Loss From Buildings

Christine Kelly, Allendale Middle School, kellychr@allendale.k12.mi.us

I developed a mini-unit on energy as a result of attending Michigan Tech Center for Science & Environmental Outreach and the class, “ED 5640 Designing a Sustainable Future Teacher Institute.” The mini-unit was designed for a middle school class. Here I am sharing an activity from my mini-unit that I adapted from an activity at teachengineering.org called “Stop Heat From Escaping.” In this activity students insulate a house (a cardboard milk or juice carton) using household materials and measure the heat loss from a bottle of hot water placed inside.

MI K-12 Science Standards (November 2015)

MS-PS3 - Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

Essential Questions:

- How can we test how well insulation works to reduce heat transfer in a home or other building?
- Which materials insulate better than others?
- How is the density of the insulation material related to its ability to reduce heat loss?

Materials

- milk carton (900mL or ½ gal)
- various materials to act as insulation (newspaper, cotton balls, fabric, plastic bags, aluminum foil, wool socks, etc.)
- stopwatch or timer
- water (300 - 500mL per group)
- 600 mL plastic bottle
- Scale
- tape (duct, masking)
- thermometers
- Hand lens or microscope



Figure 1. Materials

Procedures

1. Remind students that today we will conduct an engineering investigation. Engineers need to understand energy conservation concepts to design more effective home energy systems.
2. Ask students “Which type of insulation would keep my house warmest in the winter?” Students should explain their reasoning.
3. Show students the insulation materials available to test (students may choose to bring their own). Students may use a hand lens or microscope in choosing their material.
4. Students should predict which material they think will be the best insulator and explain their reasoning.
5. Discuss the relevance of the density of the insulating material. You may wish to have the class vote if they will pack their insulating material in a high density, medium density, or low density arrangement. Alternatively you may allow students to set up multiple experiments with different densities of their insulating material.
6. After cutting a carton in half, students pack their insulating material of choice in between the “milk carton house” and the 600mL plastic bottle. Each group should use equal amounts (mass) of each insulating material. Students attach a small sample of their insulating material to the outside of the milk carton to identify their material to the class (see figure 2).
7. Students make drawings of their set-up and make a data table to record the temperature of the water every minute for 10 minutes.
8. Groups may each set up a control (no insulation) or one group could be in charge of setting up and running three control setups.
9. Pour equal amounts of same-temperature, hot tap water into each bottle.
10. Immediately after the hot water is poured in the bottle, tape the cover on the house and place the thermometer into the “chimney” (pour spout) to measure the temperature of the water (see figure 3). Record these beginning temperature of the water.
11. Measure and record the temperature every minute for 10 minutes.

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Energy Saving Methods *continued from page 17*

12. Calculate the change in temperature for each bottle by subtracting the ending temperature from the beginning temperature.
13. Students graph their data and share the results with the class.
14. Students determine which material was the best insulator based on their data. Which had the smallest change of temperature? Which material lost heat the quickest? What does this mean? How is the density of the material related to its ability to prevent heat loss? What material(s) do they recommend to use in home insulation?
15. If time allows, have students design and make improvements to their insulation model.
16. Students / groups devise a concluding statement for the experiment based on everyone's research findings.

References

Perez-Suarez, Sharon D., Natalie Mach, Malinda Schaefer Zarske, and Denise Carlson. "Hands-on Activity: Stop Heat from Escaping." Teach Engineering Curriculum for K-12 Teachers. Integrated Teaching and Learning Program, College of Engineering, University of Colorado Boulder, n.d. Web. 12 Aug. 2015. <https://www.teachengineering.org/view_activity.php?url=collection/cub_/activities/cub_energy2/cub_energy2_lesson02_activity2.xml>

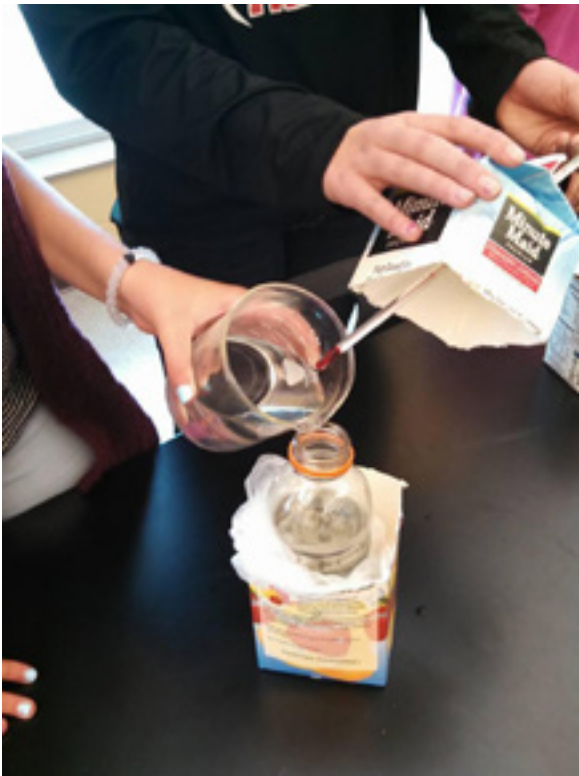


Figure 2. Experimental setup with insulation around the bottle of hot water.



Figure 3. Assembling the milk carton house around the bottle of hot water. Note the thermometer sticking out of the "chimney."

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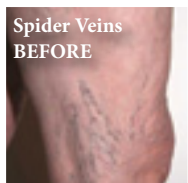
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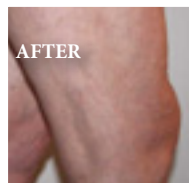
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RESOURCES & IDEAS

Using Animals to Enhance Your Curriculum and Motivate Students

By Ann Marie Sadler, 6th grade science teacher, Hillside Middle School, Northville, MI

Throughout my 26 years of teaching there is one element I have found that draws students to enjoy school year after year...animals! I am fortunate to work in a building that houses what we call "The Animal Room". A former teacher that has now retired, had a vision of dedicating an entire room to housing animals. This room contains animals such as boa constrictors, caiman alligators, a green iguana, macaws, a cockatoo, bearded dragons, leopard geckos, and tortoises. All of these animals were donated over the years, typically by people that could no longer care for them. This room is now under my charge and the care for them has blossomed into a program in which students love to be involved.

At the beginning of the school year, students must fill out an application that collects information about their prior experience caring for animals, their ability to arrive at school early, and the animals they are most interested in caring for. After reviewing these applications, I assign each student an animal they are responsible for taking care of on a daily basis for one semester. Their responsibilities include keeping the cage clean, feeding, soaking (tortoises only), and tender loving care! The snakes and alligators are the only ones fed by myself and one other teacher.

There are many positive aspects to having animals in the building. First of all, we are able to incorporate the room into many of our life science lessons. When we teach ecosystems

and biodiversity, we use the habitats to discuss biotic and abiotic factors. We also use the animals in the room as a basis for students to create food chains and food webs. Second, many students don't have family pets at home, and this allows them to have one, without the constraints that may exist at home. Another positive facet is the opportunity and responsibility to take care of a pet. I have received many emails from parents saying that working in the animal room is the one thing that motivates their son or daughter to wake up in the morning and get to school.

This is main reason I love the animal room! It truly has such a positive impact on students. This past year I received an email from a parent about her child working in the room. This student was very shy with a history of severe anxiety and depression. The mother stated that the room literally changed the child's whole view on school, and that it was like therapy. The mother also said that the room gave their child a break from anxiety and a place to relax. Like this student, the room allows many others to feel like they belong, and it is also a place where students can identify with having something to offer as they care for the animals. For many, it can also be a place where they develop friendships with other students who have the same love for animals. While it is a time commitment for me, the payoff is tenfold and I sincerely love this aspect of my job.



The Animal Room at Hillside Middle School. Pictured from left to right: 8th grader Adrien Jund, Principal Jim Cracraft, and Teacher Ann Marie Sadler.

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RESOURCES & IDEAS

Using Animals to Enhance Your Curriculum and Motivate Students

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THE ANIMAL ROOM - A STUDENT'S PERSPECTIVE

By Adrien Jund, 8th grade student, Hillside Middle School, Northville, MI

My experiences with the animal room have been phenomenal. Since I was very young, I have always been fascinated with science, nature, and the outdoors. When I got to Hillside, the animal room intrigued me immensely. The first time I walked into the room I was overwhelmed. There were geckos, macaws, snakes, tortoises, and animals of great variety everywhere you looked. I went around to each cage and enclosure trying to get a good look at each unique creature. Almost every day in sixth grade, I would go over to where the chinchilla was kept and I held her until science class began. I do not know of any other school that has this kind of extraordinary experience in which students can get so close to animals that they might normally never see in their lifetime.

Most students get to enjoy the animal room a couple times per year with their science class. However, there are also many opportunities for students to get more involved. One of the main ways is signing up to help take care of an animal for one semester. Students come before school at around seven thirty and do their jobs until around eight o'clock. These jobs consist of cleaning out enclosures, feeding different animals, and making sure each animal is lively and healthy. Each student takes their job seriously and makes sure everything is taken care of properly.

This year, I got to be a part of a special project that Hillside had not done in two years. In October, my science teacher informed me that we were going to get two hundred salmon eggs that we were going to raise and release back into the wild. She gave me that task of taking care of all of the eggs until April. Salmon eggs are very sensitive to changes in temperature, so I had to make sure that the water stayed at a constant temperature and did not fluctuate, otherwise all of the eggs could die. Also, I had to do water changes every other day to ensure that the quality of the water was suitable for the salmon to survive. This experience has been very fun and has expanded my knowledge remarkably.

Overall, I loved my experience being able to help out in the animal room. Thanks to Hillside, I and countless others have been able to interact with organisms that we otherwise would probably never see in real life. I am privileged to attend Hillside Middle School, for other schools do not have this kind of unique experience. Also, caring for the animals takes me one step closer to maybe becoming a scientist when I grow up. The animal room has always fascinated me since I first walked in, and I'm sure it will continue to amaze and intrigue an untold number of students to come.

Renewable Energy Experts Available for Classroom Presentations

The Great Lakes Renewable Energy Association (GLREA) is a statewide non-profit that promotes the use of renewable energy. GLREA has a speakers' bureau and volunteers throughout the state who make presentations on solar energy and renewable energy topics. Our twenty-five volunteers are mostly energy professionals or owners of solar energy

systems that like to share their experiences. Presentations can be tailored to the needs of a class. If you would like a presentation on solar energy or other renewable energy topics, please contact John Sarver at johnsarver3@gmail.com.



Michigan Science Educator, LaMoine Motz, Receives NSTA's Top Award

ARLINGTON, Va. – April 1, 2016 – The National Science Teachers Association (NSTA), the largest professional organization in the world promoting excellence and innovation in science teaching and learning, has announced the recipients of its 2016 Teacher Awards.

The Teacher Awards program recognizes extraordinary K-12 teachers, professors, principals, and science educators for their outstanding achievements in science education.

“These teachers and science education professionals have shown tremendous dedication and commitment to their students and to science education,” noted NSTA President Carolyn Hayes. “We are so proud to honor them as they help to inspire the next generation of informed citizens, scientists, engineers, and innovators who can embrace all that science can offer.”

NSTA presented its most prestigious award, the Robert H. Carleton Award, to LaMoine Motz, former NSTA President (1988-89) and current managing partner at Motz Consulting Group in White Lake, Mich. The Robert H. Carleton Award recognizes one individual who has made outstanding contributions to and provided leadership in science education at the national level and to NSTA in particular. Motz received his award at a special banquet and ceremony at the NSTA National Conference on Science Education held last month in Nashville.

For more than five decades Motz has been energetic, dependable, and passionate about science education and the success of NSTA. He immerses himself in the tasks at hand with no regard to rank. He does not ask people to give their time, expertise, and resources to NSTA without first serving as an exemplary model himself.

In Michigan, Motz developed a county-wide teacher center; established comprehensive professional development programs; became director of a regional science, mathematics, and technology center; was co-developer of a four-year integrated science, mathematics, and technology high school; and was founder of the Oakland County Science Education Committee.

Motz has been actively involved with NSTA for over 40 years, serving on the NSTA Board of Directors for three terms including one as President. He chaired numerous NSTA committees, including Research, Facilities, and Operations; Supervision; and Safety Advisory Board. He has served on more than 25 NSTA committees, task forces, advisory boards, and convention program planning teams. At conferences Motz has presented on science safety, facilities, STEM-based science education, professional development, learning, and assessment. Motz has authored and edited over 30 publications, including



the NSTA Guide to Planning School Science Facilities. He led a team that has presented hundreds of professional development programs, workshops, seminars, short courses, and school tours on science facilities and safety. Motz's advocacy for safe science facilities has become his legacy of a lifetime of work in science education. In addition to being NSTA's president, he served as president of four other associations. His numerous awards have included Michigan Science Teachers Association's Award for Lifetime Achievement in the Field of Science Education and NSTA's Distinguished Service Award to Science Education.

“On behalf of NSTA, I offer my congratulations and thanks to Mr. Motz, whose commitment and dedication to the improvement and enhancement of science education has helped hundreds of students and teachers nationwide,” said Hayes.

Motz will receive \$5,000, a formal citation, and an expense-paid trip to attend the NSTA National Conference.

NSTA encourages science educators to apply for its 2017 Teacher Awards. Applications and information can be found online at <http://www.nsta.org/about/awards.aspx>.

About NSTA

The Arlington, VA-based National Science Teachers Association (NSTA) is the largest professional organization in the world promoting excellence and innovation in science teaching and learning for all. NSTA's current membership includes approximately 55,000 science teachers, science supervisors, administrators, scientists, business and industry representatives, and others involved in science education.

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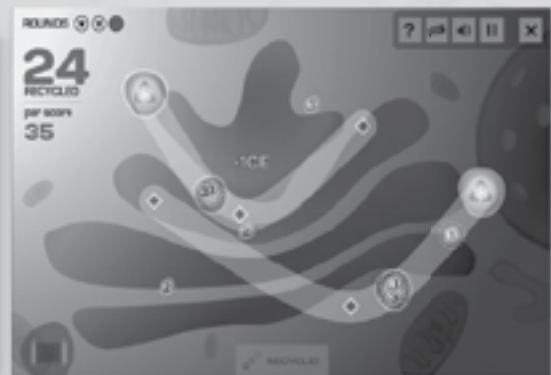
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