MSTA Newsletter

A publication of the Michigan Science Teachers Association • Volume 66.2 • SPRING 2014

In this Issue

From the President's Desk:

2014 MSTA Conference – A Few Observations

By Michael Sampson, MSTA President

So another year goes by and another great MSTA conference in the books. Job well done, Conference Committee! As board members, we don't get to see many sessions, but the few I did get to see were very good. Dr. Stephen Pruitt's keynote and the NGSS Panel Discussion were two of the sessions I was able to attend.

Dr. Pruitt spoke about the state of the NGSS and science education. The panel discussion that followed focused on answering questions from the audience. These questions ranged from how to implement the NGSS to how it will be assessed and how it will impact teachers at all levels. While attending the panel discussion, it was clear that the attendees had many questions they wanted answered. We will post the answers to those questions via an email blast when we receive that information, so stay tuned! It wasn't until I was reviewing the evaluations and comments from the members who received State Continuing

continued on page 4

From The Desk of Your Executive Director

By Robby Cramer, MSTA Executive Director

Once again, the number one theme of questions I am asked by MSTA members is: what is happening regarding the Next Generation Science Standards (NGSS) and the state of Michigan?

The Michigan Department of Education still recommends that science teachers everywhere in our state continue to work on implementation of the NGSS science and engineering practices.

However, since four Board members shared our thoughts about science education in Michigan at the December State Board of Education meeting, MSTA members and science leaders have continued to share their thoughts about changes in science education in Michigan. Presenters have included Nancy Karre (Battle Creek Math and Science Center Outreach Program), Conni Crittenden (MSTA), Joe Krajcik (CREATE for STEM Institute), Jennifer Arnswald (Kent ISD), Mary Starr, Executive Director (M&SCN), and Mike Gallenger (Oakland Schools). Each person continued to share what the science and engineering practices look like from their individual vantage points.

At the January State Board of Education meeting, Superintendent Mike Flanagan verbally announced a timeline to bring the new standards to the State Board of Education in November for consideration and December for a vote. Keep watching for further announcements and action. At the March MSTA Conference, during the panel session, MDE leadership announced MSTA would soon receive a written MDE timeline for Science. When we have the timeline, we will email the information to all members and post the timeline on our web site.

At the MSTA conference Stephen Pruitt shared a list of current and upcoming NGSS projects. The Science EQuIP has been released. This rubric will help educators to review the quality of lessons and unit resources designed to meet NGSS. The following is a link to the rubric:

(www.nextgenscience.org/sites/ngss/files/EQuIP%20Rubric%20for%20Science%20%26%20Response%20Form_Finalv1.pdf)

continued on page 2

From the Desk if the President-Elect:

by Charles Bucienski, MSTA President-Elect

Thanks to our membership for a fantastic 61st conference held at the Radisson Hotel and Lansing Center in Lansing, Michigan on March 6th-8th, 2014. It is a lot of fun to get to discuss best practices with some of the amazing teachers and colleagues that attend each year. It's also great to see all the new teaching materials at the vendor booths and to meet a lot of new people! Of course, the most valuable part of the conference for most of us is to get new ideas from the excellent sessions on all aspects of science education. Though there were many highlights during this conference one of the most talked about was our Friday night popcorn and movie. The free event included a showing of "The Day the Mesozoic Died" from the Howard Hughes Medical Institute.

The focus of this year's conference and many of the sessions were the Next Generation Science Standards. MSTA is committed to bringing the most up-to-date information concerning the adoption and implementation of the Next Generation Science Standards (NGSS) in Michigan. As this topic is the single most concerning for Michigan science teachers and continues to evolve through the adoption process, you can be sure that NGSS will continue as a focus for next year's conference too.

Make your plans now to be with us at our 62nd annual conference which will be held in Grand Rapids, Michigan February 26-28th 2015. I'm eager to meet you!

Your Executive Director - *continued from front page*

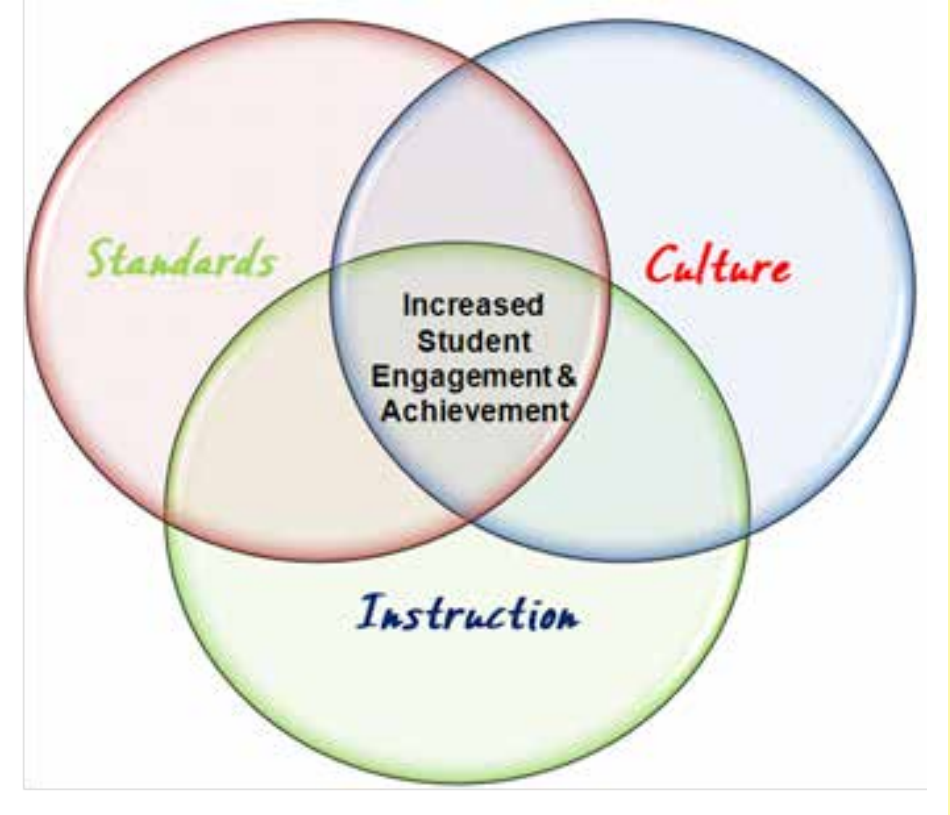
Work at the national level has begun to provide evidence statements for the high school NGSS Performance Expectations. The evidence statements break apart the observable features of the Performance Expectations. Once the work on the high school PE's is completed, work will begin on the middle school PEs, followed by the elementary PEs.

Stay tuned for additional resources to be released in the coming months.

The MSTA Board of Directors meets the fourth weekend in April for their strategic planning for next year. Preliminary work on the 2015 Conference, next February 27th & 28th will begin!

The Intersection of Instruction and Culture

From Megan Schrauben, Michigan Department of Education



In the September 2013 issue of the MSTA Newsletter, we briefly introduced the intentional instructional practices that we are emphasizing at the Michigan Department of Education. To review, we looked at the intersection of Standards, Culture, and Instruction as being intentional in your planning for lessons. Where these intersect, we envision a classroom where students are engaged in rigorous tasks that are seamlessly linked with the standards and are culturally relevant. We then followed up in the December 2013 MSTA Newsletter with an in-depth look at what the intersection of standards and instruction mean for the science classroom. Now we will look more closely at what the intersection of instruction and culture means for science classrooms.

Teaching that is engaging and culturally responsive to the learner is the result of the intersection of instruction and culture. Using scientific issues and problems helps to make the instruction relevant to students—they see where science connects to everyday life and how they could potentially make contributions to society by engaging with the science content that you want them to learn. When we intentionally plan to link areas of interest for our students with what we are doing instructionally in the classroom, we end up with an experiential learning opportunity that increases student engagement with the content. This increased engagement ultimately leads to increased student achievement and has been shown especially to hook those students that traditionally find themselves at the bottom of the achievement gap.

Another way to look at this intersection is to consider the culture of the students as being an asset that they bring to the instructional table. For example, if I am teaching in a rural area where most of my students have had experiences with life cycles of different animals, then I might use the gestation periods of cows to help them feel like they bring some knowledge to the table when introducing reproduction concepts in the life sciences. This helps them to feel like they already have some investment in the topic and builds their confidence to continue working to learn the new information. The key that we have to keep in mind is that a culturally relevant example for students that live in our largest cities most likely isn't relevant at all for those students living in the Upper Peninsula.

There may be times where you believe that a particular topic of study isn't something that your students have experience with—so if we are intentional about framing our instruction in a culturally relevant way, we need to set the stage for why they might be interested in this topic. In other words, we need to find the point of entry for our students so that they can connect with the topic and feel like they have some assets to bring to the table. If we are now instructing in an urban environment and the topic of instruction is focused on predator/prey relationships in ecosystems, and we know students haven't been exposed to many of the ecosystems described, what are some potential points of entry for our students? If we have the means, we could set up a field trip experience for students to have a common point of reference to what these ecosystem examples are, or maybe we could describe a scenario where a school bully hanging out in a certain area of the school affects student traffic patterns in the building. While this may be a really simplified model of how parts of a larger system are influenced by another part, it will give them something to relate to in order to get their feet wet before jumping into the larger discussion.

Overall, we see the intersection of instruction and culture to provide opportunities that hook students, making them want to learn even more about a topic. When this happens, we are able to increase the rigor and confidence levels of our students so that they achieve at even higher levels. All students bring assets to the table; we need to be intentional about figuring out what those assets are so that we can build the contextual instructional piece around them.

From the President - *continued from front page*

Education Clock Hours (SCECHs), I that I saw how important and helpful these sessions, and many others, were to them. Some of the comments are listed below:

- *The information about the implementing the Next Generation Science Standards will help me to be better prepared if and when MDE and the State of Michigan decide to adopt the standards.*
- *The information about the Next Generation Science Standards will help me to communicate science better to my students and the associated activities will help my students to better understand science.*
- *The information about how the Next Generation Science Standards will be assessed will be a big help.*
- *I learned about NGSS in much greater detail.*

There were many other comments from members about increasing the use of dialogue, using the engineering/ design practices and incorporating modeling in the classroom. Attendees commented on sharing new ideas with their departments, districts, and even counties. But, our work is not done! There were many comments seeking further guidance about what comes next. In keeping with the mission statement of the MSTA we will continue "*to stimulate, support, and provide leadership for the improvement of science education throughout Michigan*" and will bring you more sessions and information the NGSS and how to implement them in the classroom. So... mark your calendars for February 26th -28th , 2015 and join us for our 62nd annual conference in Grand Rapids!

Follow MSTA on

Exposing Young People to the Fun of Science!

From Lu Anne Clark, Biology Faculty Chair and Professor of Science at Lansing Community College, MSTA Higher Education Director

For thirty years, Lansing Community College has hosted the Region 11 Science Olympiad competition. For almost as long, we've been hosting a non-competitive event for elementary-aged students. We call this event SMEE – Science and Math Elementary Exploration. This year, we also participated in the 2nd Annual Science Festival at Michigan State University.

All of these events team our instructors with college students to demonstrate to younger students that science can be fun! These events require a lot of background work and can be somewhat tiring during the event as well. I would know this, as I have participated in all three all of the years. The benefits of this work are multifold. The ultimate goal is to encourage more students, especially those in the under-represented groups, to choose science or science education as a career. And better yet, to perhaps choose LCC as their college of choice. There are also many more immediate rewards. One is the learning gained by our students. We all know that the best way to learn a concept is to teach it to someone else. Many of the events of SMEE are created and supervised by our education majors. Another benefit is a chance to work closely with our students in an experiential setting outside of the classroom. For example, I really enjoyed working with my seven student volunteers at the MSU festival. The event gave me a chance to meet an online student for the first time. We probably never would have gotten a chance to talk face to face otherwise. Another plus was the "mixing" of the groups. I had volunteers from all three of my teaching sections working together. But I think the biggest benefit of this for me was seeing them in another setting. I gained a better appreciation of them as people, especially the two I had considered to be almost class clowns. Watching them interact and relate to the young children was a real eye opener for me. And although they were demonstrating concepts they were unfamiliar with, they read the directions, put the activities together and went right to work delighting dozens of children! I have a new respect for these students.

I think the biggest benefit of all these events is seeing the faces and delight of the children. For the Science Olympiad, made up of middle and high school students, I love seeing how hard they work, how intelligent they are and their maturity. I really enjoy joining in the celebration of their success and encouraging them when not so successful. For SMEE, Science Festival and similar events for elementary-aged students, the joy is in the children. Each is special and has unique skills and curiosity. Our goal as educators is to tap into this curiosity and intrigue and excite them. Most important, our goal is to assure them that they can "do science". For Science Festival, LCC staffers chose some more complicated things like isolating their own DNA and eyeball dissection. We also brought simpler things like Sink or Float, testing pH, making genes out of playdoh or making aluminum foil boats. My own booth was titled "Cheap and Simple Science" and we were very popular with our aluminum foil boats, predictions of whether or not items would float, keys to identify stuffed animal microbes, and investigations of Newton's Laws and sound. It just shows that in spite of this digital and "device" age, kids still like simple things like water! I have included the "directions" I provided my volunteers for the Newton and sound activities.

In talking with my elementary and middle school colleagues in MSTA, I realize that finding the time and money for science is getting even more limited than usual. I am encouraged by the new NGSS standards and their emphasis on inquiry. I am dismayed at how far behind the US is becoming in the world as far as producing qualified scientists. I hope with efforts such as LCC's and MSU's small contributions and with the amazing things our K-12 friends do that we can excite more students into pursuing a career in science as well as produce some of the outstanding scientists of the future.

continued on page 6

Exposing Young People to the Fun of Science

continued from page 5

Fun with Newston's Laws!

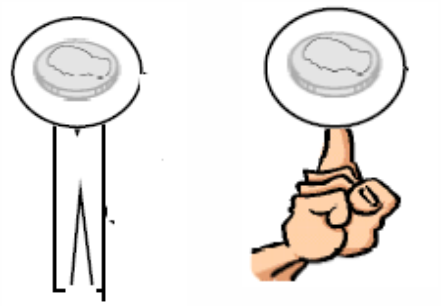
From Lu Ann Clark, MSTA Higher Education Director, Lansing Community College

Tricky Tricks

Try these tricks … without inertia they would not be possible.

Take a film can, an index card or piece of paper, and a penny or washer. Put the card on top of the cylinder and the penny centered over the cylinder on the card. Try to pull the card out from under the penny. What happens?

Now balance the penny or washer on a circle of paper on a clothes pin. Try to remove the paper but keep the penny balanced on the pin. Can you do it?



Now try it on your finger!

How does this relate to the magician trick of pulling the table cloth out from under the dishes?

Why don't the pennies & washers (or dishes) move?

Lincoln's Dive

1. Cut the cardstock paper into a long strip about .75 inches (2 cm) wide and form it into a hoop as shown. The paper should be stiff enough to hold the hoop shape on its own and the hoop works best when it is between 3-4 inches (8-10 cm) across.

2. For dramatic effect, fill the film canister with water and place on a level surface.

3. Place the hoop on the film canister as shown and balance the penny on the top of the hoop.

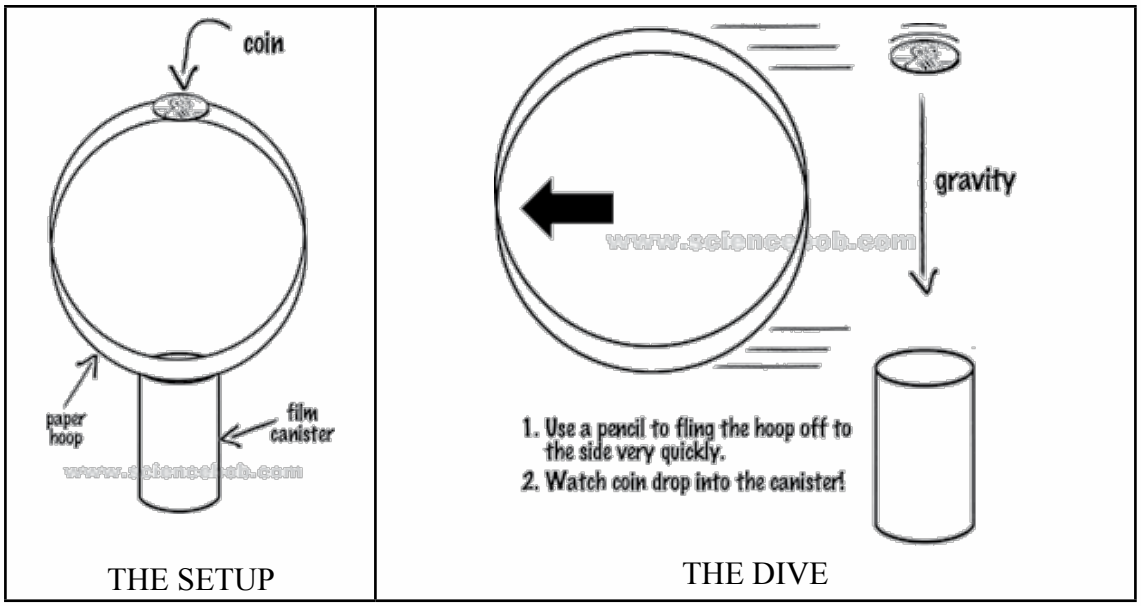
4. Time for Lincoln's big moment! Place a pencil through the center of the hoop and in one swift motion fling the hoop off to the side as pictured. If you do this correctly, the hoop will fly out of the way, and the penny will fall straight down into the canister with a splash. 10 points for Lincoln!

continued on page 7

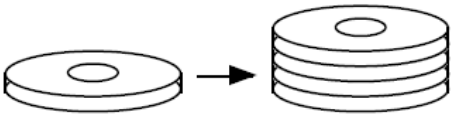
Exposing Young People to the Fun of Science

Fun with Newton's Laws!

continued from page 6



How does this demonstrate Newton's First Law?



Wacky Washers:

On a smooth slick surface, stack 4 washers in a "tower ". Aim one washer at the bottom of the stack with a good strong flick with your finger or hand. What happens?

Repeat by flicking 2 washers, one on top of the other at the stack. What happens?

Repeat with a stack of 4 washers flicked towards the stack of washers. What happens?

Aluminum Foil Boats

Make a boat out of the aluminum foil square you've been given.

Float it in the water.

See how many pennies it will hold before it sinks.

How could you improve this boat without using more paper?

continued on page 8

Exposing Young People to the Fun of Science

continued from page 7

Fun with Sound!

From Lu Ann Clark, MSTA Higher Education Director, Lansing Community College

Telephone

1. Use the telephone made with the paper cups and string.
2. Speak normally to someone on the other side of the room. Note how well you could or could not hear them.
3. Repeat but use the "phone". Did this change your ability to understand or hear the other person?

Chicken Sounds in a Cup.

1. Try this!

1. Cut a piece of yarn about 20 inches (40 cm) long.
2. Use the nail to carefully punch a hold in the center of the bottom of the cup.
3. Tie one end of the yarn to the middle of the paper clip.
4. Push the other end of the yarn through the hole in the cup and pull it through as shown in the picture.
5. Get a piece of paper towel about the size of a dollar bill, then fold it once and get it damp in the water.
6. Now it's time to make some noise! Hold the cup firmly in one hand, and wrap the damp paper towel around the string near the cup. While you squeeze the string, pull down in short jerks so that the paper towel tightly slides along the string. If all goes well - you hear a chicken!

continued on page 9

Exposing Young People to the Fun of Science

Fun with Sound!

continued from page 8

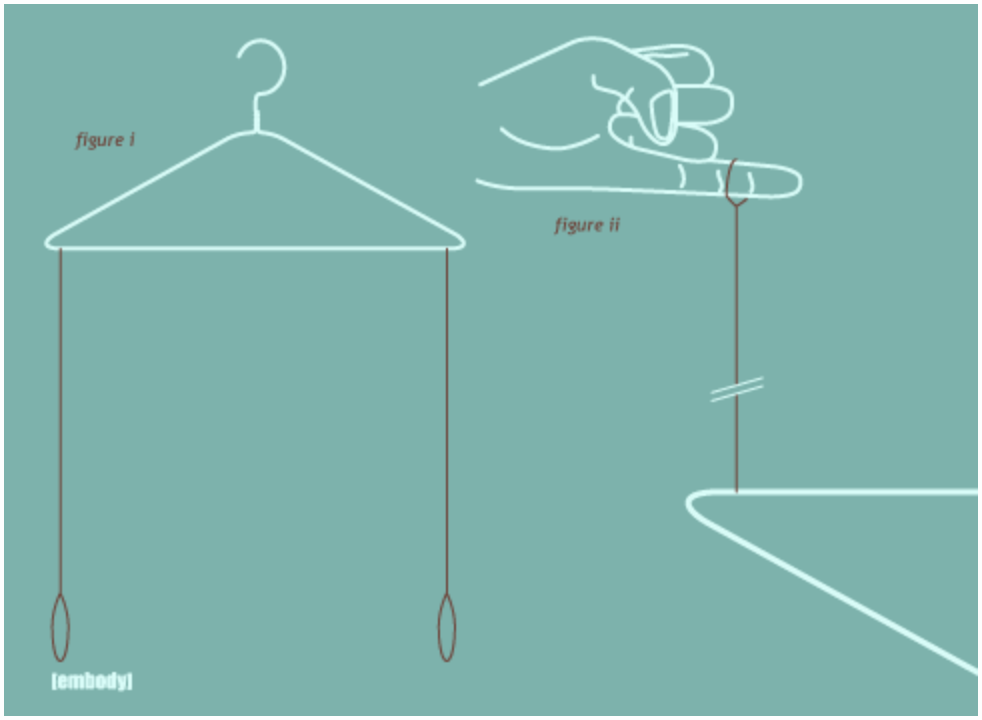
Wire coat hanger.

First, cut two 3-foot lengths of string or yarn. Next tie the two pieces to your coat hanger.

Here is important part. Twirl the loose end of the strings around your index fingers so that the yarn is wrapped snuggly around your finger tips several times. It is important that you leave enough slack in the string so that you can swing the coat hanger.

Now that you have the yarn wrapped around your fingers, position your index fingers near you ears so that the part of your finger with the yarn wrapped around it is next to your ear's opening.

Now that your fingers are in position, stand near a wall and swing the coat hanger so that it hits the wall. People around you will hear the sound of the coat hanger hitting the wall, but you will hear something quite different if your fingers are placed correctly.



2014 METRIC OLYMPICS

From June Teisan (Harper Woods Schools - grade 7 science) and Meredith Chicklas (Michigan State University Intern Educator)

As the 2014 Sochi Winter Olympics came to an end, our science class decided to hold our very own Mini-Metric Olympics- what better way to celebrate such a special and historic event! The Olympics provided teaching opportunities across the curriculum for students of all ages. Whether or not sports were of high interest to students, they enjoyed incorporating events that were taking place in Russia and gained recognition in our classroom. We focused our Olympic games in our science class and asked students to determine how closely they could match their estimated measurement to the actual measurement of the event they were competing in, using metric units adapted from a lesson from "AIMS - Activities Integrating Math and Science".

Working in small groups, electing a captain, and choosing a country to represent, students competed in four events: the Paper Straw Javelin Throw, the Paper Plate Discus Throw, the Cotton Ball Shot Put Toss, and the Sponge Squeeze (to measure expressed volume in mL). Each group elected one member to have a trial run, and used that as an example to make a prediction for their own efforts, keeping in mind that the objective was to get as close to their prediction as possible. After day one, countries elected one member to compete in the finals which took place the next day.

To extend the focus of our Mini Metric Olympics and make this a cross-curricular event, we had students work with iPads, answering questions about the country they chose to compete for, and then, in the closing ceremony, students shared interesting information they discovered about the history and culture of that nation. Although almost every subject could incorporate the Olympics in some way, and with the expansion and importance placed on the STEM subjects, this three day event was a great tool to promote interest while engaging students.

Sky Maps for Observing Planets and Bright Stars in Twilight, May through October 2014

From Robert Victor, Staff Astronomer (retired), Abrams Planetarium, Michigan State University

When organizing a first sky watching session for students, we suggest that you begin your outdoor session during evening twilight, so students can experience the joy of discovering and identifying the brighter stars as they first appear. Begin your session no later than one-half hour after sunset, or even earlier when the Moon or bright planets are visible, and continue until you have enough dark-sky time to observe the deep sky objects on your list.

If you also schedule a predawn session, allow time to observe a selection of deep sky objects before twilight begins. Start the session at least 1-3/4 to 2 hours before sunrise, and continue long enough into twilight to watch some of the brighter stars disappear.

My friend and former colleague at Michigan State University, Mr. Robert D. Miller, has kindly created computer programs and provided us with monthly sky charts tracking daily locations of the five naked-eye planets and the 15 stars of first magnitude or brighter visible from latitude 40° north. Positions of the stars and planets are plotted each day at the moment the Sun is 9° below the horizon, which we have called "mid-twilight". Locations of the planets are plotted as a separate dot for each day, with bolder dots plotted weekly on the 1st, 8th, 15th, 22nd, and 29th day of the month. Star positions during the course of the month are plotted as continuous tracks, with all stars drifting westward (left to right on the charts) in the course of the month, owing to the Earth's revolution around the Sun.

For latitude 40° N, the moment of evening mid-twilight during the course of the year occurs 43 to 53 minutes after sunset, and morning mid-twilight occurs a similar interval ahead of sunrise. For locations south of lat. 40° N, the same stage of twilight occurs closer to sunset and sunrise, and for locations farther north, twilights are longer.

Sometimes a star isn't up at evening mid-twilight at the start of a month, but might rise above the eastern horizon before month's end, for example Deneb in NNE in early May, and Antares in SE late in month. On the same chart, Rigel, Aldebaran, Sirius, and Betelgeuse adorn the western sky in mid-twilight at the start of May, but all sink below the horizon in the course of the month. Early in June, Procyon drops out of view, and by July 1 the Gemini Twins Pollux (and Castor, not shown) and the Mother Goat star Capella are heading for their exits, if not already lost in the bright twilight glow. With a large number of bright stars poised above the western horizon at dusk, April-May is a good time of year to start a daily checklist of stars seen, to track their annual disappearance into the twilight glow. A checklist is provided here [link].

Each of the evening and morning twilight charts for May through October 2014 is accompanied by a description providing: A ranking of the brightest stars and planets visible; brief accounts of the visually interesting conjunctions of planets with planets, and of planets with stars; and a list of dates the Moon passes by planets and stars. Details are provided on the two eclipses in October 2014, both widely visible in the U.S.

The Abrams Planetarium **Sky Calendar** for May 2014 and its evening star map are included to illustrate the events of this month with four planets readily visible in the early evening. For information on how to obtain future issues of the Sky Calendar, visit www.pa.msu.edu/abrams/skycalendar/

Check www.pa.msu.edu/abrams/msta/ for free downloadable information sheets, including an observer's log sheet; planet orbit charts and data tables for plotting the positions of the planets; a video of the changing sky at dusk in 2014; a video of the apparition of Comet Halley in 2061; and more.

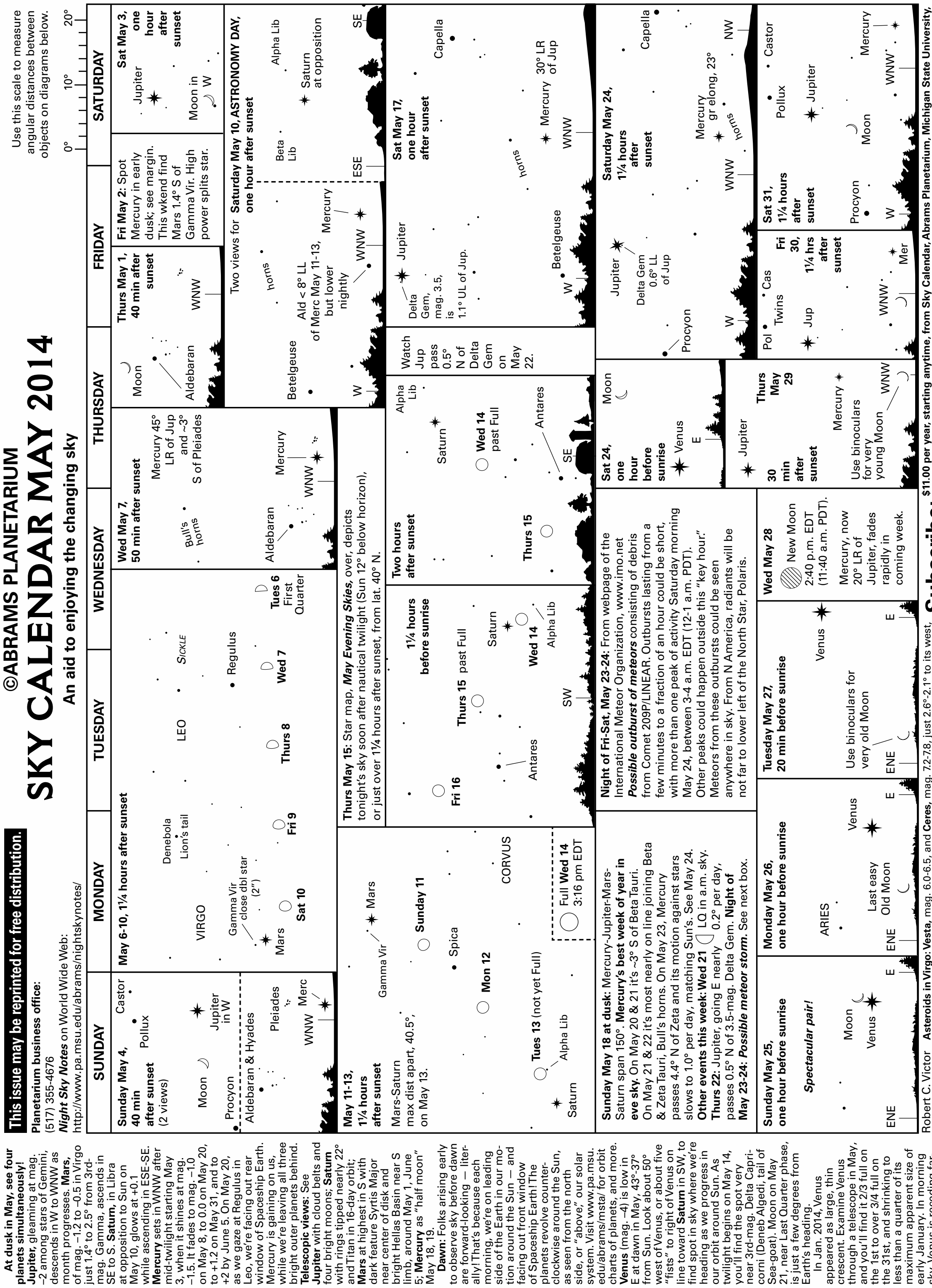
Robert C. Victor was Staff Astronomer at Abrams Planetarium, Michigan State University. He is now retired and enjoys providing skywatching opportunities for school children in and around Palm Springs, California.

Robert D. Miller, who provided the twilight charts, did graduate work in Planetarium Science and later astronomy and computer science at Michigan State University and remains active in research and public outreach in astronomy.

continued on page 12

Sky Maps

continued from page 11



This issue may be reprinted for free distribution.

Planetarium business office:
(517) 355-4676
Night Sky Notes on World Wide Web:
http://www.pa.msu.edu/abrams/nightskynotes/

©ABRAMS PLANETARIUM
SKY CALENDAR MAY 2014
An aid to enjoying the changing sky

Use this scale to measure angular distances between objects on diagrams below.

At dusk in May, see four planets simultaneously! Jupiter, gleaming at mag. –2 among stars of Gemini, descends in W to WNW as month progresses. **Mars,** of mag. –1.2 to –0.5 in Virgo just 1.4° to 2.5° from 3rd-mag. Gamma, ascends in SE to S. **Saturn,** in Libra at opposition to Sun on May 10, glows at +0.1 while ascending in ESE-SE. **Mercury** sets in WNW after mid-twilight starting May 3, when it shines at mag. –1.5. It fades to mag. –1.0 on May 8, to 0.0 on May 20, to +1.2 on May 31, and to +2 by June 5. On May 20, as we gaze at Regulus in Leo, we're facing out rear window of Spaceship Earth. Mercury is gaining on us, while we're leaving all three bright outer planets behind. **Telescopic views:** See **Jupiter** with cloud belts and four bright moons; **Saturn** with rings tipped nearly 22° and Titan in 16-day orbit; **Mars** at highest in S with dark feature Syrtis Major near center of disk and bright Hellas Basin near S limb, around May 1, June 5; **Mercury** as "half moon" May 18, 19.

Dawn: Folks arising early to observe sky before dawn are forward-looking — literally! That's because each morning, we're on leading side of the Earth in our motion around the Sun — and facing out front window of Spaceship Earth! The planets revolve counter-clockwise around the Sun, as seen from the north side, or "above," our solar system. Visit www.pa.msu.edu/abrams/msta/ for orbit charts of planets, and more. **Venus** (mag. –4) is low in E at dawn in May, 43°-37° from Sun. Look about 50° west of Venus, or about five "fists" to right of Venus on line toward **Saturn** in SW, to find spot in sky where we're heading as we progress in our orbit around Sun. As twilight begins on May 14, you'll find the spot very near 3rd-mag. Delta Capricorni (Deneb Algedi, tail of Sea-goat). Moon on May 21, near Last Quarter phase, is just a few degrees from Earth's heading.

In Jan. 2014, Venus appeared as large, thin crescent. Examine Venus through a telescope in May, and you'll find it 2/3 full on the 1st to over 3/4 full on the 31st, and shrinking to less than a quarter of its maximum apparent size of early January. In morning sky, Venus is receding farther ahead of us each day.

Robert C. Victor
ISSN 0733-6314

Asteroids in Virgo: Vesta, mag. 6.0-6.5, and **Ceres,** mag. 7.2-7.8, just 2.6°-2.1° to its west, in same binocular field! Finder chart & more: www.pa.msu.edu/abrams/ceresvesta

Subscribe: $11.00 per year, starting anytime, from Sky Calendar, Abrams Planetarium, Michigan State University, 755 Science Rd, East Lansing, MI 48824 or online at www.pa.msu.edu/abrams/SkyCalendar/

continued on page 13

Sky Maps

continued from page 12

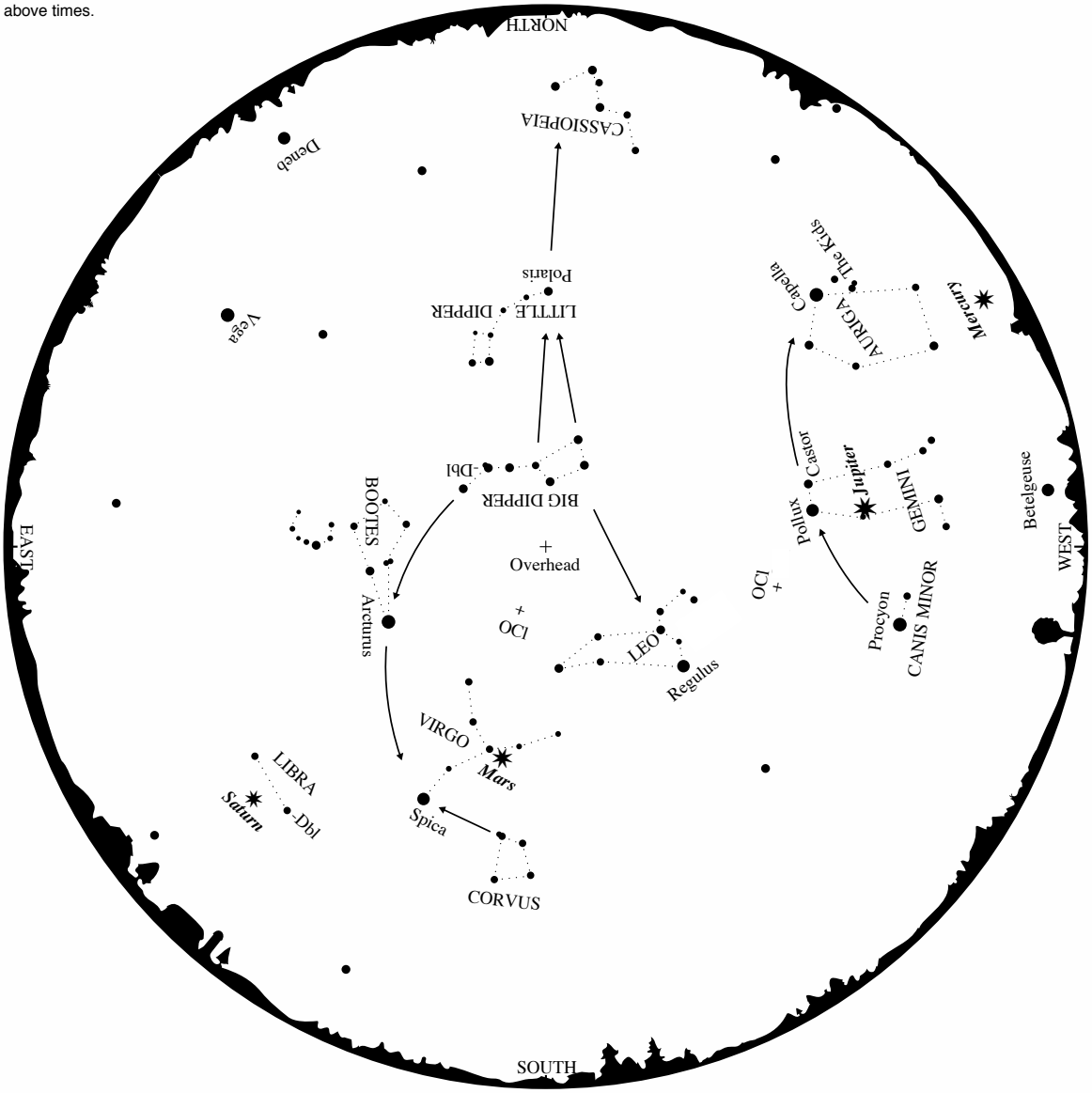
May Evening Skies

This chart is drawn for latitude 40° north, but should be useful to stargazers throughout the continental United States. It represents the sky at the following local daylight times:

Late April	11 p.m.
Early May	10 p.m.
Late May	9 p.m.

This map is applicable one hour either side of the above times.

Subscription: $11.00 per year, from ***Sky Calendar***, Abrams Planetarium, 755 Science Rd, East Lansing, MI 48824 or online at www.pa.msu.edu/abrams/SkyCalendar/



The planets Mercury, Mars, Jupiter and Saturn are plotted for mid-May 2014. Thirteen objects of first magnitude or brighter are visible. In order of brightness they are: Jupiter, Mars, Mercury, Arcturus, Vega, Capella, Saturn, Procyon, Betelgeuse, Spica, Pollux, Deneb, and Regulus. In addition to stars, other objects that should be visible to the unaided eye are labeled on the map. The double star (Dbl) at the bend of the handle of the Big Dipper is easily detected. The double in Libra is more challenging. The open or galactic star cluster (OCl) known as the "Beehive" can be located between the Gemini twins and Leo. Coma Berenices, "The Hair of Berenice," is another open cluster (OCl), between Leo and Bootes. Try to observe these objects with unaided eye and binoculars.

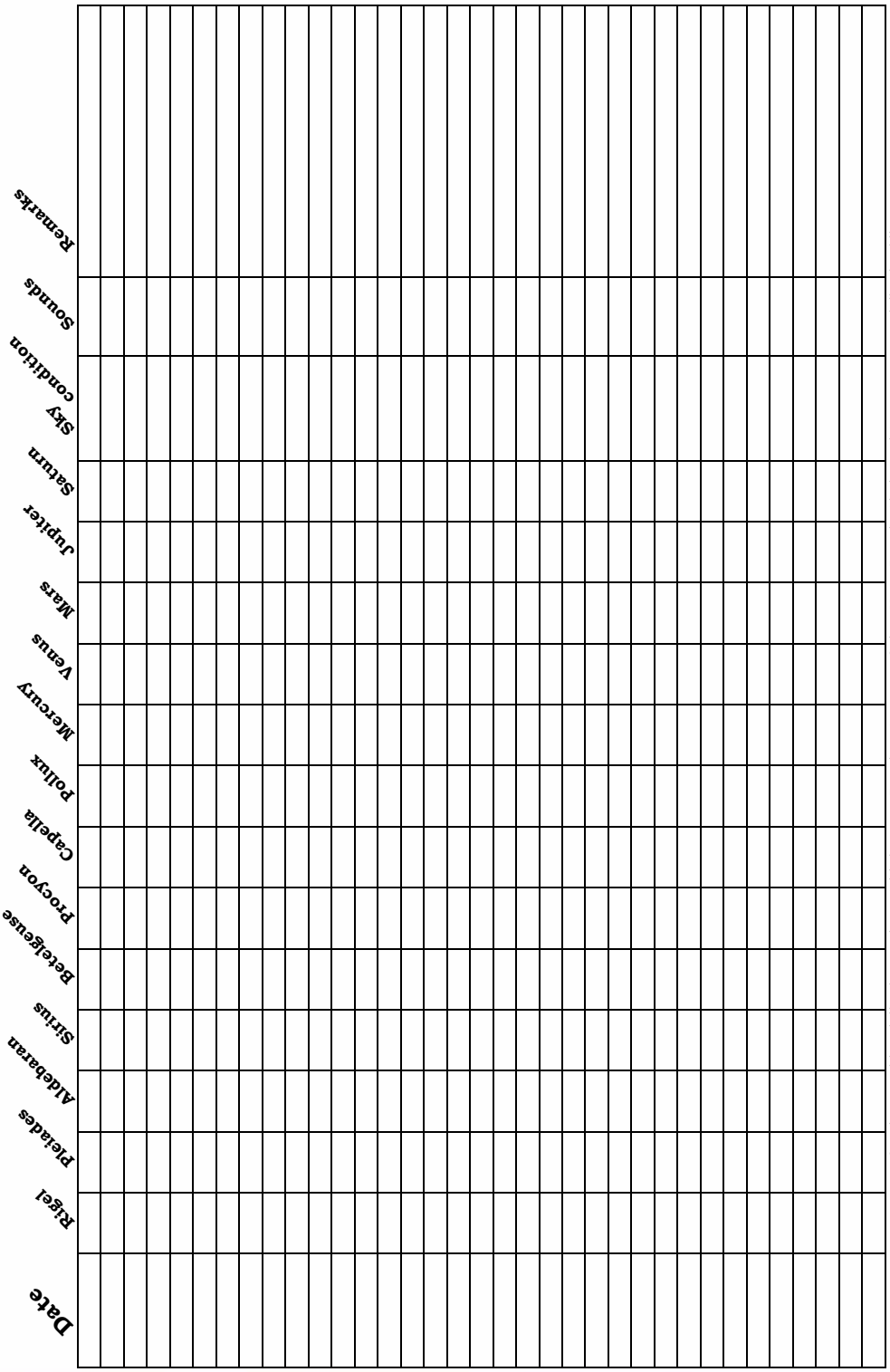
—D. David Batch

continued on page 14

Sky Maps

continued from page 13

Keep a daily log of your observations. It is suggested that you begin this activity by mid-April and continue until at least early June. Each evening during twilight, record stars and planets you can spot within 1-1/4 hours after sunset. When you see a star or planet, make a check mark in the appropriate column, or note the time you first see it. If you hear any sounds of nature, such as from birds, frogs, toads, or insects while you're out observing, list those too!



Continue making daily observations. Add the stars Regulus, Arcturus, Spica, Vega, Deneb, Altair, and Antares to your daily checklist.

Planets and Bright Stars in Evening and Morning Twilight, May through October 2014

From Robert Victor, Staff Astronomer (retired), Abrams Planetarium, Michigan State University

Following are sky charts depicting positions of the five naked-eye planets and 15 stars of first magnitude or brighter at evening and morning mid-twilight during May through October 2014. Descriptions are provided for each chart. These charts and a variety of other instructional resources and activities in astronomy are available at www.pa.msu.edu/abrams/msta/

May 2014 at dusk:

Five brightest: Jupiter, Sirius (while still visible), **Mercury** (but becomes fainter than Mars on May 8, and fainter than Arcturus on May 21), **Mars,** Arcturus.

Four planets simultaneously! Jupiter (mag. -2.0 to -1.9) descends in W to WNW. **Mars** (-1.2 to -0.5) ascends in SE to S. **Saturn,** passing opposition on May 10, shines at +0.1 for most of May, while ascending from ESE into SE. **Mercury** sets at or after midtwilight beginning May 3, while shining at mag. -1.5. The planet fades to mag. -1.0 on May 8, to 0.0 on May 20, to +1.2 on May 31, and then fades rapidly in June's first few days.

Stars: Many of winter's bright stars, in order Rigel, Aldebaran, Sirius, and Betelgeuse, depart during May, leaving Procyon, Pollux of Gemini, and Capella to linger into June. Regulus follows, from high south into well up in WSW sky. (As we look toward Regulus on May 20, we are facing out the rear window of Spaceship Earth.) Arcturus, Spica, and Vega adorn eastern half of sky. Deneb and Antares are added later in month. Antares is at opposition on May 30th.

Moon in evening near: Aldebaran on May 1; Jupiter on May 3 & 4; Regulus on May 7; Mars on May 10 & 11; Spica on May 11 & 12; Saturn on May 13; Antares on May 15; Mercury on May 30; Jupiter on May 31.

May 2014 at dawn:

Four brightest: Venus (mag. -4), Arcturus, Vega, **Saturn** (mag. +0.1). Those who rise early and get outdoors to look at the sky before dawn are forward-looking people - literally! That's because each morning, we are on the front side of the Earth with respect to our motion around the Sun - and facing directly out the front window of Spaceship Earth! This is a direct consequence of the Earth's rotating on its axis in the same direction as our planet's revolution around the Sun: Counter-clockwise, as seen from the north side, or "above" our solar system.

Planets and stars: Venus this month is 43° to 37° from the Sun. Round that off to 40°. So, if you look 50° west of Venus this month, or about five "fists" to the right of Venus on a line toward Saturn, you've found the spot in the sky where we're heading as we go forward in our orbit around the Sun. On May 14, if you look earlier in the morning to allow yourself to see fainter stars, you'll find the spot very near the 3rd-magnitude star Delta Capricorni (Deneb Algedi), tail of the Sea-goat. On May 21 the Moon near Last Quarter phase will be just a few degrees from the direction Earth is heading.

Venus passed nearly between Earth and Sun on Jan. 11, 2014, and for several weeks before and after that date, Venus appeared as a large, thin crescent. If you examine Venus through a telescope this May, you'll find it 2/3 full on May 1 to over 3/4 full on the 31st, and shrinking to less than a quarter of its apparent size in early January. In the morning sky, Venus is ahead of us, and getting farther ahead each day.

Saturn is at opposition to the Sun on May 10 this year, and Antares, heart of the Scorpion, appears at opposition on the night of May 30-31. As we follow our orbit curving between the Sun and these two bodies, they'll drift toward the western horizon, as will Arcturus in the west and eventually the Summer Triangle now overhead.

Moon in morning near: Saturn on May 14; Antares on May 15 & 16; Venus on May 25.

June 2014 at dusk:

Six brightest: Jupiter (-1.9 to -1.8), **Mars** (-0.5 to 0.0), Arcturus, Vega, Capella, **Saturn** (+0.2 to 0.4).

Planets: Jupiter, sinking nearly to WNW horizon, preparing to depart. **Mars** in S to SW. **Saturn** in SE to S. **Mercury** dropping in WNW and fading sharply from mag. +1.4 to +2.1 June 1-5.

Stars: In what remains of winter's collection, Procyon departs early in June, Capella nearly does so at month's end, depending on your latitude. Only Pollux (with nearby Castor, not shown) remain, to upper right of Jupiter. Regulus in WSW to W. Spica and Arcturus pass their high points in S. Antares ascends in SE. Altair rises N of E to lower right of Vega and Deneb, completing the Summer Triangle with them, in time for the season.

continued on page 16

Planets and Bright Stars

continued from page 15

Moon in evening near: Jupiter on June 1; Regulus on June 3 and 4; Mars on June 7; Spica on June 8; Saturn on June 10; Antares on June 11; Jupiter on June 28

(Moon very low in bright twilight).

June 2014 at dawn:

Four brightest: Venus at mag. -4 is the only planet up in morning mid-twilight. This brightest morning "star" appears low in E to ENE during June. Next in brightness are three stars all of magnitude zero: golden orange Arcturus setting in WNW; blue-white Vega just west of overhead; and yellowish Capella low in NE, ascending as month progresses.

Other stars: Altair and Deneb, joining Vega to complete the Summer Triangle overhead; Fomalhaut low in SE to S; Antares, heart of Scorpius, setting in SW early in month; and Aldebaran, eye of Taurus, emerging below Venus late in month.

Moon in morning near: Venus on June 24; Aldebaran on June 25.

July 2014 at dusk:

Four brightest (excluding **Jupiter** and Capella, on horizon): Arcturus, Vega, **Mars** (0.0 to +0.4), **Saturn** (+0.4 to +0.5).

Planets: Can you spot **Jupiter** in WNW at start of month, before it departs? Reddish **Mars in SW passes 1.3° N of blue-white Spica on July 13, the spectacular finale of their triple conjunction.** It will be fascinating to follow this colorful pairing for several evenings, as they'll be separated by no more than 5° during July 3-22, and 10° June 19-Aug. 1. **Saturn** is in S to SSW, 23° to upper left of the close Mars-Saturn pair on July 13.

Stars: Pollux reaches NW horizon early in month, Regulus sinks nearly to WNW horizon at month's end. Arcturus high in S to WSW; Spica in SW near Mars; Antares reaches high point low in S. Summer triangle ascends in E, as befits its name.

Moon in evening near: Regulus on July 1; Mars and Spica on July 5 (a spectacular trio!); Saturn on July 7.

July 2014 at dawn:

Five brightest: Venus; Mercury (after it brightens past mag. 0 at midmonth); Vega, Capella, Rigel (after it appears late in month).

Planets (both in ENE): Venus, shining nearly at mag. -4, dominates morning sky. Mercury is easy to find, especially when it's within 7° lower left of Venus July 12-20.

Stars: The Summer Triangle of Vega-Altair-Deneb, visible all night in all of July, is high in the western sky at dawn and descending as month progresses. Fomalhaut, Mouth of the Southern Fish, swims westward low in the south. **Aldebaran, eye of Taurus, is just 4° S (lower right) of Venus on July 1** and ascends the eastern sky all month as Venus remains low. Far to upper left, Capella ascends in the NE. Late in month, Betelgeuse and Rigel, shoulder and foot of Orion, emerge above the eastern horizon. (Look midway between them at an earlier stage of twilight for a vertical line of three stars, Orion's belt!) Farther north, find Pollux (with Castor 4.5° above). Pollux is just over 6° N (upper left) of Mercury on July 28 and 29.

Moon in morning near: Aldebaran on July 22; Venus on July 24; Mercury on July 25.

August 2014 at dusk:

Five brightest: Arcturus, Vega, **Mars** (+0.4 to +0.6), **Saturn** (+0.5 to +0.6), Altair.

Planets: Finally, we have our first mutual conjunction of naked-eye planets in the evening sky this year, as **Mars passes 3.4° S of Saturn on Aug. 25,** in SW sky. At dusk on Aug. 31 the crescent Moon forms a pretty gathering with Mars and Saturn, several hours after a daytime occultation of the ringed planet.

Stars: Arcturus, Spica, Antares in W half of sky, sinks lower as month progresses. Summer Triangle of Vega, Altair, and Deneb, well up in E, ascends still higher.

Moon in evening near: Spica on Aug. 1 & 2; Mars on Aug. 2 and 3; Saturn on Aug. 3 and 4; Antares on Aug. 5; Spica on Aug. 29; Mars and Saturn on Aug. 31, a nice trio!

August 2014 at dawn:

Five brightest: Venus; Jupiter and Sirius, once they appear; Vega and Capella.

Planets: A spectacular, close pairing of the two brightest planets, Venus and Jupiter, will provide much enjoyment for morning twilight skywatchers in August. Try to catch emerging Jupiter on earliest possible date. On Aug. 8, watch for Jupiter rising in ENE within 10° lower left of Venus and moving about 1° closer to it each day. By Aug. 13, the planets are only 5° apart. Look daily and enjoy the show! **From central U.S. at mid-twilight on August 18, the two bright planets will appear closest, within 0.3° apart!** They'll spread to just over 5° apart by Aug. 23, when a waning crescent Moon appears to their right, within 6° to 9° away.

continued on page 17

Planets and Bright Stars

continued from page 16

Stars: As this month begins, we see the Summer Triangle in W to NW, and Fomalhaut in SSW to SW, sinking lower with each passing day. In the eastern sky, as August opens, we're already seeing Capella, Aldebaran, and Orion's Betelgeuse and Rigel as described in the opening lines of Robert Frost's poem, *The Star Splitter;* and we're also seeing Venus, and Pollux. Being added to the spectacle early this month are Jupiter, Procyon, and Sirius. On many long-ago August mornings, I enjoyed finding out by observation on which date I could first spot Procyon, the "before the Dog" announcer of Sirius, and then Sirius itself a few mornings later.

If you look at just the right time, you can see the Winter Triangle and Summer Triangle simultaneously, just after Sirius rises and before Altair sets. There are then 11 of the 15 stars of first magnitude or brighter visible from mid-northern latitudes above the horizon simultaneously.

Moon in morning near: Aldebaran on Aug. 18; Venus and Jupiter on Aug. 23, a brilliant gathering!

September 2014 at dusk:

Five brightest (ignoring **Mercury** near mag. 0, but very low): Arcturus, Vega, **Saturn** (+0.6), **Mars** (+0.6 to +0.8) fading to equal Altair (+0.8).

Planets: Mercury 0.6° S of Spica on Sept. 20, but very low in this poor apparition of Mercury for mid-northern latitudes. **Mars passes 3.1° N of Antares on Sept. 28, with a crescent Moon nearby on the next evening.** Compare color and brightness of Mars and Antares ("rival of Mars") for several evenings around the date of their closest approach.

Stars: Spica departs in WSW, Arcturus remains prominent in W, Antares sinking in SW, Summer Triangle approaching overhead, and Fomalhaut rises in SE at month's end.

Moon in evening near: Antares on Sept. 1; Saturn on Sept. 27; Mars and Antares on Sept. 29.

September 2014 at dawn:

Four brightest: Venus near mag. –4, but in bright twilight and sinking out of sight at our mid-twilight viewing time during third week; **Jupiter** near mag. –1.8 and climbing in the east will take over the reigns. Next in brightness are Sirius in SE to SSE, and Capella nearly overhead.

The latter two stars are the southernmost and northernmost of the huge "Winter Hexagon", in clockwise order, Sirius, Procyon, Pollux (and Castor, not shown), Capella, Aldebaran, Rigel, and back to Sirius. Betelgeuse, Orion's shoulder, resides within the Hexagon. Regulus, the heart of Leo, the Lion, follows the Hexagon across the sky, as if to chase his next meal, with the twins of Gemini, Orion and two dogs, a chariot driver, and Taurus the Bull as possible menu options. Find emerging Regulus just 0.8° south (lower right) of Venus on Sept. 5. The only other star of first magnitude visible in September's dawns is Deneb in NW, the last star of the Summer Triangle to set.

Moon in morning near: Aldebaran on Sept. 15; Jupiter on Sept. 20; Regulus on Sept. 21.

October 2014 at dusk:

Six brightest: Arcturus, Vega, Capella (late in month), **Saturn** (+0.6 to +0.5), Altair, **Mars** (+0.8 to +0.9).

Planets: Saturn departs in WSW near month's end. Mars is still near Antares in SW early in month.

Stars: Arcturus in W to WNW. Antares in SW, Summer Triangle overhead, Fomalhaut low in SE, Capella rising in NNE, date depending on your latitude.

Moon in evening near: Saturn on Oct. 25 (low); Antares on Oct. 26; Mars on Oct. 27 & 28.

October 2014 at dawn:

Five brightest: Jupiter (mag. –2); Sirius; **Mercury** ranks next after it brightens past mag. 0 on Oct. 28; Arcturus after it emerges late in month; Capella.

Planets: Jupiter climbs very high through SE sky in Oct. Mercury emerges S of E as a faint +1.5 mag. S on Oct. 23, and brightens rapidly to mag. –0.6 by month's end. Mercury will pass 4° N of Spica on Nov. 4.

Stars: The Winter Hexagon described last month, with Betelgeuse inside, reaches its highest position at dawn this month. Bright Jupiter and faint Regulus are in hot pursuit. Arcturus, Mercury, and Spica, in that order, appear above the eastern horizon as October passes.

Moon in morning near: Aldebaran on Oct. 12; Jupiter on Oct. 17 & 18; Regulus on Oct. 18 & 19.

continued on page 18

Planets and Bright Stars

continued from page 17

October's two eclipses

There are two eclipses in October 2014. First is a **total lunar eclipse in the predawn hours of Wednesday, October 8.** (Set your alarm when you turn in for the night on October 7.)

Here are the times for the various stages of the lunar eclipse for the Eastern Time Zone. Moon's position in the sky is given for East Lansing, Michigan.

Stage of eclipse	Time	Moon's Azimuth	Altitude
Moon enters umbra	5:15 a.m. EDT	252°	26°
Total eclipse begins	6:25 a.m. EDT	265°	14°
Deepest eclipse	6:55 a.m. EDT	270°	9°
Total eclipse ends	7:24 a.m. EDT	274°	4°
Moon leaves umbra	8:34 a.m. EDT	[below horizon in Michigan]	

As totality begins in East Lansing, Michigan, Uranus (mag. 5.7) should be visible in binoculars nearly 1.0° to the left of the top of the eclipsed Moon. A medium to high power telescope reveals the planet's disk, 3.7 arcseconds across. As morning twilight brightens in Michigan, the totally eclipsed Moon may just fade into invisibility. Totality ends within 20 minutes before sunrise in East Lansing.

October's second eclipse is a partial solar event in the late afternoon on Thursday, October 23. The times of the eclipse stages depends on your location. In East Lansing, MI the eclipse begins at 5:37 p.m. EDT, as the Moon's disk makes first contact with the right edge of the Sun's disk. Greatest eclipse occurs near sunset, 6:43 p.m. EDT in East Lansing, with the Moon's disk covering the upper right portion of the Sun's disk. If you have an unobstructed view of the horizon 15°-16° south of due west, deepest observable coverage of the Sun's disk will occur about 2-3 minutes before sunset, with the Moon covering 55 percent of the solar diameter, or 44 percent of the disk area.

By coincidence during the solar eclipse, Venus lies 1.1° almost due north (upper right) of the Sun's center. Superior conjunction of Venus (beyond the Sun) occurs in the predawn hours of October 25. In December 2014, Venus will begin to be visible soon after sunset.

Robert C. Victor was Staff Astronomer at Abrams Planetarium, Michigan State University. He is now retired and enjoys providing skywatching opportunities for school children in and around Palm Springs, California.

Robert D. Miller, who provided the twilight charts, did graduate work in Planetarium Science and later astronomy and computer science at Michigan State University and remains active in research and public outreach in astronomy.

Addressing Student Misconceptions Using Modeling Instruction

From: Michelle Okroy, Chemistry and Physics Teacher, Warren Woods Tower High School

As we approach the implementation of the Next Generation Science Standards, students will be required to develop models to illustrate what occurs at an atomic level as well as apply various mathematical representations in order to explain a science-based concept. However, what opportunities are we providing our students to allow them to explain what they know about a concept? Students should be provided with regular opportunities to develop and explain concepts, which in turn will allow teachers to formatively assess and address misconceptions.

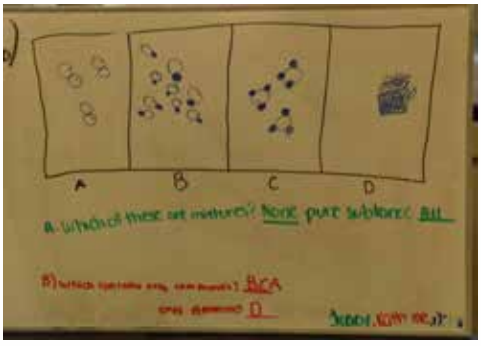
Modeling Instruction is a methodology that focuses on engaging students, through laboratory experiments, to develop scientific models in order for students to generate their own explanations based on student dialogue and observations. During the learning process, students drive their own education through constant communication and representation of data. The Modeling Instruction makes learning implicit; the students can infer answers from material provided, rather than through explicit answers found directly on the page. When students are made to think critically, they have a better, more meaningful understanding of the material.

As students adapt to becoming analytical thinkers, we must provide them with a platform in which they are comfortable expressing their ideas. Modeling Instruction provides this integral platform in the form of regular class discussions, in which students are responsible for asking their peers questions as well as explaining how they determined their own answers.

During a class discussion, each student group is given a problem to present on their whiteboard. In addition to providing an answer to their designated question, the group will also be responsible for providing an explanation as well as address any questions their peers may have. Within this classroom environment, teachers, as well as the students, should anticipate higher levels of questioning as well as explanations, as they address models as a whole and not just as fragmented facts.

This method of instruction provides the students with the opportunity to formulate their own conclusions and ideas based not only on what their group thought but what others thought as well. The role of the teacher during the discussion is to facilitate and ask additional questions in order to assess the students.

It is expected that students will initially struggle with class discussions because they may be inexperienced with explaining their conceptual ideas in this setting. However, teachers can assist in the transition by providing students with discussion guidelines and questioning techniques so they will know the expectations set forth.



The primary goal that the teachers should expect is a shift in the class dynamic as all students will be responsible to communicate their observations as they transition to a model-based curriculum. Teachers should observe an increase in engagement level as students will be required to collaborate with their peers, both within the classroom as well as on optional digital components such as class blogs or websites. This long-term approach to instruction will not only prepare school districts for the introduction of the Next Generation Science Standards but it will also provide students with the opportunities to develop models in order to explain the physical world.

Please note that classroom discussions are only one component of Modeling Instruction. For more information about Modeling Instruction, please visit the American Modeling Teachers Association at http://modelinginstruction.org/.

continued on page 20

Addressing Student Misconceptions

continued from page 19

Discussion Participation Rubric

Science is meant to be collaborative with plenty of ideas and observations to discuss. Here are a few reminders of how you will be graded on a daily basis:

Assignment (Points vary based on number of questions)

- An assignment is fully completed with work shown and units provided
- An assignment is completed before the discussion takes place
- Revisions are shown, in a different color, and all possible answers are provided
- I realize that if any of the above components are missing, points will be deducted

Whiteboard Discussion (5 points per discussion)

- I participated in the creation and display of my group's problem/question. Contents of the whiteboard are legible and are large enough to read across the room
- When presenting, I spoke about our group's problem/question
- While others are presenting, I am respectful by actively listening by making eye contact and free of distractions
- I ask questions when a group's problem/question is different than mine
- I do not interrupt others and/or distract others from the discussion
- I realize that if I fail to contribute in any of the above, points will be deducted

Lab Notebook (Points go towards completed labs)

- All notes written on the board and/or verbally discussed, are written in my lab notebook
- I realize that I can refer to my notes when working on assignments and labs
- I realize that if I fail to contribute in any of the above, points will be deducted

Questions to Ask During a Discussion

In order to truly comprehend the various topics covered in class, it is essential that you actively participate in the class discussion. As part of you weekly participation grade you will be responsible for completing an assignment, contributing to the group whiteboard, and participating in the class discussion.

You will be responsible for asking your peers questions as they present their whiteboard problems. If you think their solution (or part of it) is wrong, try to "point out" the possible error through asking a question.

Use the following stems to help form your questions. Your will be required to ask questions throughout each unit. Keep in mind, you can always ask a question that you already know the answer to.

THIS SHEET SHOULD BE OUT DURING EVERY DISCUSSION

Clarification Questions

- **How do you know…..?**
- **Where did you get…..?**
- **Why did you do….?**
- **What does….tell you?**
- **What does…mean?**
- **Where on your (equation, graph, illustration)…?**

Explanation Questions

- **What if we changed….?**
- **How is the problem similar to….?**
- **How is the problem similar to….?**
- **How does….compare to…?**
- **Is there another way to do this problem? If so, please show us that method.**

Remember, when your classmates are sharing, please phrase those "accusations" as QUESTIONS.

Are You Prepared...

to Teach in the 21st-Century Classroom?

Lawrence Technological University Can Help!

Master of Science Education

- $1,320 per course scholarships for all K-12 educators (DI or non-DI endorsement).
- Most courses offered online and asynchronous, with a science experiment component to be completed using science kits and activities.
- 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.

Master of Educational Technology

- $1,320 per course scholarships for all participants.
- 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.
- Training and Performance Improvement track (30 credits) and graduate certificates (12 credits) in Instructional Technology and Workplace Technology* are available.

**Also offered online*

Explore over 100 undergraduate, master's, and doctoral programs in Colleges of Architecture and Design, Arts and Sciences, Engineering, and Management.

For more information on these and other science programs, visit **www.ltu.edu/sciences**

Waive your application fee at **www.ltu.edu/applyfree**

Lawrence Tech
THEORY AND PRACTICE 1932
Possible is everything.

2014 America's Best Universities U.S. News & World Report
2014 Best Colleges in the Midwest Princeton Review
2014 Military Friendly School G.I. Jobs

Lawrence Technological University | Office of Admissions
21000 West Ten Mile Road, Southfield, MI 48075-1058 | 800.225.5588 | admissions@ltu.edu | **www.ltu.edu/sciences**

Curriculum Ideas

"Elements 4D"

From Jennifer Richmond, Region 9 Director jlzrichmond@gmail.com

If you are preparing to teach your students about the Periodic Table of Elements, there's "an app for that"! A fantastic, visual way to help your students understand what the elements are and how they interact can be found in the "Elements 4D" app for IOS and Android devices.

Rather than having students memorize a static chart with letters, atomic numbers, and other information that students may have difficulty relating to, download the app, print off the paper blocks, and get ready to be amazed! The "Elements 4D" app uses something called Augmented Reality (AR) to bring chemistry come to life!

By printing and assembling the free paper blocks, students can learn about 36 naturally-occurring elements. Information about the element, including its atomic weight and physical properties, comes up immediately on the device's screen. Other fun facts are also provided by the app when selected.

One final and perhaps the most impressive piece of this app is that when two of the paper blocks are touched together, the app shows how those two elements would react. The app instantly provides the chemical equation of the reaction, showing the catalyst, reactants, and resulting compounds of each interaction.

A once static and unengaging lesson on the periodic table of elements can now be brought to life with this free and amazing app. Check it out today if you have access to a mobile device!

Links:
Elements 4D in the iTunes App Store: https://itunes.apple.com/us/app/elements-4d-by-daqri/id782713582?mt=8
Elements 4d in the Google Play Store:
https://play.google.com/store/apps/details?id=com.daqri.elements4dbydaqri
Elements 4D Paper Blocks:
http://daqri.com/elements4D-paper-blocks

DAILY REMINDER.....

from Kim Mitchell, U.S. Fish and Wildlife Service Kim_Mitchell@fws.gov

Endangered Species Daily Facts

Daily facts focus on threatened and endangered species of the Upper Midwest as well as facts about the Endangered Species Act and foreign species. They are written for an audience of about 4th grade through adults and run the gamut from specific species' biology, to life history, to conservation needs. To sign up for a daily email or to follow us on twitter, go to http://www.fws.gov/midwest/ESdaily.html. A calendar of the facts can be seen at http://www.fws.gov/midwest/endangered/ESDaily/.

The Endangered Species Daily Facts are prepared by U.S. Fish and Wildlife Service biologists working in the Upper Midwest. The Service is the primary federal agency responsible for administering the Endangered Species Act. Websites with more information about endangered species can be found at www.fws.gov/endangered and www.fws.gov/midwest/endangered.

Curriculum Ideas

NEW PUBLICATION FOR CHEMISTRY TEACHERS!!

From Deanna Cullen, Whitehall High School

In September of 2013, the *American Chemical Society* voted to fund a new American Association of Chemistry Teachers (AACT). This professional organization will be designed by the K-12 chemistry education community to support its members. Initial plans include customized curricular resources, a peer-reviewed periodical, and opportunities for networking and information exchange. The *ACS* plans to roll out the new association in September of 2014. Teachers have been promised a lower, more accessible membership fee.

This is a watershed moment for the chemistry education community. Biology and physics teachers have enjoyed associations of their own for some time. I am happy to have an opportunity to collaborate more directly with other chemistry teachers across the country. You can read more about my perspective on AACT in the January issue of the *Journal of Chemical Education*. The January issue happens to be freely available to the public without a subscription. Several members of the chemistry community have offered their perspectives on AACT within the issue. Dr. Joseph Lagowski offers a lyrical history of how the *American Chemical Society*, the *Journal of Chemical Education* and the high school division of *ACS* came into existence and progressed into what they are today. There are many other articles of interest to high school teachers in the free issue including laboratories and activities that can be used in the classroom.

If you are interested in receiving updates and membership details for AACT, you can register for information. If you have questions or want to get involved, email *ACS* at aact@acs.org.

Professional Opportunities

Coming Soon to Your Region ...

From Paul Drummond, MSTA Membership Chairperson

MSTA Presents!

The MSTA mission is to stimulate, support, and provide leadership for the improvement of science education throughout Michigan and the organization has been faithful to that mission for over sixty years. It is well known that the MSTA hosts one of the top three statewide science education conferences in the United States. Throughout the years this professional development conference has grown in scope and has evolved as science and technology have evolved over the years. So, it should come as no surprise that the board has undertaken a new initiative to provide additional professional development opportunities outside the conference event itself.

For the past year and a half the Membership committee has been working with the MSTA Regional Directors to develop a program whereby members and non-members alike could have access to more professional development to meet their needs in the changing landscape of the classroom and science education. To that end, MSTA is collaborating with Vernier to rollout a series of workshops which will be hosted at various locations around the state. The first series of workshops will focus on the infusion of technology in science instruction at the elementary and middle school levels, and will be facilitated by Vernier software and technology specialists.

The first session will take place on Monday, June 23 at the Macomb Intermediate School District, in Clinton Township. The committee is working to establish workshop venues in western and northern Michigan, and the Upper Peninsula. Flyers and announcements will be sent to members via eblasts by MSTA and Michigan Science Matters Network. You will also be able to find them at the MSTA website.

These are exciting times for science education and the MSTA is right in the middle of the action. Please let us know what your professional development needs are by contacting your Regional Director. You can also contact Paul Drummond, MSTA Membership Chair at paul_drummond@msta-mich.org.

MSTA Presents…

Teaching Science with Technology

A professional development opportunity from the Michigan Science Teachers Association (MSTA) for Elementary and Middle School Teachers

Elementary and middle school teachers learn how to infuse Vernier sensors and technology with Legos, Kidwind Wind Turbines and more. Rock your classroom no matter what grade level you teach.

Date: June 23, 2014

Time: 9:00 AM – 3:00 PM (registration will begin at 8:30)

Location: Room 207 A & B
Macomb Intermediate School District,
44001 Garfield Rd., Clinton Twp, MI 48038

Registration: MSTA Member Fee - $10
Non Member Fee - $50, includes membership in MSTA
Pre-service Students - $25, includes membership in MSTA

Presented by: Vernier Software & Technology Specialists

For registration and program information contact:

- Paul Drummond at pdrummond15@gmail.com
- Sue Campbell at 734-973-0433

You can also visit us online at www.msta-mich.org.

SCECH credits available for $10

MICHIGAN SCIENCE TEACHERS ASSOCIATION

Vernier

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, 2014
- 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, 2014.
- Projects MUST be completed by June 12, 2015.
- 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 12, 2015.

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 June 27, 2014.

Mail to: Mr. Thomas P. Waclawski, 5975 Donna Court, Traverse City, MI 49684,
Phone: 231-943-4804, Email: ka8ylktom@chartermi.net

President Obama Welcomes Top Science and Math Teachers to the White House

By Fae Jencks, Confidential Assistant at OSTP

President Barack Obama meets with Presidential Award for Excellence in Math and Science Teaching winners in the East Room of the White House, March 3, 2014. (Official White House Photo by Pete Souza)

For 101 of the Nation's top science and math teachers, Monday was not your typical snow day. While DC-area students spent the day at home, the winners of the Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST) trekked through the slushy streets of Washington to spend time with President Obama at the White House.

These outstanding teachers came from far and wide to be recognized for their tireless work to equip America's students with the skills they need to grow into the next generation of innovators and science, technology, engineering, and math (STEM) professionals.

This Presidential Award is the U.S. Government's highest honor for K-12 math and science teachers. In December, President Obama announced this year's 102 winners, who represent all 50 states, the District of Columbia, Puerto Rico, and the Department of Defense Education Activity. These phenomenal educators were selected from a pool of more than 950 applicants by a distinguished panel of leaders in STEM education at both the state and national level.

Before meeting with President Obama, the teachers kicked off a three-day visit to Washington, DC, with a conversation about the future of STEM education in America with experts from the Department of Education, and participated in several professional development workshops with leaders from the National Council of Teachers of Mathematics, the American Institute of Physics, the American Physical Society, and the National Oceanographic and Atmospheric Administration. Then, on Wednesday morning, the teachers received their award during a ceremony at the National Academies of Science.

As President Obama noted in his remarks to the awardees, the Administration is committed to continuing to cultivate highly skilled STEM teachers to train America's future innovators, engineers, and discoverers. The President's FY 2015 Budget proposes $40 million for a new competition by the Department of Education to support effective STEM teacher preparation and make progress on his goal to train 100,000 STEM teachers, and $20M to launch a pilot of the STEM Master Teacher Corps. In addition, events like the White House Science Fair, upcoming White House Maker Faire, and White House Film Fest continue to inspire students and provide them with new platforms to network, learn, and grow.

The Office of Science and Technology Policy (OSTP) extends warm congratulations to this year's PAEMST awardees. We look forward to your continued efforts to inspire and grow the next generation of STEM innovators. Keep up the good work!

Professional Opportunities

Science teacher retires to take on a new role in education

By April Lehmbeck, C & G Staff Writer

Middle School science teacher June Teisan is a bit emotional about leaving her Harper Woods classroom behind, but she feels that she's being pulled in a new direction, one where she will continue to work on the side of students and education in this country.

Teisan will retire at the end of this school year and pack up her science classroom, but she's headed to Washington, D.C., after being chosen for an Albert Einstein Distinguished Educator Fellowship Program Award.

"Ms. Teisan has been an exceptional teacher throughout her career in Harper Woods Schools," Harper Woods Superintendent Todd Biederwolf said in an email. "She has been an educational innovator, a mentor to colleagues and to those pursuing careers in teaching, and a strong voice in the area of educational policy. We look forward to her continued support of Harper Woods Schools and public education in Michigan as she transitions to her new role as an Einstein Fellow."

Principal Tonya Norwood said that she remembers walking into Teisan's classroom for the first time earlier in the school year. She said that it felt like she was walking into a forest, because it was so beautiful.

Teisan brings science into her classroom with hands-on experiences and living animals in different parts of the room.

"I know that she is really going to miss what she does in the classroom," Norwood said.

Through the fellowship, Teisan will spend 11 months working with the National Oceanic and Atmospheric Administration, Office of Education. The Triangle Coalition created a news release of the fourteen science, technology, engineering and mathematics (STEM) teachers who were chosen as Einstein Fellows across the nation to serve at various federal agencies.

Teisan was the only teacher from Michigan chosen.

After 27 years in the district, she said that the decision to leave Harper Woods wasn't easy, but she felt God was sending her a message when she received not just the one offer, but three job offers in one day.

"God didn't just open a door; he threw open a garage-sized door," she said.

"It's hard to move on. It's hard to move away," she said. "Harper Woods has been a great home for so many years."

Teisan applied late last year. She was chosen as a finalist and flew to Washington, D.C., for a round of interviews. Then, she found out that she was chosen for different opportunities. Her plans are to work to continue to open the door to STEM fields for those who are underrepresented in those fields, like women and minorities. With her experience, she is able to focus on younger students more so than those who are already getting that attention.

Harper Woods Middle School teacher June Teisan is retiring to take on a new role in Washington, D.C. Above, she stands with Harper Woods Middle School students a couple of years ago near a waterway where they conducted research.

While in the nation's capital, she has plans to visit decision-makers in education in the Legislature and other departments to try to talk about what she considers too much reliance on testing.

She said a year's worth of learning cannot be assessed in one test.

"Kids are not a number," Teisan said.

When she leaves Harper Woods, she said she'll miss the staff, students and families, who have all been supportive. She'll miss being a science teacher, which she calls a job where she gets "the most toys that you get to play with, with the kids."

"It will be a big change," she said.

When talking about that big change and leaving her post in Harper Woods, Teisan wiped away tears.

Working with the kids is going to be something she misses every day, she said. It's a job where, she said, you want "to show them that there's a smiling face at the door that you can count on."

"There's a dynamic when a classroom is running at optimal levels, when kids are focused on what they're doing … when you have those 'aha' moments," she said.

"They're just so full of promise and hope and talent," Teisan said of the students.

Yet, she doesn't feel like she's leaving them behind.

"I'm bringing them with me when I go to represent them in D.C.," Teisan said.

— Reprinted with permission from C & G Newspapers

FEATURED ARTICLE!!

Data Literacy Tools Abound: Fostering and Enhancing Data Literacy through Visual Representation

From Bill Dinkelman, MSTA Technology Chair, Ottawa Area ISD bdinkelm@oaisd.org

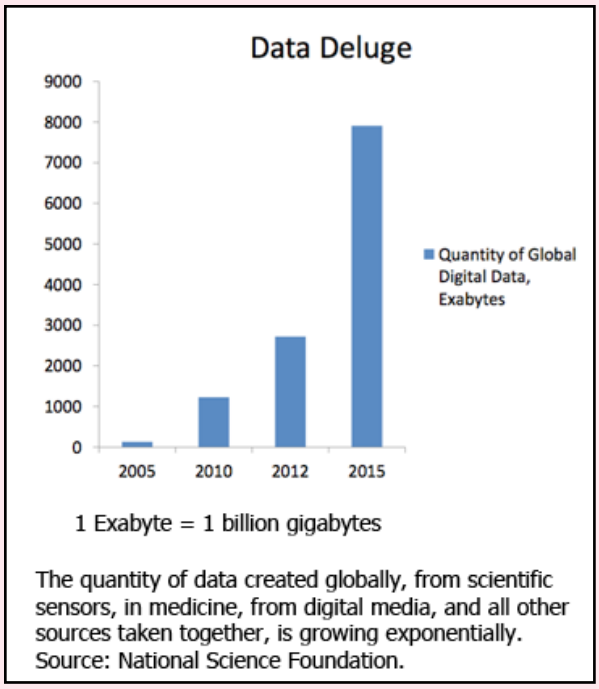
We can't turn on the news, scan a newspaper's website or peruse an interesting blog without the ever-present display of data. The age of data is clearly upon us.

Are you talking about this with your students? If not, when can you start? I ask because as science educators, we have tremendous opportunities to build awareness of data across many of its forms and applications with our students. It is critical that we provide our students with opportunities to begin wrestling with data in learning settings because data is a 21st century reality.

This abundance of data is a very real phenomena. The world is literally awash with data. The National Science Foundation estimates that global data reserves approached 3000 exabytes in 2012 (1 exabyte = 1 billion gigabytes…or $1x10^{18}$ bytes for the science notation geeks in the crowd).

This data originates from all professions and economic sectors. From medicine to retail; real estate to weather forecasting; or the garage of your car mechanic to the laboratory bench of world-class cancer researchers, data is everywhere.

The National Science Foundation does not see the growth of global data reserves slowing down. In fact, they anticipate that the growth of data will continue to expand exponentially. By 2015, it is estimated that global data collection and storage from all sources will exceed 8000 exabytes (EDC, 2014).



Graph courtesy of the Education Development Center's Ocieans of Data Institute at http://www.oceansofdatat.org

Let's carry the data deluge metaphor a bit farther as we consider several examples of hydrosphere-related data freely available for exploration, research and inquiry by the general public.

The National Oceanic and Atmospheric Administration (NOAA) is a leader in making data available for use for free. Consider the multitude of data sets and related tools available via NOAA directed websites that include: Science On a Sphere (http://sos.noaa.gov/Datasets/index.html), Climate.gov (http://www.climate.gov), NOAA's National Climatic Data Center (http://www.ncdc.noaa.gov/cdo-web), NOAA's Integrated Coral Observing Network (ICON) - Coral Health and Monitoring Program (http://www.coral.noaa.gov) and NOAA's Great Lakes Environmental Research Laboratory (GLERL) (http://www.glerl.noaa.gov/data). Each of these sites provide access to both historic and near-real time data collected by networks of sensors managed by scientists and engineers on the frontlines of the most pressing challenges of today. Better yet, many of these sites have embedded web-based tools to support the display and analysis of single and interrelated data sets for consumption by the general public. Access to rich, complex data sets collected and used to answer the world's toughest scientific questions continues to expand.

The challenges of navigating a world driven by scientific and engineering advancements that continuously produce, collect and make data available present educators with significant opportunities to prepare students to become data literate citizens. Data literacy is a critical skill needed by all of our students to navigate a world increasingly dominated by data. To understand and begin addressing the challenge brought about by all this data, let's briefly explore the concept of data literacy.

Vahey, Yarnall, Patton, Zalles, and Swan (2006) identify data literacy as the ability to appropriately and interchangeably use and interact with data in all its forms to do the following.

- Formulate and answer questions using data as part of evidence-based thinking.
- Use appropriate data, tools, and representations to support this thinking.

continued on page 30

Data Literacy Tools

continued from page 29

- Interpret information from data.
- Develop and evaluate data-based inferences and explanations.
- Use data to solve real problems and communicate their solutions.

Many of the themes highlighted in this operational definition are reflected in the Common Core Literacy Standards. In science, similar themes are clearly present in the Next Generation Science Standards (NGSS). The NGSS, in particular, call out the importance of data in the Science and Engineering Practice of analyzing and interpreting data. The practice of analyzing and interpreting data in science classrooms is articulated in increasingly complex ways on page 9 of NGSS Appendix F – Science and Engineering Practices in the NGSS.

In this table we see a vision for the student practice of analyzing and interpreting data. As one studies just the first few bullets in each column, we see an emphasis on recording and sharing qualitative data in the lower elementary grades. The introduction of quantitative data is identified for upper elementary students as they begin to represent data in tables and other appropriate visual displays that depend upon the nature of the data itself. In middle school, students begin to construct and analyze large quantitative data sets to identify linear and non-linear relationships as well as identify relationships across time and geography. Previous experiences with data analysis and interpretation support high school students as they analyze large data sets using computational and mathematical tools, technologies and models to make valid scientific claims.

My sense is that we have some work to do on this front. I'm concerned by a general lack of consistent and high-quality opportunities across our K-12 educational systems for all students to routinely engage in this particular practice. This concern can likely best be captured with a quote from the Education Development Center's (2012) Oceans of Data website that that observes how "science is data intensive, (while) today's science education is not."

How can we begin to make progress on this front? There are certainly many good answers to this challenge. The right answer for you and your students will depend greatly on

Grades K-2	Grades 3-5	Grades 6-8	Grades 9-12
Analyzing data in K–2 builds on prior experiences and progresses to collecting, recording, and sharing observations. • Record information (observations, thoughts, and ideas). • Use and share pictures, drawings, and/or writings of observations. • Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems. • Compare predictions (based on prior experiences) to what occurred (observable events). • Analyze data from tests of an object or tool to determine if it works as intended.	Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used. • Represent data in tables and/or various graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships. • Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation. • Compare and contrast data collected by different groups in order to discuss similarities and differences in their findings. • Analyze data to refine a problem statement or the design of a proposed object, tool, or process. • Use data to evaluate and refine design solutions.	Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis. • Construct, analyze, and/or interpret graphical displays of data and/or large data sets to identify linear and nonlinear relationships. • Use graphical displays (e.g., maps, charts, graphs, and/or tables) of large data sets to identify temporal and spatial relationships. • Distinguish between causal and correlational relationships in data. • Analyze and interpret data to provide evidence for phenomena. • Apply concepts of statistics and probability (including mean, median, mode, and variability) to analyze and characterize data, using digital tools when feasible. • Consider limitations of data analysis (e.g., measurement error), and/or seek to improve precision and accuracy of data with better technological tools and methods (e.g., multiple trials). • Analyze and interpret data to determine similarities and differences in findings. • Analyze data to define an optimal operational range for a proposed object, tool, process or system that best meets criteria for success.	Analyzing data in 9–12 builds on K–8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data. • Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution. • Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible. • Consider limitations of data analysis (e.g., measurement error, sample selection) when analyzing and interpreting data. • Compare and contrast various types of data sets (e.g., self-generated, archival) to examine consistency of measurements and observations. • Evaluate the impact of new data on a working explanation and/or model of a proposed process or system. • Analyze data to identify design features or characteristics of the components of a proposed process or system to optimize it relative to criteria for success.

Appendix F – Science and Engineering Practices in the NGSS table courtesy of the Next Generation Science Standards website at http://www.nextgenscience.org

continued on page 31

Data Literacy Tools

continued from page 30

your specific classroom, content and available resources. For now, I'll offer two specific suggestions and save others for future MSTA newsletters and journals.

The first suggestion is practical in nature and related to your mindset as a science educator. I simply encourage you to be more intentional. Talk about the growing availability of data with your students. They will appreciate and understand your candor and awareness of this challenge. Look for and capitalize on opportunities to intentionally include data in a variety of forms and graphical displays that support your daily instruction. Be more intentional in your planning of student labs to establish opportunities and expectations for the purposeful collection and analysis of data. As with many challenges in education, intentionality is the first step toward developing solutions.

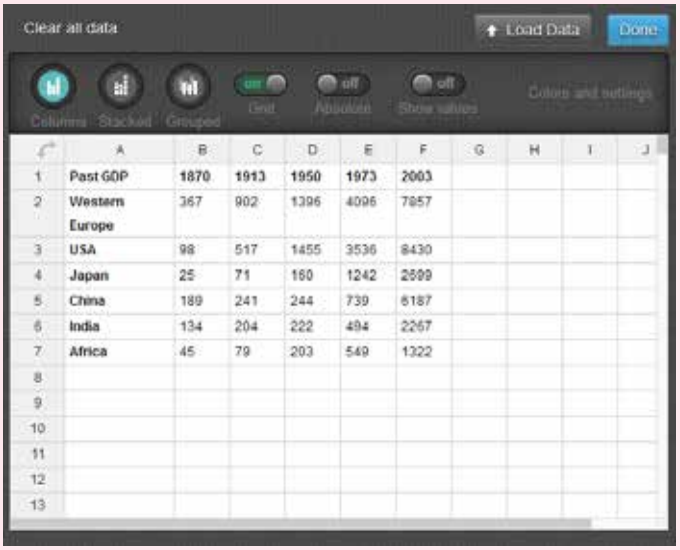
The second suggestion is to begin adding web-based and data literacy tools to your science instruction and student learning experiences. An excellent web-based approach to consider is infogr.am (http://infogr.am).

Infogr.am is a free online tool to create and share various graphs, tables and infographics. Like other web-based tools, users register with an e-mail address, username and password. Your username and password provide access to the website and saved work at a later time. The free version allows users to create data-based charts and tables for inclusion in reports or presentations as well as publish them via the Internet and social media. An upgraded version is available for $18/month, but the free version is perfect for you and your students.

After logging in you are offered the option of choosing an infographic template (or one of more than 30 different chart types). *See images at bottom of page.*

For this example, let's start with the column chart design shown at right. After clicking on the "Add chart" button, the chart is added to a simple infographic workspace with an area to provide a title and description. The fun starts by hovering over and double-clicking the chart. When you do this, the data included in the chart opens up for editing in a spreadsheet view. From this point you edit data labels and values as well as settings to meet your specific needs. To view your revised graph, click the "Done" button.

Additional tools in the lower right-hand area of the Infogr.am screen provide the ability to add additional charts, maps, labels, images and web-based video elements to the infographic before publishing. Publishing options available with a free account include the creation



	A	B	C	D	E	F
1	Past GDP	1870	1913	1950	1973	2003
2	Western Europe	367	902	1396	4096	7857
3	USA	98	517	1455	3536	8430
4	Japan	25	71	160	1242	2599
5	China	189	241	244	739	6187
6	India	134	204	222	494	2267
7	Africa	45	79	203	549	1322

Infogr.am's intuitive data editing tool provides teachers and students with a simple interface to enter data for display.

Infogr.am provides users with built in templates to get started with the creation of infographics or charts of more than 30 different types.

continued on page 32

Data Literacy Tools

continued from page 31

of a web page URL or sharing on Facebook, Twitter and Pinterest social media platforms.

Other web-based tools similar to Inforgr.am are available for your consideration. In my opinion Inforgr.am provides a relatively quick learning experience for both students and teachers. Although functionality is not yet optimized for use with touch-based tablets, I am excited by Infogr.am's future plans to provide the ability to create short infographic video presentations.

Enjoy your dive into the world of data analysis and interpretation with your students. I'll be back in future MSTA newsletters with additional ideas and software tools for your consideration focusing on data analysis and interpretation to consider for your instructional and student use.

References and Related Resources

Education Development Center (2012). Visualizing Oceans of Data 2012 Knowledge Status Report. Oceans of Data Institute, Educational Development Center available at http://www.oceansofdata.org.

Education Development Center (2014). The Data Landscape. Oceans of Data Institute, Educational Development Center available at http://www.oceansofdata.org.

NGSS Lead States (2013). Next Generation Science Standards: For States, By States - Appendix F. Achieve, Inc. on behalf of the twenty-six states and partners that collaborated on the NGSS available at http://www.nextgenscience.org.

Vahey, P., Yarnall, L., Patton, C., Zalles, D., & Swan, K. (2006, April). Mathematizing middle school: Results from a cross-disciplinary study of data literacy. Paper presented at the annual conference of the American Educational Research Association, San Francisco, CA.

Spring

OPEN HOUSE

MARCH 22 • 10 A.M.-2 P.M. • MAIN CAMPUS

Encourage your students and their families to join us for an insider's look at college life. Spring Open House is free and open to the public. Attendees will explore campus and the dozens of undergraduate STEM programs available at WSU, as well as enjoy many activities, including:

- Academic resource fair
- Info sessions
- Financial aid presentations
- Walking tour of campus
- Planetarium shows
- College of Engineering lab tours

For directions, parking details and more information, visit **openhouse.wayne.edu**.

WAYNE STATE

AIM HIGHER

wayne.edu

FEATURED ARTICLE!!

Academically Productive Talk and the NGSS

By Mary Jordan-McMaster, Michigan Chemistry Teachers Association Representative, Allen Park High School

A main tenant of the Next Generation Science Standards is that students will engage in the practices of inquiry and discourse in order to develop and refine their thinking and ideas. The framework suggests the following science and engineering practices will help students understand how scientific knowledge develops using many approaches to investigate, model, and explain the concepts of science.

1. Asking questions and defining problems
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations and designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

There are a number of strategies that can be used by teachers to implement these practices; one such strategy is Academically Productive Talk. Sarah Michaels and Cathy O'Connor discuss APT in their publication, "Talk Science Primer" a part of the Talk Science Project at TERC.

Imagine a classroom where students have just completed a science investigation and a whole class discussion is underway. Students put forth competing ideas in their clearest and strongest form, even though some ideas may turn out to be more correct than others. Students explain their ideas in detail with evidence. They listen carefully to each other with respect. Students take seriously and evaluate their own and others' competing ideas. In other words, they are intellectually engaged.

This is how the authors envision a science classroom where students are engaged and thinking like scientists. This certainly depicts the type of classroom I would like to teach in, so I have been implementing their "Talk Moves" into my lessons. Academic Productive Talk is based on four goals and incorporates nine "Talk Moves" to meet those goals.

The first goal of APT is to have **individual students share, expand and clarify their thinking.** The "Talk Moves" suggested by Michaels and O'Conner to meet this goal are:

- Give the students time to think by using strategies like Partner Talk, Writing as Think Time, and by increasing wait time. If a teacher poses a question, students should be given adequate time and opportunity to formulate a thoughtful response.
- Encourage students to "Say More" by asking the following questions:
  - "Can you say more about that?"
  - "What do you mean by that?"
  - "Can you give an example?"
  - Help to clarify student response. For example, "So, let me see if I've got what you're saying. Are you saying…?" Be sure to give the original student an opportunity to agree, disagree, and say more.

The second goal is **for students to listen carefully to one another.** The teacher facilitates this by

- Asking the students who are listening to the speaker to rephrase or repeat what they have heard.
  - "Who can repeat what was just said or put it into your own words?"
  - "What did your partner say?"

The third goal is for **students to deepen their reasoning.** Once a student has made a claim, it is important that they support that claim. By further questioning, the teacher can encourage students to expand their thinking by adding details and evidence.

- Ask students for evidence or to state their reasoning.
  - "Why do you think that?"
  - "What's your evidence?"
  - "How did you arrive at that conclusion?"
  - "Is there anything in the text that made you think that?"
- Challenge the student or provide a counter example.
  - "Does it always work that way?"
  - "How does that idea square with Sonia's example?"
  - "What if it had been a copper cube instead?"

The fourth and final goal of APT is to encourage **students to consider what they are thinking in relation to others** in the class.

- Ask students to consider the thinking of others and if they agree or disagree and why.
  - "Do you agree or disagree, and explain why."
  - "Are you saying the same thing as her or something different?"
  - "How is your thought or idea different?"
  - "What do people think about what he answered?"
  - "Does anyone want to respond to that idea?"
- Ask students to add on to the ideas and thoughts of the other students.
  - "Who can add onto the explanation that is being built?"

continued on page 35

Academically Productive Talk

continued from page 34

  - "Can anyone take that explanation and push it a little further?"
- Ask the students to explain what another student means.
- "Who can explain what she means when she says that?"
- "Who thinks they could explain in their words why he came up with that answer?"
- "Why do you think he said that?"

This type of discourse in a science classroom can help to construct an environment where students are thinkers and collaborators. By using APT, teachers can build a classroom climate that more readily embraces the Science and Engineering Practices in the NGSS. The "Talk Moves" are valuable tools that can help us to move into the next generation of science teaching.

References:

Michaels, Sarah and O'Connor, Cathy. "*Talk Science Primer.*" TERC 2012

SUMMER STUDENT OPPORTUNITY!!

Calling to Your Students: Michigan Tech Summer Youth Programs Wants You!

From Liz Fujita, *Assistant Coordinator, Youth Programs, Michigan Tech Center for Pre-College Outreach*

Summer camp? Sort of... but better. Our programs aren't ordinary. Neither are our students! They build robots, rappel down cliffs, perform chemical diagnostics, fly airplanes, and make movies. They come from all over the country and the world for one reason: to experience Summer Youth Programs at Michigan Technological University.

We are once again excited to spread the word about 2014 SYP! Students in grades 6 - 11 are encouraged to come visit the beautiful Upper Peninsula, make new friends, and spend a week learning about a topic they are passionate about.

SYP explorations are week-long camps designed to give students a fun pre-college experience. All of the courses are taught by faculty, staff, graduate students, or local experts in topics as varied as: chemical engineering, renewable energy, materials science, digital photography, psychology, rocketry, and geological engineering. Each exploration is hands-on, bringing students into the labs and out into the field. Design and test bridges, create your own short documentary, perform chemical experiments... the possibilities are vast.

Students who come to SYP live in Michigan Tech's largest residence building, Wadsworth Hall. They have a roommate, a small hall cohort and residence counselor, access to game rooms, lounges, and -- of course -- the dining hall. Participants come from all around the country and world to experience SYP.

Evenings allow students to relax and participate in many different recreational activities that range from athletics to a variety show, from crafts to exploring the scenic Keweenaw Peninsula, all while under the supervision of our professionally trained Activities Counselors. Residence Counselors provide general supervision at night and serve as mentors to the students by conducting nightly floor meetings to reflect on the day's adventures.

Please feel welcome to give us a shout if you have specific questions. There is a wealth of information online (www.syp.mtu.edu), and we are always excited to hear from you! Classes are rapidly filling, but we feel confident that there is always something available to meet your students' interests.

Additional Contact Information: www.michigantechgearup.com • Office: 906-487-1161

CONFERENCE REPORTS

Conference Report

From Andy Frisch, Farwell High School

CCSS, NGSS, HSCE, IDK, LOL. As a small, rural high school science teacher that teaches any and all science and mathematics courses in any given year, these acronyms all meant the same thing to me. I am too busy teaching to keep up with the latest "buzz" words. Like many of my fellow science teachers, I am more focused on student achievement on a daily basis than I am keeping up with current political trends in education.

When I was informed of my scholarship to attend the Michigan Science Teachers Association conference in Lansing this year, I knew what I wanted to do. I went to the MSTA conference in search of clarification of how these educational documents will affect me and my students. I was successful in my quest.

I have always been apprehensive of the High School Content Expectations (HSCE's). They seem like there are too many standards and expectations without enough connectivity, like a bunch of isolated facts. There is little connection between the concepts. Facts are just facts. It is not until these facts are connected to each other that they become meaningful, and only when facts are put into a "real-world" scenario that they can become useful science.

There are several themes that I heard throughout the conference, which makes me excited about the Next Generation Science Standards (NGSS). We have to get kids excited about science. The desire for some high school kids to study science is weak and waning. We need to show students that science is "cool", interesting, and makes the word a better place to live. All some students see is a bunch of facts that they have to learn. There is little connection between memorizing a vocabulary list and making the world a better place.

Topics need to be connected, definitely within a science sequence, but also between disciplines, such as english, history, economics and mathematics. Science needs to be put "in context". Science is not only in a text book, but everywhere around us. The NGSS emphasizes connections and a context that students can relate to in their world. The HSCE requires students to learn redox reactions; the NGSS would have students follow the process of how bauxite becomes an aluminum can, which is an example of a redox reaction. Who cares which elements loses an electron and which element gains one?

Students need to be prepped for success to ensure success. As the NGSS was being written, it seems they started at highest levels of understanding and worked backwards. What is a student expected to know at the end of a course? What does a student need to know before entering a course in order to achieve the desired outcomes?

The NGSS seem to be breaking past pedagogy. They were written by science educators that have the "patience" to do the right thing, in the right order, the right way. Fortunately for me, I have taught and think like the NGSS design. With the collaboration of my fellow science teachers, we will ensure the success of our students in the generations to come.

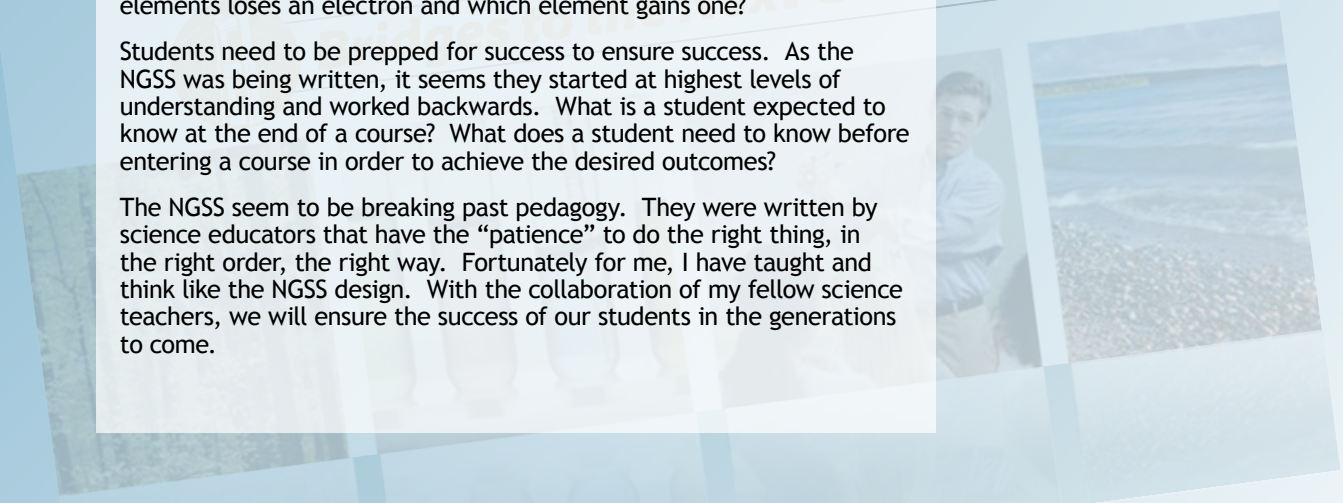
Conference Report..... From our Scholarship Winners!

My name is Sarah Stevens and I am a 5th grade teacher at Mary McGuire Elementary School in Mt. Pleasant, Michigan. I had the honor of being selected as one of the scholarship recipients to attend the MSTA Annual Conference, this past March.

I have been a special education teacher for the past 10 years, but this year, took a position as a 5th grade teacher in general education. Of all of the subjects I was looking forward to teaching, science was at the top of my list. I have always loved science, especially life science, and as a "new" 5th grade teacher, I wanted to make sure that I made learning science as meaningful for my students as some of my teachers had made it for me. Being selected to go to the conference allowed me to learn how other educators were making science content applicable to their own students.

My favorite session at the conference was the "Elementary Toolbox" because the presenter talked about how the material that students are learning right now, in science, is going to impact their ability to find a career and be successful "problem solvers" in the future. I have always believed that science should be learned by touching, feeling, and doing; this session really reinforced that idea.

In this day and age, when district budgets are so very tight, it is truly a privilege to be able to attend this kind of conference. I am appreciative of the new ideas and motivational presentations in which I was able to take part.



CONFERENCE REPORTS

2014 Conference Report

from Jennifer Richmond, Region 9 Director jlzrichmond@gmail.com

If you were not able to attend the annual MSTA conference this year, you missed out on many great science sessions! This year, the "Bridges to the Next Generation" theme provided numerous high-quality sessions to help science educators across the state learn from one another.

The "MAISA Title I Supports for the Next Generation Science Standards" presentation by Jen Arnswald and Sarah Coleman provided a rich online resource for NGSS. The project has free materials that were designed to help teachers and school districts teach NGSS and gather ideas. If you missed this session, check out the Kent ISD open access site: http://openaccess.kentisd.org/Courses/3325#/ to access the numerous professional development modules about NGSS.

Also at the MSTA conference this year was a great vendor and exhibit hall! MESTA (Michigan Earth Science Teachers Association) had a fantastic rock sale and raffle; there were excellent vendors providing resources for science educators; the University of Michigan's Natural History Museum was handing out free "dinosaur poop", and the MSTA booths were staffed with MSTA board members with information about our organization.

The MSTA Regional Directors displayed upcoming and past events in each region. Regional Directors were proud to nominate numerous educators for scholarships to the conference. These scholarships provide teachers with the opportunity to attend the conference, some as first-time attendees. The directors also greeted conference attendees who were visiting the exhibit hall during lunch. It was a great opportunity to "put a name with a face" and the Regional Directors were happy to meet so many fantastic science educators!

Finally, this year at the conference, the Howard Hughes Medical Institute (HHMI) provided a selection for the first-ever "movie night"! All conference attendees were welcome to view the bioactive short film "The Day the Mesozoic Died" and enjoy fresh-popped popcorn! HHMI provides numerous free resources on their website. Science educators who may have missed this event should check out the HHMI website: http://www.hhmi.org to get a taste of what the movie night provided.

The 2014 MSTA conference had many great offerings for science educators. I encourage anyone who has never attended a conference to mark their calendars for February 26-28, 2015. If you attend regularly, we look forward to another great event! Next year's conference will be held in Grand Rapids and will be sure to once again provide great resources for all attendees!

Making Connections

from Lindsey Nyland, Forest Hills Central High School

This March I had opportunity to attend my first MSTA conference. As a first - year teacher, this opportunity was especially valuable. The new ideas and activities I walked away with were extremely beneficial. Like many teachers, I am always looking for new ways to promote student engagement and make learning relevant. I want my students to walk out of class excited about what they have learned. I want them to be able to say, "This is why it matters" or, "This is why I need to know this."

I was excited about one activity from the conference in particular because I could use it right away in my environmental science class. We used data from the wolf and moose population study on Isle Royale, Michigan to study populations and community ecology.

Students were given several figures to analyze from the Isle Royale wolf-moose study. Different figures depicted information such as moose population distribution, moose carcass siting locations, wolf pack territorial boundaries, wolf population numbers, etc. Their first task was to examine each of their figures individually and extract any and all information. Next, students compared two figures. Their task was to make connections. How are the two related? What is the significance? Finally, I had students break into groups and compare their information. Each group member contributed information from a different year of the population study. Their task was to again, make connections. How are all of these figures related? What is the significance? How does it all fit together? Can you make any predictions about the wolf and moose populations in the future?

I was excited to see a lot of student engagement. Students realized that they were not just looking at a bunch of numbers and figures; they were unraveling a story about real populations that live right here in Michigan. I found that students wanted to know more. Why did the population change so drastically? Why were there three wolf territories one year, but only two the next? Why are the moose on this part of the island and not that? What does the island geography look like; does that factor into moose distribution? What is the climate on Isle Royale? We began to put the pieces of the puzzle together, delving further into the research that has been conducted and exploring ethical issues such as whether or not more wolves should be introduced to the island. I used this activity in environmental science, and it would work great for biology as well. The data from the wolf-moose population study can be found at: http://www.isleroyalewolf.org/wolfhome/ann_rep.html.

RE: STEM Scholarships for 2014 graduates

Dear Michigan Educator,

We want to share our excitement with you and your graduating high school seniors. We are pleased to announce Great Lakes Renewable Energy Association (GLREA), a non-profit 501c3, is offering at least ten $500 scholarships at the Michigan Energy Fair held on June 27 & 28, 2014. The fair will be held at the Ingham County Fairgrounds in Mason, MI.

The scholarships will be awarded by lottery draw selection, not based on need, merit or other affiliation. All graduating high school seniors who will be attending a college or university in the State of Michigan and plan to major in a STEM (Science, Technology, Engineering, Math) field, renewable energy, energy efficiency, environment or other related fields are eligible for nomination. The student will simply need to be nominated by a STEM teacher. Each teacher may nominate one student. Simple!

The scholarships will be drawn by GLREA representatives Saturday, June 28, 2014 at the Michigan Energy Fair. Students need to be present to be awarded a scholarship. There will be a maximum of one nomination per teacher and a maximum award of one scholarship per student. Because this is a lottery drawing, nomination does not necessarily mean a student will be awarded a scholarship.

Nominations will be accepted through our website: www.glrea.org We have enclosed a sample recommendation form which demonstrates what information will need to be submitted by their teacher for nomination. There will be a brief summary about the student required.

We encourage teaching professionals to recommend one or more students for this very exciting and uncomplicated program.

If you or someone you know would be interested in donating towards a scholarship or if you are interested in joining GLREA as an Energy Educator, please contact us.

For questions, please contact Allan O'Shea, co-chair of the MEF at 231-510-1817 or email windowman50@hotmail.com.

Sincerely,

Allan O'Shea
Vice President GLREA
Co-chair, Michigan Energy Fair

Recommendation Form

SCHOOL NAME_____
LOCATION_____
ADDRESS_____
PHONE NUMBER_____
STUDENT NAME_____
STUDENT ADDRESS_____
TEACHER RECOMMENDING STUDENT_____
TEACHER PHONE_____
TEACHER EMAIL_____

BRIEF SUMMARY OF WHY YOU ARE RECOMMENDING THIS STUDENT

_____
_____
_____

The GLREA is offering an Energy Educator membership for $35.00 per year.

The Fledgeling

The Fledgeling flies! MSTA science lessons for elementary teachers is published as a recurring feature in the MSTA Newsletter. Establishing good science practices are essential for a solid science program. This is true for all age groups. Through hands-on, inquiry based science, special needs students are achievers too! The Fledgeling is edited by Sally DeRoo, MSTA.

LATE WINTER-EARLY SPRING WALK

Recess: Enjoy a walk around the school site. Make observations, take notes, and draw pictures during the "science" walk!

Scout the area several days before, take a few notes on what you could point out during the walk. Look for interesting birds. Do notice tree shapes, or a field of dried wild flowers and weeds. Plan several walks to observe and record seasonal changes.

To compare the data collected. Post the student's observations and drawings for class discussion. Note: If the school site and neighborhood needs a clean-up, and trash is included in the data collected, it suggests another project. Keeping our environment clean and safe is everyone's responsibility! Clean-up projects can make Earth Day every day. Keeping some school sites trash free is a challenge and can be frustrating. School site improvement assistance is readily available. Contact MSTA, we help!!!

LOOK AND LISTEN TO LOCATE BIRDS

Look for "identification patterns" on the bird's crest and feathers. Develop a vocabulary list of terms to assist in identification. Provide students with a "simple" picture, Note the birds shape, size and location. Make a list of the common birds, those you see daily. Make a list of birds found locally. Pigeons. Common Sparrows, Crows and Starlings are a few that are easily recognized. Listen for familiar "chirps" and "song patterns'". Stopping at a feeding station to listen, is great fun! If your school does not have a feeding station, establish one! Children with Special Needs, THRIVE on such projects!

INTERESTING BIRDS TO OBSERVE

TUFTED TITMOUSE

The Tufted Titmouse is easily recognized by a tiny tuff of feathers on the head. This while and gray bird is a familiar sight at winter feeders. Titmice usually travel in small flocks. Titmice are often permanent residents in Michigan.

DOWNY WOODPECKER

The Downy Woodpecker and its close cousins are favorites to observe. Some woodpeckers move south for the winter. The Hairy Woodpecker and the Downy Wood pecker stay in Michigan all winter. Woodpeckers can be heard tapping on trees, looking for insects. Hollow trees transmit the tapping sound. Point out that a hollow tree is like a drum!! Hollow wooden musical instruments have been used for thousands of years for communication and musical rhythms! Listen to hear the sound to locate the bird. Downy and Hairy Woodpeckers look very similar. Size of the body and the beak are distinguishing characteristics.

continued on page 41

LATE WINTER-EARLY SPRING WALK

continued from page 40

NUTHATCH

The Nuthatch is often found among a flock of winter birds. Look for a bird that climbs down the tree. This movement pattern helps to identify the bird. Nuthatches will eat a variety of foods especially nuts and berries. They enjoy insects missed by other birds that don't hunt upside down.

REFERENCES FOR BIRD WATCHING

Stokes: Beginner's Guide to Birds, Little, Brown and Company # ISBN 0-16-81811-9

Peterson: How to Know the Birds, A simple Aid to Bird Recognition, A Mentor Book, The New American Library. NOTE: This book is out of print, but often available at the library. Good diagrams to isolate bird characteristics

Burton: Audubon Backyard Birdwatcher, Bird feeders and Bird Gardens, Thunder Bay Press, # ISBN 1-57145-186-2

Establish a classroom library. Boxes of great books are found at garage sales and library sales for pennies on the dollar.

Call for 2015 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, 2014

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, and exhibiting a passion for science and teaching. 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.

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

2015 MSTA Awards Nominations Form

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.