

LINKS

LESSONS, INNOVATION & NEW KNOWLEDGE IN SCIENCE



FALL 2022



THE OFFICIAL MEMBER NEWSLETTER OF MICHIGAN SCIENCE TEACHERS ASSOCIATION



TABLE OF CONTENTS

Explore Michigan, Explore Science	3
Bridging Land Stewardship and Great Lakes Literacy through Watershed Exploration Programs	5
Moving Still Productions Offers Free Series of Films About Climate Change for Classroom Instruction	7
Fall 2022 Meeting of the APS Eastern Great Lake Section and the Michigan Section of AAPT: Pushing Boundaries in Physics and Education	8
There is More to NASA Than Rocket Science	10
Free STEM Online Learning Sessions Available For K-12 Students	11
Science Events Held Throughout Michigan	12
Determining the Percentage of Sweetener in Soda Pop Still a Fun and Exciting Experiment for the Classroom	13
Gift Of Life Michigan Offers Hands-on Experience	14
Where Do I Begin?	15
Make it Stick: The Science of Successful Learning: A Book Review	17
STEM Books to Start Your Elementary Year!	19



Exploring the Outdoor Learning Area with EEGS staff at NMU

Explore Michigan, Explore Science: MSTA 2023

Richard Bacolor | MSTA President

This year marks the 70th Annual MSTA Conference. To commemorate that milestone, we've chosen the theme "Explore Michigan, Explore Science." As we look to rebuild and learn from the last two plus years, we hope look to be inspired by the amazing science all around us. And we take to heart the encouragement found in our state motto "If you seek a pleasant peninsula, look about you." We would love for you to share the stories of that exploration when we meet in Lansing next March. There is still time to [submit a conference session proposal](#), and please keep an eye out for early-bird registration information coming soon.



Glenn T. Seaborg Center at NMU

We also believe that MSTA is more than just a conference. MSTA is our passion's statewide professional organization, and our most valuable resource is you. Because we know conference attendance is not always an option, this year we will be bringing MSTA to you; or at least closer to you and your science education efforts.

Our first "Explore Michigan, Explore Science" board meeting took us across the Mighty Mac to Marquette and the Glen T. Seaborg Center

at Northern Michigan University. Fittingly, the science and engineering for our state's most iconic connector was completed the same year MSTA held its first conference, in 1953. Our gracious host for this trip was Chris Standerford, the Director of the Glenn T. Seaborg Center and MiSTEM Region 15. We conducted our board meeting business in the amazing classroom innovation space at NMU's Seaborg Center. We then invited members to join us for a lunch and learn as NMU staff lead us on tours of several departments including [Chemistry](#), [Clinical Sciences](#), [Earth-Environmental-Geological](#), and [Exercise Science](#).



Exploring the Chemistry Department at NMU



Exploring Medical Laboratory Technician labs at NMU

Our next MSTA Board meeting will be held on November 5 at Northwestern Michigan College in Traverse City. Tamara Coleman, who teaches in the biology department and is an Experiential Learning Fellow at NMC will be our host. Some of our members may recall that Tamara gave an engaging session on the Science of Stress at MSTA 2022. Please consider joining us as you are able for another enriching day to “Explore Michigan, Explore Science.” More information can be found on the website or by contacting office@msta-mich.org.



Exploring our hand-eye-foot coordination with the Exercise Science department at NMU

MICHIGAN SCIENCE TEACHERS ASSOCIATION
**PARTNERSHIP
PROGRAM**
PARTNERS

Belle Isle Conservancy

**Boy Scouts of America Michigan
Crossroads Council**

Critter Barn

DataClassroom Inc

Detroit Zoological Society

FARM Science Lab

Gearbox Labs

Gift of Life Michigan

Impression 5

Inland Seas Education Association

Insectopia

IQhub

Michigan Audubon

Michigan Agriculture in the Classroom

Michigan Chemistry Council

Michigan Soybean Committee

Michigan Space Grant Consortium

**Midland Center for the Arts Alden B. Dow
Museum**

Museum of Science | EiE

National Energy Foundation

Van Andel Institute

Whole Planet Consulting

[Learn More](#)



Bridging Land Stewardship and Great Lakes Literacy through Watershed Exploration Programs

Trisha Smrecak, PhD | Inland Seas Education Association

Many education and psychology researchers have tried to measure how to foster environmentally minded citizens and a passionate STEM workforce (Hungerford and Volk, 1990; Chawla, 1992). Ultimately, most agree a childhood connection to a place through outdoor experiences is an integral part of creating the next generation of environmental stewards. The respected environmental educator and emeritus researcher at Antioch University, David Sobel, has hypothesized that “One transcendent experience in nature is worth 1,000 nature facts.” As an organization dedicated to inspiring a lifetime of stewardship and passion for the Great Lakes, the Inland Seas Education Association is committed to helping educators instill a connection to place in their students through immersive Great Lakes STEM field trips on a ‘77 schooner since 1989.

Michigan is certainly a Great Lake state. Except for a few square miles in the southwestern portion of the state, water anywhere in our boundary drains into a Great Lake. However, drainage from significant portions of Minnesota, Wisconsin, Illinois, Indiana, Ohio, and New York, as well as Ontario, Canada, also flow into the Great Lakes (see Fig 1). Choices communities make daily have ramifications on Great Lakes basin health. Yet our program evaluations echo a recurrent, common misconception: Great Lakes environmental issues

originate from recreation and shipping activities directly on the lakes.



Figure 1. Great Lakes basin watershed. Each colored land surface drains into the Great Lake to which it is adjacent. Image provided under Creative Commons licensing through Wikimedia Commons.

Students, despite learning about watersheds in their classrooms, do not link behaviors on land, like plastic waste disposal, road salt use, and changes in land use, to the environmental issues impacting the Great Lakes. They, along with their teachers, need support integrating land- and water-based experiences into their

curriculum, and Inland Seas has begun piloting programs to support this integration.

ISEA is in the piloting phase of many programs, offering a limited number of fully funded overnight experiences in the 2022/2023 academic year to interested teachers and their students. Through overnight programs or a la carte experiences in spring and fall, students can learn how to define a watershed boundary and assess its health through macroinvertebrate and water chemistry data collection in Watershed Watchers, study the physical characteristics of the stream and its surrounding riparian zone in Study the Stream, and dissect native clams and cattails in Dissect the Watershed, learning the role of native organisms in the watershed as well as compare traits to learn what make invasive organisms successful.



Students can also explore the role of groundwater as the 6th Great Lake through beach experiments and connect coastline behaviors to groundwater and the Great Lakes. In Navigate the Great Lakes, they learn the skills to use charts and tools for navigation on the Great Lakes and connect the coastline to shipping, recreation, and Great Lakes stewardship. In Boatyard Challenge they learn how ships have been designed and engineered to face the challenges of navigating on the Great Lakes and design a battery-operated boat to navigate their own challenges in our water trackway. They can also learn how remotely operated vehicles are used to monitor the Great Lakes for pollution, invasive species, and native species health and design their own remotely operated vehicle to deploy in Lake Michigan with ROV Engineer and Explore. These programs, set within the Leo Creek Watershed in Suttons Bay along the coast of Lake Michigan, integrate the concepts of Great Lakes' basin health with the behaviors and choices made

on land that can impact Great Lakes' health, ultimately creating more knowledgeable stewards of our youngest citizens.

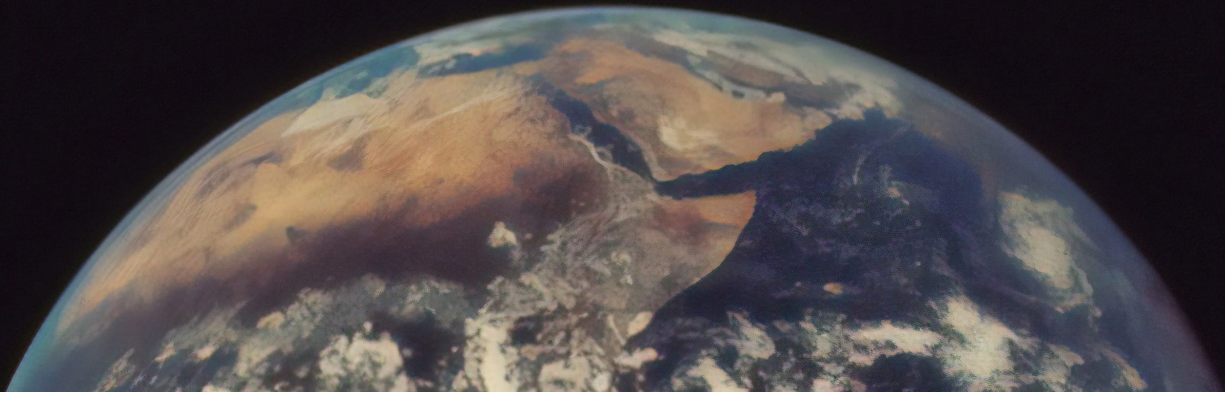
With ISEA's Watershed Exploration Programs, we hope to provide transcendent nature experiences filled with student-empowering authentic science inquiry connecting youth to the Great Lakes' watershed in a meaningful way. Knowledge gained from the featured watershed is immediately relevant to students' home watersheds, with data available for watershed comparisons, spatial and mathematical lesson plan extensions, and opportunities for teacher support. Join us in a pilot to steer the design of our Watershed Exploration Programs to be an impactful contribution to classes like yours for decades to come.



If you would like to participate in a pilot program with ISEA, please visit this website to learn more: schoolship.org/watershed-programs and contact Izzy Cooper (icooper@schoolship.org) with questions or to schedule your adventure!

References

1. Chawla, L. 1992. Childhood Place Attachments. In: Altman, I., Low, S.M. (eds) Place Attachment. Human Behavior and Environment, vol 12. Springer, Boston, MA.
2. Hungerford, H.R. and T.L. Volk. 1990. Changing Learner Behavior Through Environmental Education. Journal of Environmental Education, vol 21, 3.



Moving Still Productions Offers Free Series of Films About Climate Change for Classroom Instruction

There are many free resources for teaching climate change at schools and educational organizations. Moving Still Productions Inc. recently completed a series of short documentary videos called [Climate Emergency: Feedback Loops](#), narrated by Richard Gere, featuring twelve renowned climate scientists, and endorsed by the Dalai Lama and Greta Thunberg.

The five short films, ranging in length from eight to 14 minutes, are ideal for classroom use. They are available for free, along with an accompanying science curriculum for grades sixth to 12th as well as discussion guides suitable for university level and community groups. [Click here](#) to learn more about this series of films.

SAVE THE DATE!



MSTA 70TH ANNUAL CONFERENCE
**EXPLORE MICHIGAN,
EXPLORE SCIENCE**
MARCH 3-4, 2023 • LANSING, MI



Fall 2022 Meeting of the APS Eastern Great Lake Section and the Michigan Section of AAPT: Pushing Boundaries in Physics and Education

A joint meeting of the Michigan Section of the American Association of Physics Teachers (MiAAPT) and the Eastern Great Lakes Section of the American Physics Society, titled [Pushing Boundaries in Physics and Education](#), will be held on Friday October 21 and Saturday October 22 at Lawrence Technological University.

[Register](#) today for the event by Friday, October 14, 2022. You can also submit and abstract for contributed talks and poster presentations [here](#). The abstract submission deadline is Friday, September 30, 2022.

If you know of a student who is not an APS member, please let them know that they can create a free student APS account.

EGLS Undergraduate and Graduate Student Outstanding Poster Awards

We will be awarding two poster awards with a \$100 cash prize each. One to an undergraduate poster presenter and one to a graduate poster presenter, selected based on the level of their participation in the research presented in their poster and the norms of excellence in physics.

Doc Brown Young Investigator Award Nominations are requested for the early career Doc Brown Young Investigator Award. Nominees should be lecturer or pre-tenured faculty at an institution within our EGLS region.

Please feel free to contact us (Bhujyo Bhattacharya and Niklas Manz) for more information at bbhattach@ltu.edu and nmanz@wooster.edu.

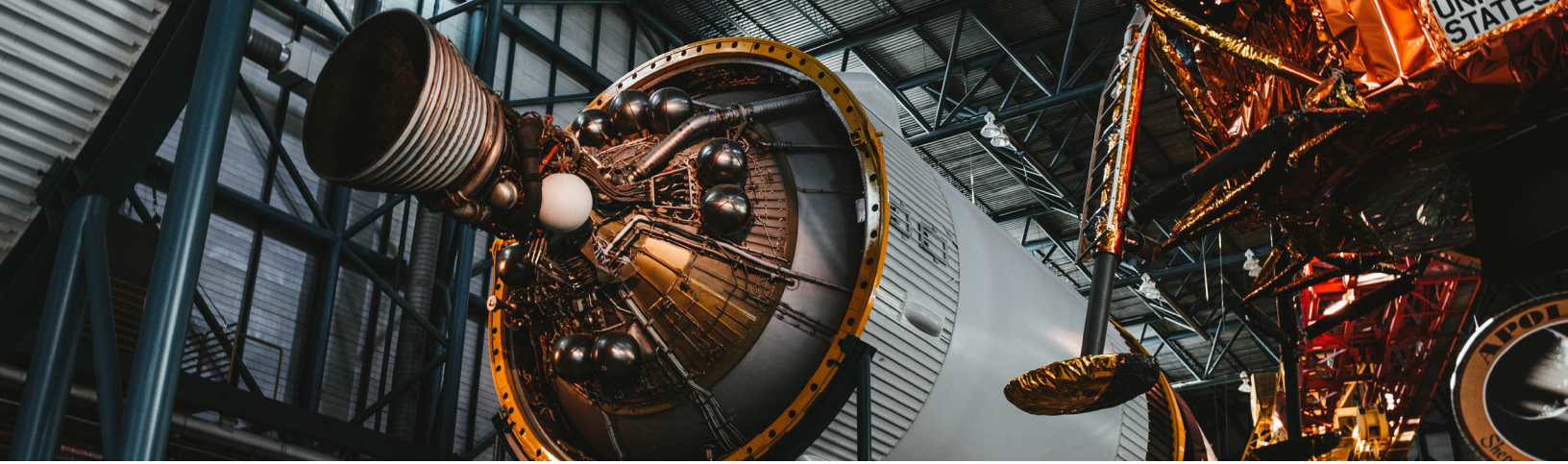
See tentative schedule on page 9.

Friday, October 21

12:30 PM	Presidential Welcome/Opening remarks (featuring LTU President and Dean of Arts and Sciences)
12:45 PM	Plenary I (40 mins + 5 mins Q&A) x 2 talks
2:15 PM	Coffee Break
2:30PM	Plenary II (40 mins + 5 mins Q&A) x 1 or 2 talks -- still deciding
3:30 or 4:00 PM	SPS Zone 7 meeting
5:00 PM	Poster Session
6:00 PM	Conference Banquet
8:00 PM	After-Dinner Speaker

Saturday, October 22

7:30 AM	Breakfast
8:00 AM	Parallel Sessions for Oral Presentations
10:00 AM	MIAAPT Keynote Address (40 mins + 5 mins Q&A)
10:45 AM	Snack Break
11:00 AM	Plenary III (40 mins + 5 mins Q&A)
11:45 AM	EGLS Chair's note
11:50 AM	Plenary IV (40 mins + 5 mins Q&A) x 1 or 2 talks -- still deciding
12:35 or 1:20 PM	Conference Ends
1:30 PM	ALPhA Session + MIAAPT Make and TAKE



There is More to NASA Than Rocket Science

Tony Matthys and Brian Danhoff

When you think of working with NASA, you likely think of teams of engineers building rockets, satellites, and rovers used to explore distant planets. However, NASA also generates massive data sets about conditions right here on Earth. This data is used by people working in a wide variety of STEM careers in ways that impact our daily lives.

To help raise awareness about careers that use this data, Mi-STAR has developed a series of four Career Connection Explorations which are now available. Career Connection Explorations are classroom activities that go beyond a simple introduction to a scientist or engineer -- the goal of these explorations is to help students discover a wide range of applications for NASA's data products and the career paths that rely on them.

Each exploration highlights someone working in a different career, gives students a chance to interact with NASA data related to that career, and helps students brainstorm other related careers.

Each Career Connection Exploration begins with a short article featuring a specific person who works in that career. The articles describe what each job entails and how NASA products are used. Sometimes the relationship between a career and NASA is expected, as in the case of Jennifer Perez, a featured meteorologist who uses satellite data for her weather forecasts. But other

relationships are more surprising, such as for Colin Brooks, a geospatial analyst, who has used NASA satellites to help keep our lights on by warning power companies about harmful algal blooms that can shut down power plants.



In the second activity of each Career Connection Exploration, students use NASA data in a way that is similar to someone in the featured career. For example, in the Meteorologist Career Connection Exploration, students can use data from NASA weather satellites to identify patterns in their regional weather and make

predictions. This is just one of four possible activities for this Exploration, and the variety allows teachers to pick and choose activities that best fit their classroom needs.

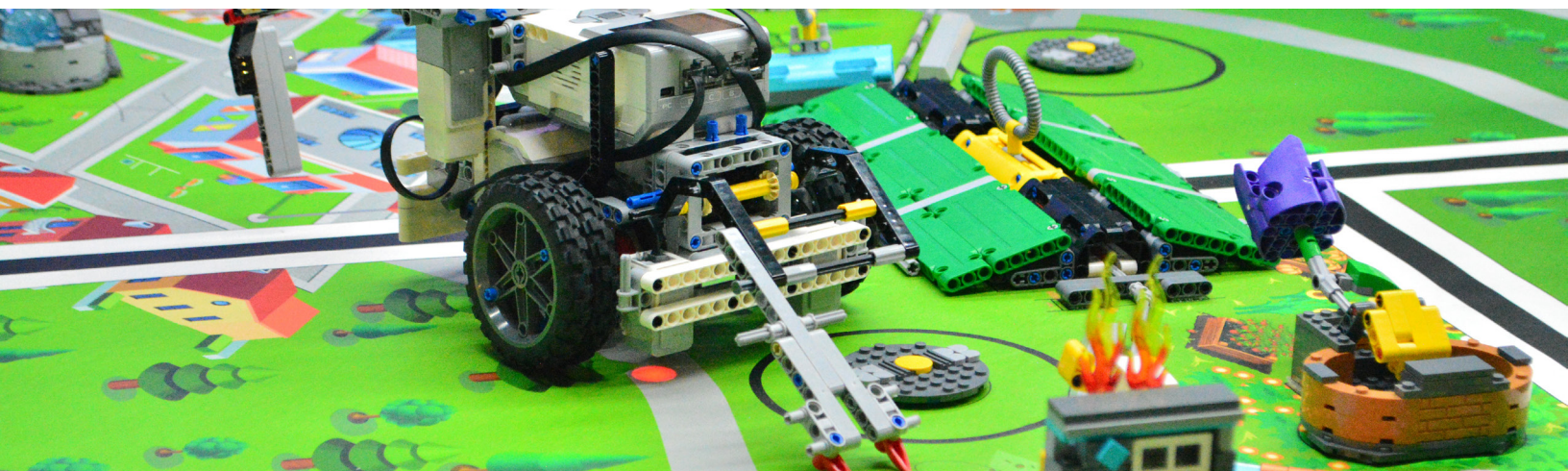
In the third activity of the Career Connection Explorations, students work in small groups and then as a whole class to brainstorm ideas about other careers that benefit directly and indirectly from the work done by the featured career.

Career Connection Explorations are a great way to cap off many Earth Science units, such as Mi-STAR's units 6.1: The Water Cycle, 7.2A Volcanoes, and 8.7: Global Climate Change. The minimal

advanced preparation required from teachers make Career Connection Explorations easy to use.

These are available now to all on Mi-STAR's website. Explore and access all the Career Connection Explorations at <https://mi-star.mtu.edu/curriculum/ngss-career-connections/>

These resources were supported in part by funding provided by the National Aeronautics and Space Administration (NASA), under award number 80NSSC20M0124, Michigan Space Grant Consortium (MSGC).



Free STEM Online Learning Sessions Available For Fourth to 12th Grade Students

The U.S. Army Combat Capabilities Development Command Ground Vehicle Systems Center has partnered with Wayne State University to sponsor Virtual Great Lakes Regional and Tribal Nations STEM zoom learning sessions for students in grades fourth through 12th on Saturdays from 1:00 -4:00 PM beginning in September. You must register your student for this free opportunity.

[Register here](#)

You will be sent a Zoom Link invitation via the email provided during registration.

Scheduled Saturdays

September 24, 2022
October 29, 2022
November 19, 2022
December 17, 2022
January 28, 2023
February 25, 2023
March 25, 2023
April 22, 2023
May 20, 2023



Science Events Held Through Out Michigan

Lary Kolopajlo | Eastern Michigan Universtiy

In late May and early June, a four-day excursion science camp was performed for 5th grade students from the Wayne-Westland school district. The camp was held in the chemistry department at Eastern Michigan University (EMU). The camp was titled: Evidence to Jury. On the first two days, students learned forensic techniques to analyze crime scenes, including fingerprinting, counterfeit detection, physical changes, and mystery powders. On the third day, students learned about the U.S. judicial system, such as defense attorneys, prosecutors, jury, and judges. On day four students held a mock trial to determine whether a suspect was guilty or innocent. Students were very engaged during activities and had a lot of fun.



Girl's Group July 7th Event

On July 7, a cosmetic chemistry activity was held in the chemistry department for "Girl's Group." (<https://www.girlsgroup.org/>). Girl's Group has offices in Ann Arbor and Jackson and is

committed to developing a diverse workforce that includes young women. The culture of Girl's Group centers on diversity, equity, and inclusion. Students learned about chemical and physical changes, and then performed lab experiments to make a lip balm and hand cream.

The Southeast Michigan Metropolitan Science Fair was held virtually during late February and early March. The chemistry department participated in judging hundreds of innovative projects from middle school and high school students.

The U.S. National Chemistry Olympiad is a chemistry competition for high school students. In Washtenaw County, it is sponsored by the Huron Valley Local Section of the



17th Annual Washtenaw Elementary Science Olympiad | Photo by Jack Blackburn

American Chemical Society. In the first phase of the competition, students took an online local section exam. Ten students were then selected to move on to the next phase of the competition, the national exam. Involving both written and lab practical, the national exam was held on the campus of EMU. The exam began in March and ended in May.



Determining the Percentage of Sweetener in Soda Pop Still a Fun and Exciting Experiment for the Classroom

Evgenia Koneva, Renee Trotman, Zain Shouman, and Mark Benvenuto

The well-established experiment of boiling soda pop to dryness is a classic laboratory experiment but we have found it to still be a valuable one for our first-year students. We find that simply boiling soda pop, both regular and diet, to what is called “dryness” a fun learning experience, and one that teaches a significant amount.

The experiment works as follows:

1. Measure out with a graduated cylinder a portion of soda pop, and an equal portion of the diet soda pop. We routinely have students measure out 100mL.
2. Take the mass of each, which should be close to 100g.
3. Pour each sample into a pre-weighed beaker, and set this on a hot plate at high heat.
4. After the solution begins to boil, when the volume has decreased significantly (over 50% reduction), take the sample off the hot plate, and let it cool on some bench top surface.
5. When the beaker is safe and cool to touch at the upper rim, roll it about to determine if the residue flows like syrup, versus like water. Note that if it does not flow like syrup, simply re-heat the sample and reduce the volume more, and repeat that step.

6. Note, with the diet soft drink, the sample can be boiled until almost all liquid is gone, since artificial sweeteners are roughly 100 times sweeter than natural sugars. As a point of comparison, if the regular soda is boiled too long, the sugar will burn and the residue will smell like roasted marshmallows.
7. When both samples are dry or flowing like syrup, weigh each beaker with the residue. The regular soda routinely weighs 5g to 12g more than the diet when we start with a 100mL sample.
8. You now have the mass of the dry material, the mass of the beaker (the dissolved solids), and the mass of the starting soda pop. This is enough to determine the percentage of sugar or artificial sweetener. It is also enough information to set up a ratio to determine how much sugar or artificial sweetener is in a 2L bottle.

The formulas for each calculation can be written as follows:

Percent dissolved solids:

$$(\text{mass of residue} / \text{mass of starting soda pop}) \times 100$$

Total solids in 2L bottle:
(mass of residue/starting vol.) = (X / 2.0L)

This activity can be done as a classroom demonstration, or as an experiment with each student boiling samples individually. Also, it can be performed with a variety of different soda pops, and their diet counterparts. By using several different soda pops and their diet versions, students can compare projects from the

experiments. Additionally, it allows students to discuss how food and food products are made, and gives them practice in basic measurements and mathematics, such as percentages and ratios. It also matches with the following two Michigan science standards, MS-LS1-7, which discusses rearrangement of molecules in food, and MS-PS1-2, which is aimed at analyzing properties of materials prior to and after some interaction.

ALL
of US

Anyone can save and improve lives through organ, tissue and eye donation.



Gift Of Life Michigan Offers Hands-on Experience

Alison Gillum | Gift of Life Michigan

Gift of Life Michigan is rolling out a unique new learning experience as part of its award-winning All of Us Student Education Program this fall. Students will now be able to examine human organ specimens including the heart, lungs, kidney, liver, and pancreas. The plasticated organs are on permanent loan from the University of Toledo's Anatomical Donation Program. Experts at the University of Toledo say specimens produced by plastination are playing an increasingly important role in teaching and research in the fields of anatomy and pathology.

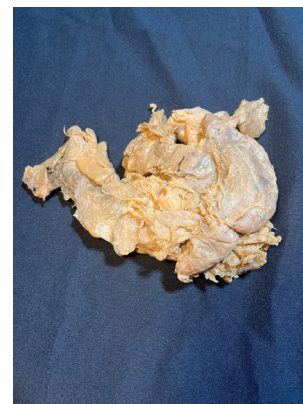
Michigan educators interested in bringing the All of Us program to their students are encouraged to reach out to Gift of Life Michigan at allofus@golm.org or visit its website at www.golm.org/allofus.



Heart



Kidneys



Pancreas



Lung



Where Do I Begin?

Katie Stevenson / MSTA Elementary Director

Making time for science during the elementary school day is a struggle that too many teachers face on a daily basis. As a former 4th grade teacher, I know the demands and worries. This year I transitioned from the classroom to an instructional coach for a Pre-K through 5th grade building, supporting all subjects. This article will suggest a few ways I have incorporated more science into daily schedules.

Start with reading! Reading aloud is so important for our students and offers benefits for all learners. In the book [Sharing Books, Talking Science](#), the authors encourage teachers to help their students

read like a scientist. They provide questions that can be asked while reading commonly found titles at all grade levels through the lenses of the NGSS cross-cutting concepts. For example, in the story *Charlotte's Web* students can think of the story plot in a scientific way. What was the effect of Charlotte writing her message in her web? Why does she write the message? She is trying to save Wilbur, the pig, and persuade the farmer to let him live. During reading instruction, we are often focusing on beginning, middle, and end, problem and solution, characterization, etc. These are all cross-cutting concepts that can allow students to show their sense-making of science ideas as well.

Cross-Cutting Concepts	Sample Questions
Patterns	What is being repeated? What can I predict?
Cause and Effect	What happened? Why did it happen? How did it happen?
Structure and Function	What does it do? What are the characteristics or properties? How do the properties help it work, or function?
Scale, Proportion and Quantity	Is this bigger, smaller, heavier, faster, the same as...?
Systems	What are the parts of the system? How do they go together? (Using a model) What if we made a change or took a part away?
Energy and Matter	What is the system doing? Is there something in the system being changed, or transformed?
Stability and Change	Is there something happening in the system? Is there something that is changing?

Incorporate science into a fun writing project! A popular series used with many grade levels is the [What If You Had Animal...](#) books. This is a great opportunity to work in persuasive writing and animal adaptations. Third graders used the picture books along with their science unit on animals. They focused on an animal part each week and discussed the writing process as well as looked at each structure and the function it provided for the animals. Students finished with a writing project on animal teeth. They had to choose one type of tooth (claim) and support their choice with evidence and reasoning.

The stress put on reading instruction in our elementary class is not going to disappear in the upcoming years. But the urgency for science instruction is becoming more and more prevalent. Start small by thinking of ways you can take what you are already doing and modify activities to bring in the scientific mind of your students.



Have a discussion during a meeting time! Some teachers have been using a [Page Keely probe](#) as a formative assessment opportunity. They will have the students complete the one question probe as morning work or exit ticket. Then during a morning meeting, class council, or even snack time, have students discuss their thinking. This can be used with all ages and all science concepts! Discourse around a science idea can provide teachers with insight to misconceptions, opportunities for extensions, student wonderings, and more.



Follow MSTA on Social Media

 [@MSTAmich](#)

 [@mstamich](#)

 [@MSTAMich](#)

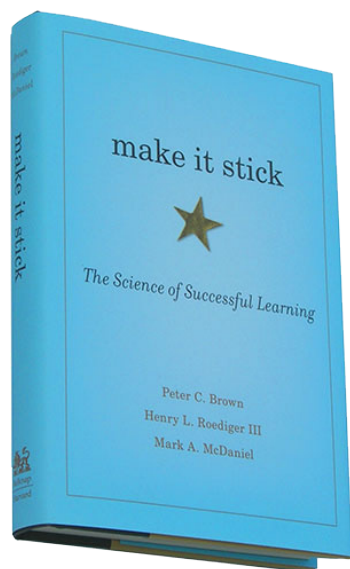
 [@MSTAmich](#)



Make it Stick: The Science of Successful Learning: A Book Review

Jordan D. Smith, M.A.Sci.Ed | St. Patrick Catholic School, Spring Arbor University

As science educators, we want our students to learn the value of science, as author and science vlogger, Hank Green calls, “that elegant system for sorting the facts from the fertilizer.” We know the value of empirical evidence and that should extend to our teaching practice when it comes to choosing methods that are effective. How do you sort through all the noise and information to find methods that truly work to help students learn that are backed by solid evidence?



Make It Stick: The Science of Successful Learning by Brown, Roediger and McDaniel takes the guesswork out of this. It turns out what intuition tells us works best to help us learn is

in fact wrong. Repetitive reading, highlighting, or drilling is what many students do because this process feels like we are learning because we are spending a lot of time performing these actions.

The authors continue to review the best research on learning and translate it into practical advice through stories and case studies of those who put it into practice. This book was recommended to me by a colleague, and reading it was a validation of many of the processes I’ve found helpful and did without thinking, while also inspiring me to more intentionally implement some of these principles in my teaching.

For instance, while retrieval practice or review is a normal part of most classes, the authors explain the most optimal way to implement these strategies is based on the idea that practice is most effective when it happens spaced out. In other words, you need to start to forget something in order for the review to help reinforce the memory. Practice also needs to be mixed up with varying types of practice. So the massed practice we often use in say a chemistry class to teach mole conversions would be better if mixed in with a variety of new and old problem types like molar mass, molar volume and perhaps atomic mass calculations.

While persistence and grit are buzzwords in education, the authors posit that the research

actually supports the long-term value of trying hard things and failing in producing lasting learning. As many an inspirational poster (including one hanging in my classroom) claims, Fail is merely a, “First Attempt In Learning.” They also addressed the logical traps we can fall into as learners in overestimating our knowledge and recommend how to study in such a way to avoid false confidence.

While reinforcing many commonly held educational theories and widely accepted methods, the authors picked a fight on the issue of learning styles. They claim that the research simply does not support the notion that we all learn one way best. Learning is best, they claim, when reinforced with methods that touch on multiple modalities and styles not to reach a variety of learners but rather to make

learning more multidimensional and durable. The authors wrap up their tour of modern learning research with an emphasis on the ubiquitous growth mindset. While this is also a buzzword in education, their emphasis on the research behind it does bring something new to the table than what we typically would see in a professional development session on growth mindset.

I highly recommend this book to all teachers and especially preservice teachers. At just over 250 pages, the authors write in an accessible and easy to read prose that unlike many education books is not overly academic. They summarize the state of the science in what is best for learning without getting bogged down in minutia so takeaways from the research is easily understood and applied.



“In my ninth grade biology class, Gift of Life has consistently provided free and engaging interactive presentations that reach all the students!”

— Nicole Durso,
ninth grade biology teacher

ALL of US

Student
Education
Program



Introduce your students to the world of donation and transplantation!

Our free learning experience includes:

- Overview of organs and tissues that are transplanted.
- Hands-on look at organ and tissue specimens.
- Simulations to teach students how donation works and why patients need transplants.
- Transplant recipients in attendance to share their stories.

Learn more at golm.org/allofus



STEM Books to Start Your Elementary Year!

Crystal Brown | MSTA Regional Director and STEM Teacher, Hunter Elementary in the Gibraltar School District

There is no better way to introduce your students to problem solving, perseverance, and the Engineering Design Process than a great STEM book! I LOVE to read books to kids. It is my favorite way to capture attention and weave a spell of creativity over the class. As an elementary STEM specials teacher, I have a unique opportunity to read to students from five-year-olds through fifth graders. Here are a few of my recommendations, along with a small activity or lesson to try with your students after reading.

June Almeida, Virus Detective!

By Suzane Buckingham Slade

This is a great narrative biography of how June grew up to one day discover the first human coronavirus. It has a wonderful account of how she grew up loving science and photography, and because of her love of both art and science, she noticed details and structures that other people would not see. As scientists, we think like engineers, asking questions and imagining possibilities, and this is the perfect book to spark interest and questions in virology. As I read this story to my fifth graders, I could see their curiosity

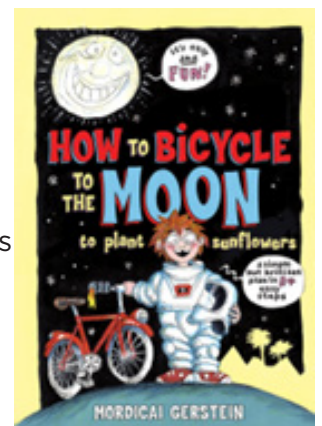


peaked by the discovery of the coronavirus in the 1960s, the description of microscope techniques like negative staining, and June's work of photographing and classifying viruses. After reading the story with students, I had students practice some virus detective work on their own and study some virus images to notice similarities and differences in their characteristics. Feel free to use [my activities](#) to spark your own ideas!

How to Bicycle to the Moon to Plant Sunflowers

By Mordicai Gerstein

This book is just plain FUN! I've read this to my third graders for a few years and they seem to be at just the right age for this very serious and detailed plan to get to the moon on a bicycle. It's dashed with enough silly to make students giggle, but also sprinkled with enough of the engineering design process to make students think. They notice how he imagines his possibilities and selects the best option. They see how he tests out his plan on Earth and makes improvements to his design based on the problems he experiences. Each part of the plan has been thoughtfully crafted, and students love



the wild imaginative ideas that come to life on the page. In the end, we all use our most important engineering tool - our imagination - to imagine other ways we could get to the moon, and even other fun activities to do once we get there! Maybe we could ride our drone to the moon to make the biggest slam dunk in history! Maybe we could trampoline to the moon to swim in a big moon pool of water-Jello! Students have a great time exercising their imagination and brainstorming ideas, and then we select one and make our own plan. This [one page activity](#) could be the start of a great writing project, or it could be the end to a really fun one day lesson.

One Plastic Bag

By Miranda Paul

This incredible story of how one woman inspired change in her community has sparked a huge plastic bag recycling movement in my own school. Students will fall in love with this story of Isatou and can very clearly see her thinking as the thinking of an engineer. I use this book as another way to show how being an engineer is not necessarily a career, but a way of thinking. WE can be engineers just like Isatou can. In this true biographical story, Isatou and the women in her community weave together plastic bags after finding them littering their space and damaging their local environment. After reading this story, my second graders were inspired to start recycling plastic bags at our school. We've joined a [Recycling Challenge](#) hosted by Trex to be able to track our recycling and become part of a movement to remove plastic film from landfills. Check it out!



Papa's Mechanical Fish

By Candace Fleming

This book would be great for any elementary student, but my first graders especially enjoy the intricately detailed pictures and fun descriptions of sounds coming from Papa's workshop. In this story, Papa is a special type of engineer: an inventor! Students are fascinated as he uses the features and characteristics of a fish to try to invent a mechanical fish. This brings up a great discussion about how other engineers have used the special features of animals to inspire their designs and how we as engineers are always looking to the natural world to fuel our imagination. Throughout the story, the daughter's questions spark constant re-engineering for Papa, which leads to an important realization. The daughter is an engineer too! She's the one asking questions after the designs fail, pushing the work forward as she notices weaknesses that need to be improved. After a great read and a powerful discussion, my first graders love to take a minute to design their own mechanical animal. Maybe it will be a mechanical flamingo with a special elevator to get to the top or cranks inside to make the legs move, or even stilts connected to your legs so you can move by walking the legs of the majestic animal. Once again, our imaginations allow our engineering minds to create endless possibilities.

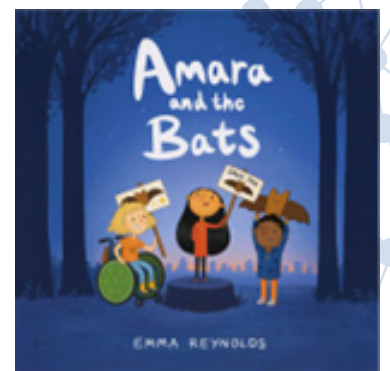


Amara and the Bats

By Emma Reynolds

This is a new book in my rotation that I found on [NSTA's Best STEM books of 2022](#).

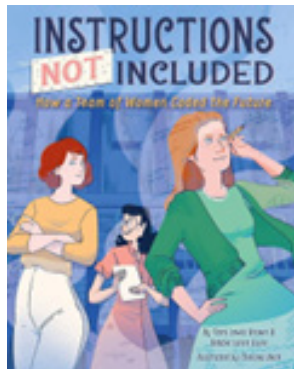
This beautiful story follows the experience of a young engineer-minded girl named Amara, who has loved bats all her life. After moving to a new town, she's



saddened to see that the bats in her new local park are no longer around. She is inspired by other young people she's read about taking action for the environment and decides to do something to bring the bats back. Her story follows the engineering design process as she asks how she can bring the bats back. My students love to see kids like themselves taking action. When she shares her plan with her classmates, the community begins to get behind her and they are all able to renovate and rebuild the local bat habitat. This story was a great way to show how a little passion can spark an idea, which can fuel a movement, which can power a change in a community.

Instructions Not Included

By Tami Lewis Brown &
Debbie Loren Dunn



I love the look on my fourth graders' faces when they see the 'computers' that made mathematical calculations before the invention of modern day computers.

This story is a great biography of three women who were tasked with figuring out how to use the ENIAC, but were given no instructions. These mathematicians, these engineers, these determined problem solvers, persevered through failure to invent a creative and useful way for a mechanical computer to solve complex mathematical problems accurately. In between the beautifully written lines of text are the threads of an engineer's thinking. In the end, students are inspired by the magnitude of the ENIAC and other punch card computers of its kind. There are incredible photographs at the end, but you can also check out the [resources I've created](#) as a unit or a lesson for this great resource listed in [NSTA's Outstanding Science Trade Books of 2020](#).



Student Engineering Competitions to Complement your 3rd-12th Grade STEM Curricula

Square One's Innovative Vehicle Design (IVD) Competitions Offer...

- ❖ 5 Separate & Unique Program Options
- ❖ Grant Funding Available !!
- ❖ Project, Problem, Place Based Learning
- ❖ Relevant, Rigorous & Authentic Projects
- ❖ NGSS Engineering Practices Alignment

Team Registration is Now Open !!

"The most engaging and encouraging atmosphere for competition."
- Anonymous Teacher 2022 IVD Competition

"I cannot rate highly enough how extraordinary the Innovative Vehicle Design program is with Square One...."
- Michelle VandyBogurt, Northwest HS



ivdinfo.org

Square One is a K-12 Non-Profit STEM Education Organization



www.msta-mich.org