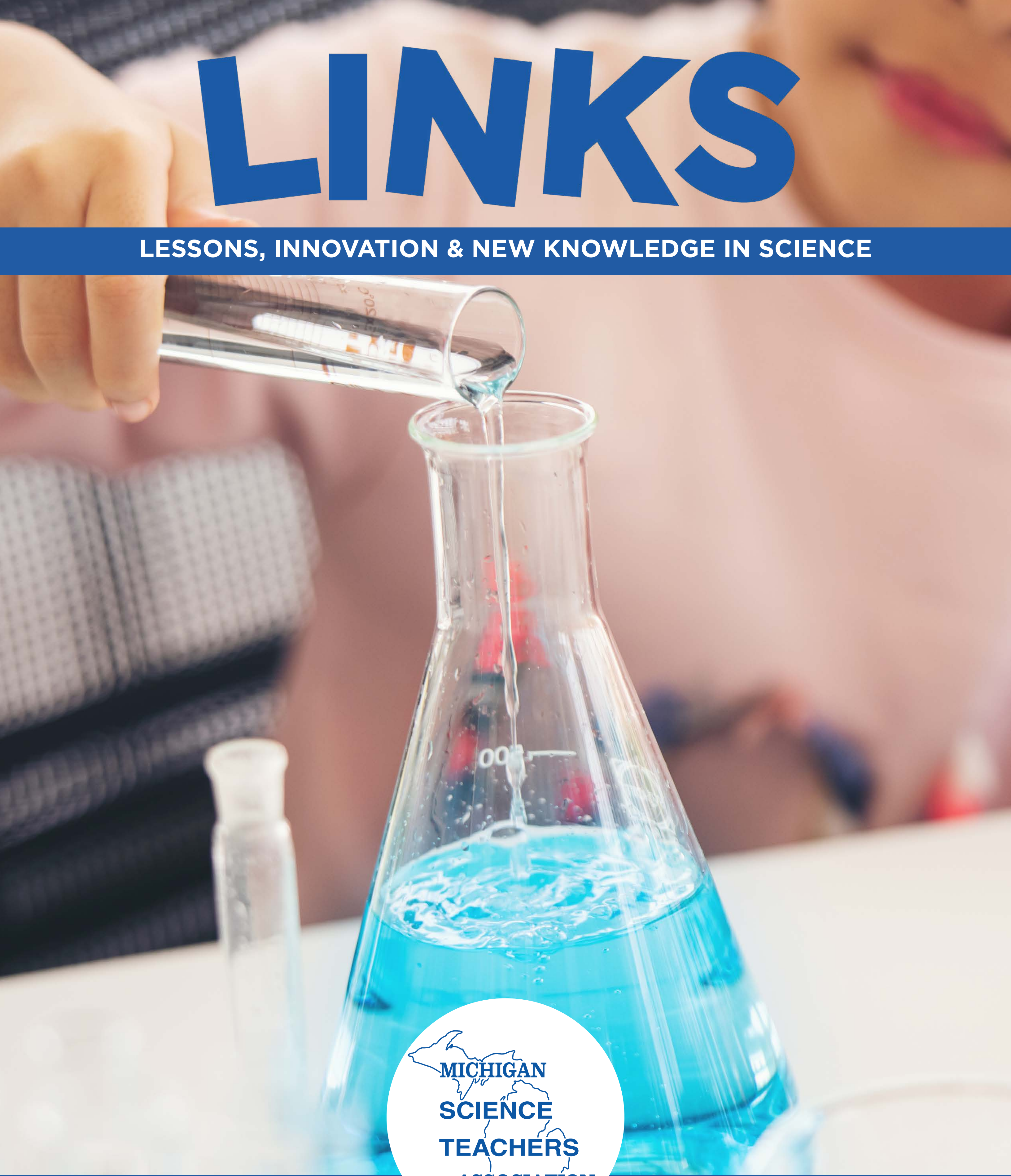
LINKS

LESSONS, INNOVATION & NEW KNOWLEDGE IN SCIENCE



MICHIGAN SCIENCE TEACHERS ASSOCIATION

THE OFFICAL MEMBER NEWSLETTER OF MICHIGAN SCIENCE ASSOCIATION

TABLE OF CONTENTS

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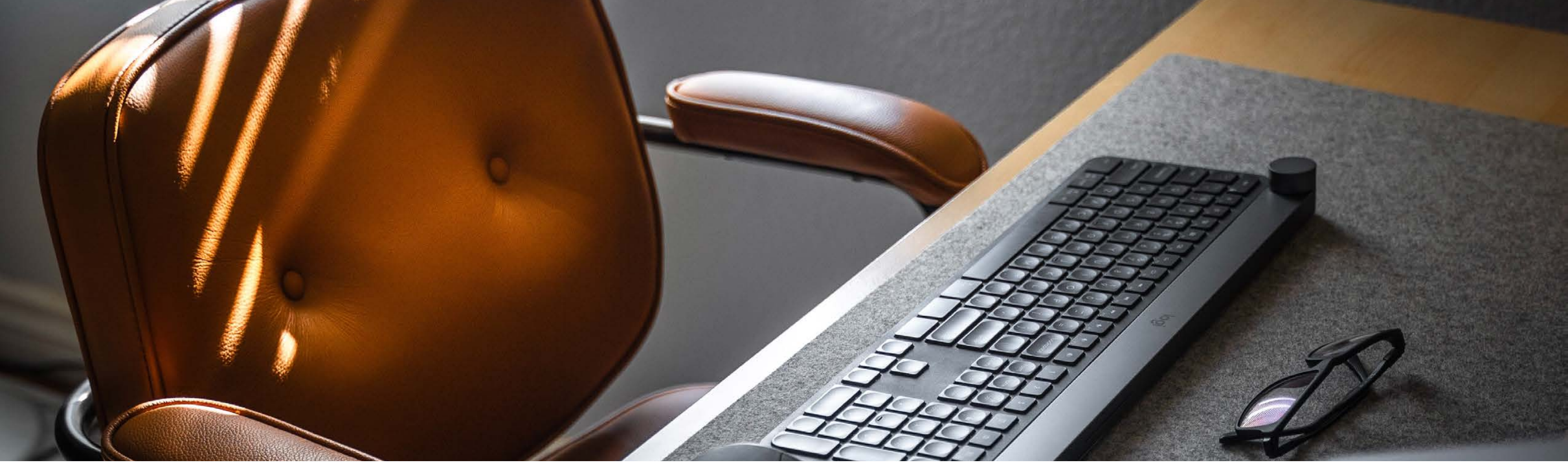


From The Desk of the Executive Director

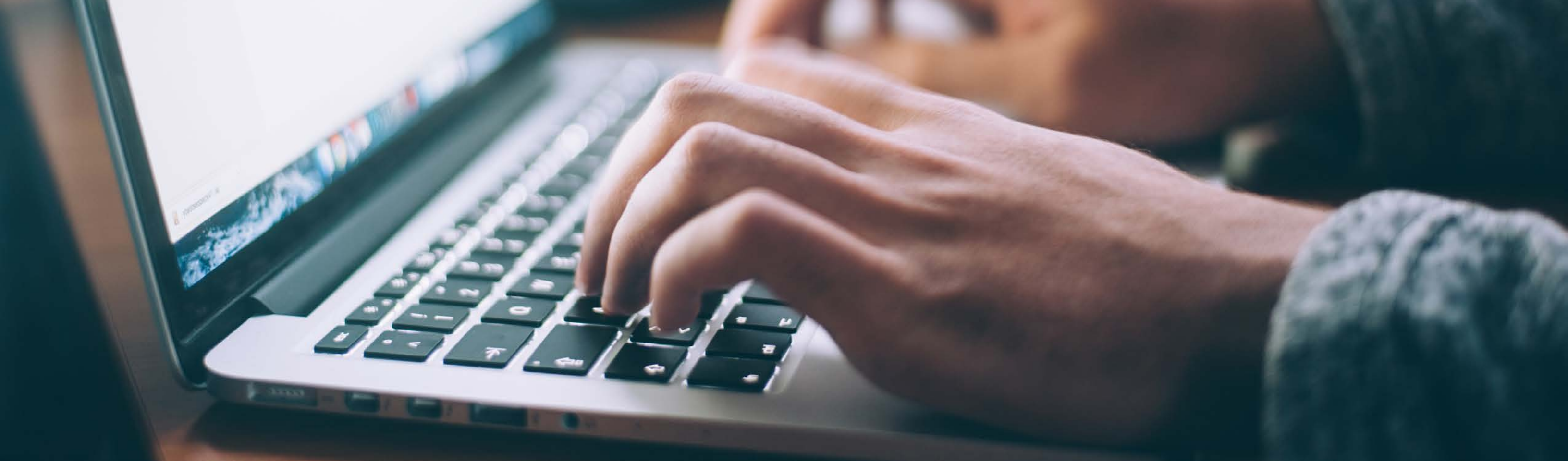
As the Executive Director of MSTA, it is my distinct honor to represent our association whose mission it is to "stimulate, support, and provide leadership for the improvement of science education throughout Michigan." Our Board of Directors is dedicated to advancing our mission in everything we do. The most important "thing" we do is our conference. Please join us on February 27th and March 6th for our virtual conference, which promises to be everything, if not more, than we hoped for in a virtual platform.

RISE: Re-imagine Innovative Science Education is the theme of MSTA's 68th Annual Conference! MSTA is honored to join in the re-imaging of how we explore, discover, wonder and teach about science within the constraints of a global pandemic. Along with the challenges we, as science educators, face; let's also explore the new opportunities and partnerships we are afforded. Attending this year's conference will enhance your understanding of how our amazing educators are prompting changes in instruction and assessment practices at the classroom, district and state level with a virtual, hybrid or face-to-face classroom. With over 48 sessions provided by your fellow Michigan science teachers, leaders and recognized national presenters; you are guaranteed to acquire some new ideas, new strategies and new resources. We encourage you to join us on February 27th and March 6th to share in re-imaging and celebrating Michigan science.

We are pleased and very proud to announce a wonderful array of Keynote and Acclaimed Speakers. While attending the conference, set aside Saturday, February 27th at 8:00 AM for our Conference Welcome and Keynote, "Re-Imagining our roles: Dreamscapes in Science & Engineering" by Dr. Christopher Wright. Our elementary and middle school folks will not want to miss a presentation by the authors of *Picture Perfect Science*, which connects literacy and science/STEM in a most productive way at 11:00 AM on 2/27. Another Keynote will be presented by Dr. Desmond Murray at 12:15 PM on the 27th. During our second Saturday, we are excited to host Gloria Ladson-Billings who is recognized for her "many efforts that have led to new models for examining ways to reduce academic disparity between mainstream and minority students." Please join us on Saturday, March 6th for her keynote on "Pandemic Pedagogy: How Good Science Teaching Can Make it Better." Finally, for our emerging engineers, we welcome Theanne Griffith, PhD, author of *Magnificent Makers*, who will share "Cultivating Curious Minds with Creative Thinking Skills."

My admiration and many thanks go out to our conference planning team.

Betty Crowder
Executive Director
MSTA



Mi-STAR Learning Series: Offering Solutions and Community Support

Marcia Goodrich and Lindsey Watch

The Michigan Science Teaching and Assessment Reform project developed its Mi-STAR Learning Series to help educators share best practices and make it easier to implement NGSS-designed curricula. It has since become a go-to resource for teachers dealing with the unprecedented challenges posed by COVID-19.

"The Mi-STAR Learning Series was envisioned as a way to support both the Mi-STAR community and the broader community of Michigan science teachers," said Lindsey Watch, Mi-STAR curriculum development associate. "Now, with the changing teaching environment, it's been a perfect way to have discussions and share ideas on what's working, whether your school has in-person learning, remote learning, or a hybrid of the two.

"Instead of having individual teachers all try to recreate the wheel, the Learning Series brings them together," she added. "Teachers are great problem solvers."

Learning Series sessions are open to everyone and are held on Zoom. They have attracted between 50 and 250 participants per session. Each begins with a presentation on a specific teaching challenge. "We've had wonderful guest presenters," said Watch. Some focus on Mi-STAR: professional learning facilitator Minna Terrell, of St. Clare County ISD, and Noyce Fellow Dawn Kahler, of the Kalamazoo Public Schools, shared their tools for adapting units for remote learning. The Noyce Fellows are a cadre of 20 middle school STEM teachers selected for their potential to lead STEM education reform in Michigan. Their work is supported by Mi-STAR and Michigan Technological University with funding provided by the National Science Foundation (award #1758392).

Other presenters have focused on best practices that go beyond Mi-STAR. "Almost all pedagogy addresses in-class learning, but with a small change you can achieve the same results in a remote setting," said Watch. But even when kids are in school, new challenges arise. "Teachers are having to engage students in a socially distanced classroom, where everyone is six feet apart and wearing masks," she said.

Learning Series presenters have addressed netiquette (internet etiquette) and tips for engaging students from afar, including inviting them to create virtual lockers. Students can decorate these digital spaces to reflect their interests, from soccer to music to pets. "It gives kids a chance to express themselves, and it gives teachers a chance to learn more about students they may not see in person," said Watch.

During presentations, teachers can participate in breakout sessions of four or five individuals, delve deeply into potential solutions to common challenges and subsequently share their ideas with the larger group.

"The discussions have been the biggest draw," said Watch. "Getting the Mi-STAR community together and crowdsourcing those ideas has been great. People have told us, 'Talking with others in the breakout rooms, finding out what's working for them, hearing how they are doing—that helps me so much.' And it helps the Mi-STAR staff at least as much as it helps teachers."

Anyone can access recorded Learning Series sessions and find out about upcoming presentations here. Past topics include best practices in remote teaching, assessing students virtually, and teaching English language learners. Upcoming topics include remote tools for activities like modeling and facilitating student discussions.

State Continuing Education Clock Hours (SCECHs) are available for teachers who attend these sessions. The Mi-STAR Learning Series is supported by a grant from the Michigan Department of Education through the MiSTEM Advisory Council grant process and via a subaward from Grand Valley State University, as well as ongoing support from the Herbert H. and Grace A. Dow Foundation and the National Science Foundation.

LINKS

Learning Series Session

Upcoming Presentations

To Be It, You MUST See It: Providing Diverse STEM Role Models for All Students

Joan Schumaker Chadde, Amy Emmert, Dr. June Teisan, Dr. Sandra Yarema, Dr. Jeffrey L. Ram, Marion Tate

Exposure to role models is a proven mechanism for fostering career aspirations in young people. However, finding STEM role models of color can be a challenge; with minority representation in STEM fields significantly lower than white or Asian Americans (NSF, 2017). To address these challenges, educators from Detroit's Belle Isle Aquarium/Belle Isle Conservancy, Michigan Technological University, and Wayne State University, created a multi-faceted project to pique interest in science and STEM careers amongst 5th grade students in the Detroit Public School Community District (DPSCD), funded by a four-year National Science Foundation grant.

A four-day summer institute was offered annually 2017-2020. Several STEM career role models (see Table 1) were invited to present. They responded to the following questions-- How did you get interested in your career path? How did you prepare for your career? What do you like about your job/career? What challenges have you faced? Teachers heard personal stories from STEM professionals that look like their students-- stories of how they became interested in science as a youngster and how they pursued their dream of becoming a scientist. Teachers became aware of the wide variety of career paths available to their students-- careers in water quality, fisheries, wildlife biology, climate science, natural resource management, and more. Teachers

received a list of trade books (see Figure 1) on STEM careers to share with students and contact information for the role models to invite them to present to their students.

In 2020, the teacher institute was offered virtually and the STEM career role models presented online. This turned out to be an even more effective experience for participants with the addition of visuals and the ability to engage STEM role models from a larger geographic area-- demonstrating how readily accessible "classroom" guests can be. The visuals enhanced understanding of the presenter's career path and provided an effective springboard for questions.

Teacher feedback was very positive: *"The STEM career role model presenters were inspiring and amazing. I was not aware* *of many of the careers that were presented!"* Jennifer Edwards, 5th grade teacher, Ronald Brown Academy.

"My students would enjoy meeting the STEM career role models because they can see themselves, people of color, in positive careers." Ms. Cheryl Williams, Bethune Elementary-Middle School teacher.

With so much now being offered virtually, potential presenters are just an email invitation away. One strategy for identifying potential STEM Career Role Models is to reach out to state and local chapters of professional societies. Here is a short list to get started: National Society of Black Engineers, Society of Hispanic Professional Engineers, American Indian Science & Engineering Society, Society of Women Engineers, National Association of Black Scuba Divers, National Organization of Professional Black Natural Resources Conservation Service Employees.

Providing children's trade books (Fig. 1) in the classroom that showcase diverse people in STEM careers making significant contributions provides good reinforcement of the presentations.

It's crucial to note that hosting diverse STEM career role models is important for ALL students, not just under-represented students. In some schools and nature centers, little diversity is present. This can have an unintended consequence of students perceiving that STEM careers are something for only white children to aspire to. When we bring diverse presenters into our classrooms to share their skills and professional experiences, we demonstrate that ALL people can make important contributions to solving the scientific and engineering challenges facing our global society.

Anything we can do to increase awareness of STEM careers will hopefully inspire more students to take science courses in high school and increase their appreciation for the enjoyment, satisfaction, and community contributions that these career paths offer (Greenland & Sheldon, 2007).

Table 1. Sample STEM Career Role Model

Career	Degree/Major	Place of Work
Water & Air Quality	Environmental Enginnering, B.S., M.S.	Air Management Engineer Dept. of Natural Resources Madison, WI
Recreation Management	2-year Associate	Dept. of Natural Resources Belle Island State Park Detroit, MI
Urban Forestry Geography	Geography, PhD	Assistant Professor Michigan State University East Lansing, MI
Meteorologist Climate Scientist	Meteorology, M.S., PhD	National Oceanic & Atmospheric Admin. University of Michigan Ann Arbor, MI
Aquarist/Marine Biologist	Marine Biology	Fish Ecology Bass Proshop
Wildlife Biologist/Ecologist	Fisheries, Wildlife and Conservation Biology, PhD	Dept. of Ecology & Evolutionary Biology University of Michigan Ann Arbor, MI
Zoology	Wildlife Biology	Detroit Zoological Society Royal Oak, MI
Wildlife Biologist	Biolgoy, B.S.	US Army Corps of Engineers Detroit, MI

Figure 1. Suggested trade books on STEM Career Role Models

Jennings, Doresa A. 2019. **The STEAM Chasers: We Made That.** What seemed an ordinary homework assignment turned into a life changing adventure for Shar, Terrence, Ebony, Akiya, Marcus, and Chase as they take a scavenger hunt through town finding the contributions Black Americans have made to our everyday lives in the areas of Science, Technology, Engineering, Art, and Math.

Pellum, Kimberly Brown. **Black Women in Science: A Black History Book for Kids.** Features fifteen powerful stories of fearless female scientists that advanced their STEM fields and fought to build a legacy. Through the triumphs of these amazing women, you'll find remarkable role models.

Abdul-Jabbar, Kareem. 2012. **What Color is My World.** Kareem Abdul-Jabbar, basketball legend and the NBA's all-time leading scorer, champions a lineup of little-known African-American inventors in this lively, kid-friendly book. Here is a tribute to black inventors whose ingenuity and perseverance against great odds made our world safer, better, and brighter.

Teachey, Tiffany. 2019. **What Can I Be: STEM Careers from A to Z.** An inspiring and easy-to-read alphabet picture book that teaches our next generation about Science, Technology, Engineering, and Math (STEM) careers.

RESOURCES

Virtual Field Trip - Belle Isle Aquarium

Belle Isle Aquarium Lesson Plans

Black Environmental Champions

Creating STEM Pathways at Detroit's Aquarium

References

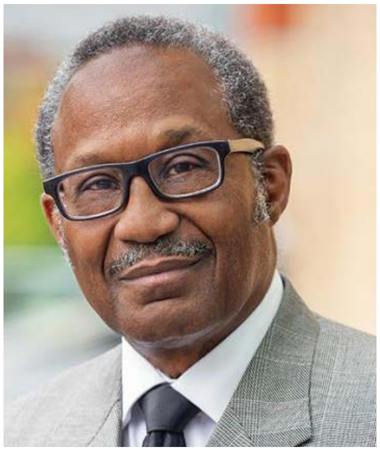
Greenland, Paul, and Anna Marie L. Sheldon. 2007. Career Opportunities in Conservation and the Environment. Ferguson Publishing Company.

National Science Foundation, National Center for Science and Engineering Statistics. 2017. "Women, minorities, and persons with disabilities in science and engineering." Special Report.

The material in this article is partly based upon a project titled "Promoting Student Interest in Science and Science Careers through a Place-based Environmental Educational Program at a Public Aquarium," supported by the National Science Foundation under Grant No. 1614187. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

Considering Diversity in Teaching a Physics Class

Shomari Manu Jabulani, Ph.D.
Univeristy of Michigan/Jabulani Consulting LLC



The hope with the lesson below is to show that science, mathematics, engineering are knowledge bases that are packed with diversity despite the history of non-inclusion, and the lack of equity. Many people and cultures from ancient times to more recent times have contributed to the expansion of scientific knowledge. However, a science teacher may need some resources to jump start the development of lessons that are not only engaging, content rich, but also culturally relevant and culturally enriching.

The lesson plan below was used by the author in various settings with augmented versions. The author has also had the opportunity to teach this lesson to adults as part of a Master's and Certification Program at a major university here in Michigan.

Lesson Plan
Does the Design of an Airplane Impact It's flight performance?

Teacher: Shomari M. Jabulani, Ph.D.: Demo/proposal ***Date:*** 11/21/2017
Subject/grade level: 7th - 11th graders ***Class Length:*** 60-75 minutes

Science Standards: (Please indicate the source of these standards.) NGSS

Science and Engineering Practices
Developing and Using Models
Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed world(s).

- Develop a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-ESS1-1)

Using Mathematical and Computational Thinking
Mathematical and computational thinking in 9–12 builds on K–8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions.

- Use mathematical or computational representations of phenomena to describe explanations. (HS-ESS1-4)

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.
- Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-ESS1-2)
- Apply scientific reasoning to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion. (HS-ESS1-6)

Engaging in Argument from Evidence
Engaging in argument from evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current scientific or historical episodes in science.
- Evaluate evidence behind currently accepted explanations or solutions to determine the merits of arguments. (HS-ESS1-5)

Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in 9–12

Crosscutting Concepts
Patterns
- Empirical evidence is needed to identify patterns. (HS-ESS1-5)

Scale, Proportion, and Quantity
- The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs. (HS-ESS1-1)
- Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth). (HS-ESS1-4)

Energy and Matter
- Energy cannot be created or destroyed–only moved between one place and another place, between objects and/or fields, or between systems. (HS-ESS1-2)
- In nuclear processes, atoms are not conserved, but the total number of protons plus neutrons is conserved. (HS-ESS1-3)

Stability and Change
- Much of science deals with constructing explanations of how things change and how they remain stable. (HS-ESS1-6)

Connections to Engineering, Technology, and Applications of Science
Interdependence of Science, Engineering, and Technology
- Science and engineering complement each other in the cycle known as research and development (R&D). Many R&D projects may involve scientists, engineers, and others with wide ranges of expertise. (HS-ESS1-2),(HS-ESS1-4)

Connections to Nature of Science
Scientific Knowledge Assumes an Order and Consistency in Natural Systems Cause and Effect

- Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-ESS2-4)

Disciplinary Core Ideas
PS2.A: Forces and Motion

- Newton's second law accurately predicts changes in the motion of macroscopic objects. (HS-PS2-1)
- Momentum is defined for a particular frame of reference; it is the mass times the velocity of the object. (HS-PS2-2)
- If a system interacts with objects outside itself, the total momentum of the system can change; however, any such change is balanced by changes in the momentum of objects outside the system. (HS-PS2-2),(HS-PS2-3)
- ETS1.A: Defining and Delimiting Engineering Problems
- Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. (secondary to HS-PS2-3)

ETS1.C: Optimizing the Design Solution

- Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade-offs) may be needed. (secondary to HS-PS2-3)

Lesson Objective(s):

1. Students will be able to reinforce knowledge of motion
2. Students will be able to construct a plane and gather flight data: quantitative (distance, time, speed) qualitative (path of flight characterization)
3. Students will demonstrate knowledge of using the scientific method in evaluating the effect of airplane design on its motion performance

Materials: (Please attach any necessary handouts, reading materials, etc.)
Laboratory Worksheets, Airplane Design worksheets, paper clips, plain lined paper, printer paper, construction paper, meter sticks, stop watches, timer (possible projected)

ENGAGE
Time: 5-7minutes

- Describe how the teacher will capture students' interest, access prior knowledge/understanding, and/or generate questions.
- Include teacher actions as well as student actions.
- Explain how students might struggle or any common alternative ideas they may have and how the teacher will support them.

Teacher: begin by orally introducing the Lesson Title (Driving Question) to the students.
Students: Minor responses expected.
Teacher: Send one or more pre-made planes across the room and field reactions from students. What just happened? Who can describe in detail?
Students: some voluntary reactions
Teacher: tosses an unfolded sheet of paper and asks for reactions from students
Teacher: They were both sheets of paper, why did one fly? What are the differences? Then the teacher steers the students' responses back to the Driving Question. Teacher teases the class with vocabulary terms: Airborne, thrust, drag, friction, gravity, lift, design and asks class to think of other terms related to what they just observed.
Teacher: Directs students to form groups of 4 to investigate the Driving Question

EXPLORE
Time: 25- 35 minutes

- Describe the activity students will be doing. Include teacher actions as well as student actions.
- List conceptual questions the teacher will use to encourage and/or focus students' exploration.
- Explain how students might struggle and how you will support them.

Teacher: Allows each team to choose a folded piece of paper from the teacher to find out which design they will be responsible for. As the teams look at their mystery design, the teacher will go to each table and quickly establish roles for each team (Facilitator, Go-for, Recorder, Assembler). Students will mull over their mystery design and reach agreement on roles. Teacher tells the Facilitators to send the go-to get the supplies for constructing their plane.
Students: The Go-Fors retrieve the design worksheet, the lab-sheets, etc.
Teacher: Stops everyone to check that they have what is needed and then leads a short discussion about variables and procedures must be listed before team can begin carrying out their procedures (steps that begin with a verb). What are variables? What would be the Independent variable? What should be controlled variables (constants)? What could we mean by quality of flight? What calculations are involved to complete the data charts?
Teacher: After all groups have good attempts at completing Lab worksheet #1, A timer is set (10minutes), and groups can proceed to the hallway areas to quietly carryout procedures and record data on Lab sheet #2.
Students: Carry out Procedures, gather, and record data on paper airplane performance. Then return to table to complete data charts.

EXPLAIN
Time: 15 minutes

- What big idea or phenomenon are students explaining given the standards and objectives listed?
- How will students connect prior knowledge to today's exploration?
- List higher order thinking questions the teacher will use to elicit student explanations and allow them to justify their explanations.
- Explain how students might struggle and how you will support them.
- The notion of variables will be explained by students and modifications made by the teacher. Table 1 what variables did you list? Table 2, etc
- Students will be involved in discovering the relationship between design and flight characteristics.
- Students will use prior knowledge of finding the mean, calculating speed, analyzing variables, and organizing data.
- Students may struggle with terms that are unique to flight of an airplane. I will use terms such as lift, drag, etc to explain the forces acting on the plane
- Students may also struggle with writing scientific explanations (CER). I will move table to table providing guidance and "review' of writing CERs.

ELABORATE
Time: 15 minutes

- Describe how students will develop a more sophisticated understanding and apply their understanding to a new situation(s).
- How is this knowledge and/or understanding applied in our daily lives?
- Teacher will lead whole class discussion on filling in a class chart using "means" so that each table can compare it's data to the whole class result. What does this new chart say? How can you put this into words? Write a new CER based on whole class data and compare and contrast with the first CER written. What do you think about airplane flight today? Are their different purposes for flight and how might that purpose impact airplane design?

EVALUATE
Time: Continuous

- Describe how the teacher will formally or informally check for understanding throughout the lesson. Table/team visits to determine progress, misconceptions, and to motivate and re-instruct.

- How will students demonstrate that they have achieved the lesson objective(s)?
- The completion of charts per table will be seen. The quality of the CERs (Claim with justification, citing of at least 3 pieces of evidence, reasoning ties the evidence to the claim)
- Success of the class will be partially measured by the whole class chart that is produced. This would show the success or lack thereof of each table and expose various weaknesses in computation, vocabulary, and use of scientific method.

Possible on a second day each group will report to the class their specific findings using upgraded white boards or large construction paper to highlight charts adjustments and a graph or graphs based on the whole class chart. (Summative)

A final version of the Laboratory report will be due on a date about three days after the investigation. (typed preferred)

Differentiation strategies to meet student needs:
Generally, I assume that reading levels and vocabulary use will not be uniform so I build in some vocabulary actions during the class. Differentiation depends on the class dynamics (hearing, sight, mobility issues). The class is designed to allow everyone to play a role in discovering the forces of flight without realizing such as they try to get their plane to fly. Informal formative assessment will allow me to address any minor special situations or simply re-state instructions or maybe draw a short diagram.

Opportunities to highlight DIJE-related issues (diversity, inclusion, justice, equity):
If not this class then during the next, I would highlight various contributors to flight with a slide show and possible short readings for students. Depending on the class environment, movie clips on the Tuskegee Airmen, Emelia Earhart, Bessie Coleman, and Daniel Bernoulli.

Safety Notes:
The materials themselves are generally considered non-hazardous. However, several instructional warnings about playfulness with paper clips will not be tolerated and respect for everyone must be shown.

In basic procedural terms the teacher will:

1. Prepare multiple types of paper airplane design worksheets from the websites given or from other sources. Then place the different airplane design worksheets/instructions in different trays for teams from which teams will select. Also ensure that there are enough materials for each team. Additionally, it would be helpful, but not mandatory, for the teacher to have built completed examples of each available design.
2. Queue videos for ease of access
3. Prepare Data tables and charts in advance of class.

LINKS

Laboratory Worksheet 1

Tuskegee Airmen Article

Tuskegee Airmen: First Black Military Pilots

Bessie Coleman Facts

Bessie Coleman, the Black Cherokee Female Pilot

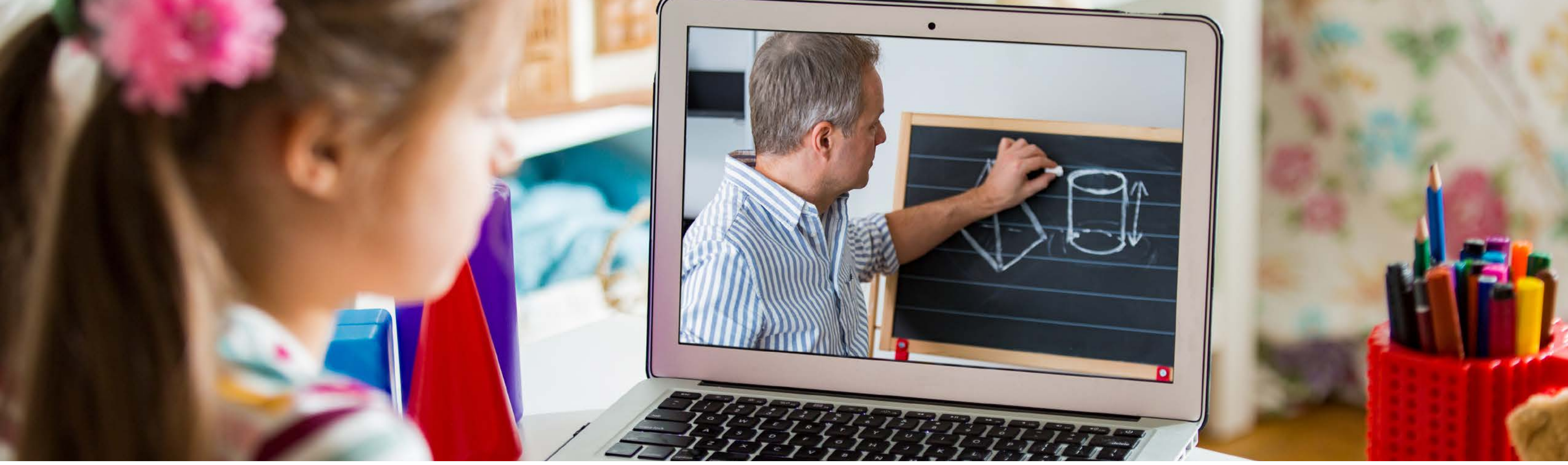
Amelia Earhart

Daniel Bernoulli

Bernoulli's Principle

Paper Airplane Designs

How to Make 10 Awesome Paper Airplanes



Mi-STAR Offers Open-Access Lessons, Professional Support for Remote and In-Person Learning

Marcia Goodrich and Luke Bowman

To help teachers coping with the upheaval wrought by the pandemic, Mi-STAR has made five of its remote learning science lessons and additional professional learning resources freely available to all educators.

Mi-STAR offers middle school science curricula and teacher professional learning that supports the Next Generation and Michigan State Standards and empowers students to use science and engineering to address real-world issues.

Lessons for teaching in person or at a distance
The remote learning lessons are suitable for grades 6–8, and some teachers have used them in fifth-grade classes. They can be completed in two or three class periods and taught in person, as a hybrid of distance and in person learning, or at a distance, either synchronously, via Zoom or other classroom meeting software, or asynchronously. All the activities can be done at home with minimal guidance and few special materials.

"We have heard the lessons are also ideal resources for substitute plans when the teacher is out sick," said Luke Bowman, a Mi-STAR curriculum development assistant and a research assistant professor at Michigan Technological University. They can also be provided to students who are chronically absent and can be used in hybrid classes, where some students come to school while others stay at home.

The lessons are aligned with the Michigan Science Standards and focus on Science and Engineering Practices, providing students hands-on exercises in how to do science. Mi-STAR was also concerned about redundancy, so the lessons supplement—and do not repeat—the regular Mi-STAR curriculum.

Mi-STAR began adapting the lessons for remote learning last spring as classrooms shuttered across the state. "Our Mi-STAR teachers told us there was a great need for supplemental resources that could be taught remotely," Bowman said. "Plus, we focused on educational equity. We needed to design for the most challenging learning environments, where students had no access to a computer and little to no guidance from teachers, parents or guardians."

"Mi-STAR teachers got the first crack at those first remote learning lessons in the spring," Bowman said. With their feedback, Mi-STAR staff improved those lessons and also wrote two enhanced lessons with expanded teacher guides, videos, and assessment tools: Lesson 6: Constructing Explanations and Lesson 8: Data Analysis. "They were designed along the lines of a traditional Mi-STAR unit," he said. "They are now available to anyone in the world, along with three other remote learning lessons."

All the lessons feature activities students can do at home. In one lesson, students do an experiment to help them make a claim as to why certain animals are better adapted to cold environments. “They coat their finger in butter, submerge it in ice water, and then compare it to how it feels when they don’t butter their finger,” Bowman said. “Students also record the activity, graph it, and in the synchronous version, they can share their results with the class.”

Kudos from teachers

The feedback has been overwhelmingly positive, he reported. Among the teacher comments:

• “Content was perfect for home learning.”
• “This lesson concept was easily accessible and yet challenging enough for our students 6–8.”
• “I like how there is a question being posed that our students can easily wrap their heads around and engage in. I also like how this lesson is creating a platform for some possible debate.”

In addition to the five publicly available lessons, Mi-STAR is making a suite of resources on remote teaching available at no charge to Michigan educators. They include the following videos:

LINKS

How to Remotely Build a Class Unit Bubble Map From the Ground Up

Mi-STAR Robust Science Teaching Remotely

Bubble Mapping with Google Jamboard

Modeling with Google Jamboard

Student Jamboard Intro

Teachers can also access Mi-STAR’s Learning Series, a collection of presentations, resources, and recorded discussions on a variety of topics, including remote best practices, supporting English language learners, and assessment.

“The Mi-STAR Learning Series was envisioned as a way to support both the Mi-STAR community and the broader community of Michigan science teachers,” said Lindsey Watch, Mi-STAR curriculum development associate. “Now, with the changing teaching environment, it’s been a perfect way to have discussions and share ideas on what’s working, whether your school has in-person learning, remote learning, or a hybrid of the two.” State Continuing Education Clock Hours (SCECHs) are available for teachers who attend these sessions.

The remote learning lessons and Mi-STAR’s Learning Series are available on the Mi-STAR website.

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