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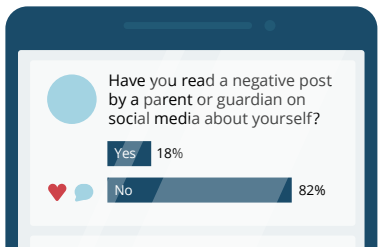

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ERIK (HASH) HERSMAN FROM ORLANDO

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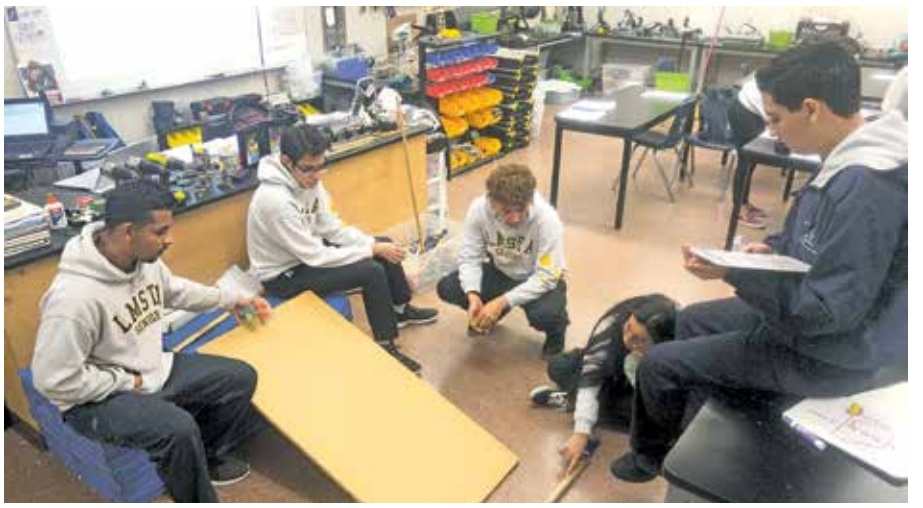
Adding Inquiry to 'Cookbook' Labs

"I have converted several standard labs from AP Physics 1 to more engaging inquiry labs using *NGSS* [*Next Generation Science Standards*]. I want my labs to connect to my students' lives, phenomena they see and feel every day," says Jose Rivas, AP Physics 1 and engineering teacher at Lennox Math, Science, and Technology Academy in Lennox, California. "The old way [of teaching labs] was very procedural. Students had to follow steps and get a result, then answer questions at the end. It was very teacher-guided," he says.

One lab Rivas revamped uses an Atwood machine, a physics laboratory device often used to demonstrate basic principles of dynamics and acceleration. The machine typically involves a pulley, a string, and a system of weights. "Students look at how mass affects acceleration when they find the weight of a penny using an Atwood machine…I tell [them], 'You have a penny and equipment [I provide, such as rulers and stopwatches]. You have to figure out how much this penny weighs,'" he explains. He no longer gives students instructions for doing this.

"Students set up their procedure and decide what their claim is and how to support their data. The fun part for them is they develop a setup themselves. They compare their calculations to the penny's actual weight," he relates.

"Some students find out that pennies from different years have different weights. I ask them, 'How does that affect your experimental design?' Then they troubleshoot ways to decrease errors," he reports. "It's important that students get opportunities to fail and re-evaluate their original claim. It's not about [getting] a specific result."



Jose Rivas's AP Physics 1 students at Lennox Math, Science, and Technology Academy in Lennox, California, work on a rotational inertia investigation.

Students can even "use other resources besides the pulley. It gives them an opportunity to be creative. Students control the lab and can explore," Rivas observes. "We miss creativity in science and engineering. Students can still collect data and be creative."

With the *NGSS*, Rivas contends, "students are given ownership of how they approach a phenomenon…[It really works when they can] identify the properties of a phenomenon they witness every day." After identifying students who like baseball, for example, Rivas says he has those students conduct "a baseball bat analysis [in which] students develop their own claim based on what they want to analyze. How can they hit the ball on its 'sweet spot?' How does inertia affect the swing of a bat? Can a bat be made better? They come up with good ideas."

When doing inquiry labs, Rivas stresses to students, "I'm not the repository of all knowledge. We need to look at resources [for finding the answers]…[It's important to] not be afraid to say, 'I don't know.'" He tells new teachers, "You're not going to get this the first time. It's a process."

When revamping labs, Rivas says he uses the *NGSS* Appendices because they "show you what growth should be for science and engineering practices. This helps with vertical alignment." He also uses Page Keeley's Uncovering Student Ideas book series. "They have good open-ended phenomena [and] inspire me to create my own scenarios to develop good investigations for my students."

Transforming "cookie-cutter" labs to inquiry-based labs "takes a lot of time for the teacher, but it's time I want to spend," Rivas concludes.

See Adding Inquiry, pg 4

NSTA Members to Vote on New Name PG 8

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NSTA National Science Teachers Association

COMMENTARY: **Lisa Hinkelman**

How Schools Are Failing Girls...And What We Can Do About It

By Lisa Hinkelman


Lisa Hinkelman

It has long been thought that girls are "good at school." They tend to be more compliant, follow directions, cause fewer disruptions, and earn better grades, and ultimately are often viewed as better students than boys, particularly in K–12 settings. But does this type of performance and compliance translate to postsecondary and career success?

Sometimes.

Educators' persistent mindset that girls are "good at school" has caused them to overlook some of the unique challenges girls face as they progress through school. This can result in success being defined with a narrow lens—one that does not always equate to long-term achievement outside of academics.

We know that girls are graduating from high school—and even college—at the highest rates ever. They have access to courses and careers once considered off-limits for girls; they are making tremendous strides in equal representation in law school, medical school, and many other graduate programs of study.

This doesn't sound like much of a crisis. In fact, it sounds rather promising, right?

We tend to view education as the pipeline to occupational attainment and advancement, which is where this argument fails. When we dissect the national workforce, we find staggering disparities in women's representation in positions with the highest pay, power, and prestige. Case in point, women represent fewer than 5% of Fortune 500 chief executive officers, less than 25% of our country's elected officials, and just 20% of equity partners in U.S. law firms. Even in traditionally female-dominated arenas like education, 77% of K–12 teachers across the country are women, yet represent only 23% of school superintendents.

What happens during girls' middle school, high school, and postsecondary education and continues into their careers that proliferates this stark inequity? The academic data tells us that it is not a lack of ability, aptitude, or competence holding girls back; other factors need to be examined. We know social, cultural, and historical influences tremendously impact girls' options and opportunities. But is there more to the story?

To develop a deeper understanding of the issues impacting girls' lives, the nonprofit Ruling Our Experiences (ROX) conducted *The Girls' Index* (*http://bit.ly/TheGirlsIndexReport*), one of the country's largest and most unique surveys of girls. We wanted to learn more about the interpersonal, social, and environmental factors that influence girls' behaviors and belief systems. Surveys of nearly 11,000 U.S. girls revealed that their confidence drops precipitously between fifth and ninth grade, and it doesn't return to pre–middle school levels. One in three girls stay away from leadership because they don't want others to think they are bossy, and nearly half say they are afraid to speak their mind or disagree with others because they want to be liked.

We also learned that high achievement does not insulate girls from confidence challenges. More than 30% of girls who earn a 4.0 grade point average or higher report that they do not think they are smart enough for their dream job. In our research specifically focused on girls and science, technology, engineering, and mathematics (STEM) (*http://bit.ly/GirlsAndSTEM*), we found that while girls' interest in STEM careers increased throughout middle and high school, their perception of their abilities in STEM subjects decreased as they got older.

This data shows us that we are dealing with a crisis of confidence.

If we want to create a more equitable world in which girls are well-represented in all sectors and at all levels, schools can no longer afford to focus exclusively on the academic outcomes of their female students at the expense of their social, emotional, and personal needs. Rarely do high-achieving girls receive extra attention, support services, or interpersonal enrichment in schools because we make the false assumption that their grades are the key indication of their potential. Girls need the chance to develop academic competence alongside interpersonal and academic self-efficacy. They need to have the skills, but also have a belief in their abilities so that they can actualize their full potential.

How do we do this?

First, **recognize that confidence does not come from compliments,** it comes from experiences. Girls need a safe environment to take risks, to make mistakes, and to try new things in a space protected from ridicule, embarrassment, and unhealthy competition. We can create classroom environments where exploration, inquisitiveness, and creativity are supported over judgment, perfectionism, and fear of failure. If we don't have a safe environment for new experiences, our capacity to build confidence is compromised.

Second, **implement targeted interventions** focused on building confidence so that girls' confidence in STEM does not negatively impact their interest in STEM. Girls lose confidence in themselves and their abilities in STEM subjects throughout middle school. During these years, the percentage of girls who describe themselves as confident drops 26%, and by ninth grade, 15% fewer girls believe they are good at math and science. Targeted interventions for elementary girls should focus on maintaining their confidence. For middle and high school girls, the focus should be on rebuilding and expanding their personal and academic confidence.

Finally, **recognize that exposure is not enough** to cultivate motivation and persistence. We cannot simply expose girls to STEM activities, coding camps, and robotics clubs and expect them to pursue a STEM career. While we know these activities help create interest, they do not always shift a girl's perception of her abilities in these areas. Ensure that these immersion activities are consistently coupled with the necessary interpersonal awareness activities that girls need to build their self-confidence and self-efficacy. ●

Lisa Hinkelman, Ph.D., is the founder and executive director of ROX, a national nonprofit that delivers evidence-based programming in schools with girls, conducts national research with girls, and educates adults who work with, parent, and mentor girls.

NSTA Reports

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Adding Inquiry, from pg 1

'Don't Reinvent the Wheel'

Vanessa Wentzloff's philosophy about tweaking cookbook labs is expressed in the title of the workshop she hosted at a Michigan Science Teachers Association conference: Don't Reinvent the Wheel: Creating Inquiry Experiences for Students. "Use what you already have," the Avondale High School (Auburn Hills, Michigan) physics teacher urges. "Just modify it…Start with a lab or lesson you're very experienced with, comfortable with, and passionate about."

Wentzloff offers these steps for transforming cookbook labs:

- Identify the Disciplinary Core Idea (content) and Science and Engineering Practice (skill) you wish to teach.
- Find a lab, demonstration, or activity you already use to cover this content.
- Explore how you can adjust this lab to meet your skill.
- Decide when you're going to do the inquiry experience and determine what purpose it serves.
- Adjust the purpose and guiding question based on inquiry.
- Keeping your skill in mind, determine what you want to keep from the original lab.
- Create your inquiry lab, making it as student-driven as possible.

She acknowledges that when revamping labs, "you're dealing with a mindset shift in the science department" because both new and experienced teachers can "have a learning gap, [and say,] 'We weren't taught to teach like this.'" Teachers can focus on students' interests when choosing phenomena. "The phenomenon is my favorite part of the unit because I can see what students are curious about…[You can] go off script based on students' interests or what they're curious about."

In true inquiry, Wentzloff maintains, "students have lots of questions that can be connected to other things." For her energy and momentum unit, for example, her students came up with this driving question: Is hockey more dangerous than football? "We looked at collisions in football: Why are they dangerous? [Because of] the energy or momentum transfer," she notes.

"We've been so rigid with curriculum, and now we have a chance to make it student-driven instead of teacher-driven," she says. "Look at the content piece; don't [lead] students in a certain direction…[Think] of the process instead of the right or wrong answer."

During inquiry-based experiences, "the students will figure it all out and make most of the conclusions you're about to say out loud," Wentzloff quips.

For example, she changed her circuits lab by asking students to build circuits, then make conclusions. "I didn't give them any vocabulary; they had to make inferences" and describe what they saw, she explains. "This was very challenging for students… Sometimes students won't get it right away or will see different things than what you expect. But the phenomenon should lead to questions [on the teacher's part]. 'What do I need to know to teach it?'"

If teachers think they'll have to buy a lot of new equipment and supplies to do inquiry, "that's a misconception," Wentzloff points out. "If you're already doing these things in your classroom, then just modify what you're doing and use what you have at your disposal."

Preparing for Inquiry

While modifying labs and lessons to make them more inquiry-based as a sixth-grade teacher at Woodrow Wilson Middle School in Council Bluffs, Iowa, Jessica Rosenberg—now a K–12 science curriculum specialist for the Council Bluffs Community School District—says she discovered she "had to work up to that inquiry piece" instead of immediately doing guided and open inquiry with her students. During her first year of teaching, she says she "followed the stages of inquiry in order, but this didn't work. I had to teach based on what students needed…I had to help students lead themselves a bit better, gradually prepare them to do that."

First "I would teach lab safety skills and do the lab as is," without any inquiry, she recalls. "The next time [I taught a lab], it was still more teacher-led, but somewhat student-led [so I could] push their thinking a little further. It helped them gain more confidence."

Eventually her students became ready for guided inquiry. "I gave them a scenario and a suggested list of materials or let them create a poster," Rosenberg explains.

Finally, they were able to do a lab or lesson with full inquiry because "they were more confident and willing to try different things," she reports. "I asked students to solve a problem or make something better." For example, when teaching about potential and kinetic energy, she asked students to create a bobsled track to keep athletes safe during the 2014 Winter Olympics in Sochi, Russia.

"One big misconception is that every lesson can be inquiry-based," Rosenberg points out. "If the students don't have the skills for it, you have to meet them where they're at. Do scripted labs at first, then work up to student-led labs."

Building students' levels of confidence "is so hard because this generation feels like their every move is being looked at under the microscope" due to social media, she admits. "We need to teach them a level of acceptance of failure, that they won't be outcasts [if they fail]. We need to build relationships with students and help them feel safe."

Rosenberg says she has found "it helps to have a prepared list of probing questions to ask students, to prompt them, but not give away too much of the solution, guiding them when necessary." In addition, teachers should "be flexible because students' investigations may take a different turn. Maybe a student makes a connection that you didn't anticipate. This makes the project even better," she contends.

In a unit, "not every lab has to be inquiry-based," Rosenberg maintains. She found what worked with her sixth graders was to have a driving question board featuring a topic or a debatable question. "Students posed questions on the board, and that helped keep them interested in the unit and allowed them to share ideas," she recalls. "It helped me guide the conversation and hit the standards, tie in what students wanted to know based on the standards. Full inquiry came into play a lot more at the end of the unit," although "not all students made it to full inquiry" because as sixth graders, they needed more time to develop the necessary skills, she relates.

Rosenberg determined whether students were doing full inquiry based on informal observations of "the percentage of how much I was doing versus the percentage students were doing. If students were [doing a high percentage], it was true inquiry," she concludes. ●

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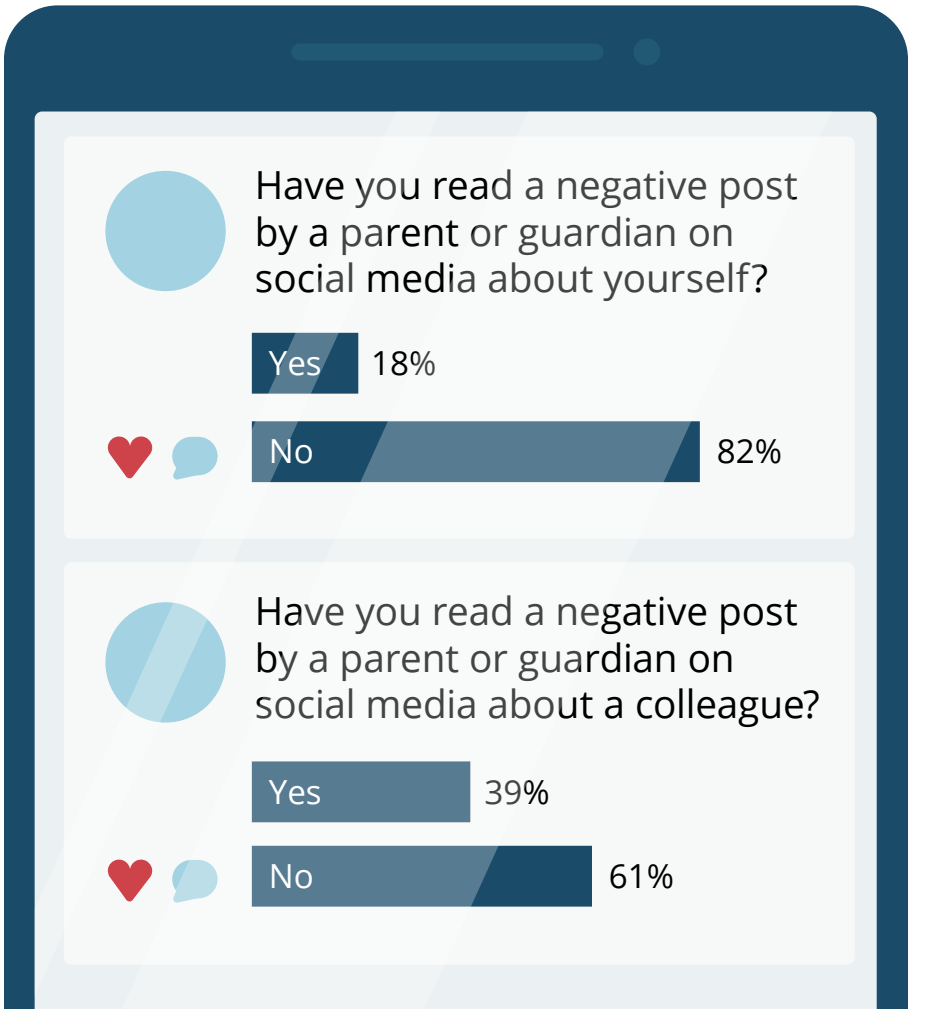
Social Media's Mixed Impact on Educators

In this month's Ask a Mentor column, Gabe Kraljevic offers advice to a teacher who wondered about the proper response to a negative social media post by a student's parent. (Read Kraljevic's response on page 11.) In an informal poll inspired by this question, 82% of respondents say they have not read a negative post by a parent or guardian about themselves, and 61% haven't read one about a colleague. Two-thirds (66%) say social media makes their job as an educator more difficult.

None of the educators who read a negative post about themselves responded publicly to the post, 10% say they replied privately to posts about themselves, and 31% report ignoring it. Of those reading posts about a colleague, none report responding publicly, 4% responded privately, 12% alerted their administration, and 16% informed their colleague.



Here's what teachers are saying about the impact of social media on their relationships with students and their parents or guardians:

Students don't know how to manage their social media use and use it to blow up disagreements and continue them throughout the day, wherever they are.—*Educator, High School, Iowa*

I use social media to share lesson ideas with other educators, to share what my K–4 science classes are doing. I post less about myself.—*Educator, Elementary, Indiana*

I do know that parents communicate with one another and often share wrong information about school policies/procedures or things that occurred during the school day, and I wish that wouldn't happen. I imagine that kind of spread[ing] of gossip and misinformation happens on social media, but I have no proof, and I also imagine that it happened before social media existed. I have a personal policy to not be friends with parents at my school until the entire family has graduated out, so that helps me keep negative feedback at bay: I don't have to ever look at it because I am not connected to it.—*Educator, Middle School, Texas*

Social media is an opportunity to share learning experiences and their outcomes to community members and often improves the relationship between the school and its stakeholders, making my job less difficult.—*Educator, Other, Middle School, Michigan*

Social media helps me network with other science teachers, which is incredibly helpful since I am the only science specialist in our elementary and primary schools.—*Educator, Elementary, New Jersey*

I believe the positives about social media and the communication it allows outweigh the negatives.—*Educator, High School, Missouri*

I can't control what people will write about me, and there will always be someone who disagrees with me, my approach, or my treatment of their child. I prefer to spend my energy dealing with the majority of students who need my support and whose families will talk to me directly and politely if something is amiss.—*Educator, High School, Manitoba, Canada*

Students are addicted to it and tend to always have it on their minds. Many ignore university rules regarding cell phones.—*Educator, Institution of Higher Learning, Missouri*

I'm cognizant that social media is public, so I manage it accordingly.—*Other, Informal Education Setting, Washington, D.C.*

While I only use social media in an extremely limited capacity, mainly as a tool to keep in contact with friends and family around the world, I know that many of my colleagues spend a lot of time posting and commenting on the posts of other people. In this politically polarizing time, people become upset by extreme comments made by others, so much so that they have even taken month-long breaks from social media. Teen[age] students also react to posts and comments from peers, and they react in the middle of class since some of them are constantly checking their phones. Students have to constantly be educated about the internet and social media, that whatever they put out there is there forever. They also have to be reminded that they should not be taking photos or videos of others without consent that they then post. For the most part, all forms of social media are very distracting for a large segment of the population.—*Educator, High School, South Carolina*

Nothing can be taken back from the printed word!—*Educator, Elementary, Georgia*

Helps me keep up with trends in education.—*Educator, Middle School, Illinois*

First, the instant gratification and overstimulation social media supplies makes engagement in anything longer than 148 words problematic. Secondly, social media encourages (if not demands) transactional, low-level thinking. Both of those effects work against my students.—*Educator, High School, California*

It's stupid. The kids are more focused on their "story" than class sometimes. Too many people think all teachers should be on Twitter. Twitter stinks. —*Educator, High School, Massachusetts*

Fast transmission of inaccurate information and the very real potential for getting into a mud wrestle with a parent/taxpayer.—*Educator, Middle School, Connecticut*

I do not use it that much.—*Educator, High School, Minnesota*

I use social media to promote science in the classroom; I do not have much contact with parents through it. —*Educator, Elementary, Virginia*

I get to see a side of students that is not always visible in the classroom. For example, mental [health] issues and home abuse may show up online, and yet they are not obvious during the school day. I get an overarching view of my students' lives.—*Educator, High School, Iowa*

It is wonderful and extends my [professional learning network].— *Administrator, Institution of Higher Learning, Texas*

Always have to worry what people write and how it will affect your school or district.—*Administrator, Elementary, New York*

It can twist a situation and push [so-called] "helicopter parents." At the same time, it can really connect teachers for best practices and enable more [and] greater opportunities for collaboration and positive outlook about a school.—*Educator, High School, California*

Kids are *constantly* on Snapchat, sharing pictures of peers, myself, and assignments. Cheating has become a chronic issue.—*Educator, High School, New York*

I must be in tune with what is going on all the time to stay ahead of my students.—*Educator, Institution of Higher Learning, Texas*

Parents and students both will post anything. Also, always have to be aware of actions. A simple picture with a drink may be misconstrued as a wild party.—*Educator, High School, Alabama*

You have to adjust your mindset, similar to assuming you are always on camera once you [leave] your dwelling. You don't know who is posting, who is talking to whom, who shares with others who would surprise you, or how people interpret comments. As an example…and this is mild: My school is expanding, undergoing construction currently. A parent asked about the long-term plan and posted, saying we needed teachers immediately (instead of a year from now).—*Educator, Elementary, Nevada*

Kids are distracted.—*Educator, Middle School, California*

Some posts pass around incorrect information. Once people believe something, it is very difficult to correct their misconceptions.—*Educator, High School, Kentucky*

Students spend 90% of their time on the social media, and during their fights, they call their parents [to come to] the school, and their parents come and fight in front of the entire school.—*Educator, High School, Wisconsin* ●

Quotable

We all must be lifelong learners. The day we stop learning is the day we cease to be relevant.

—Former U.S. Education Secretary Arne Duncan

NSTA Members to Vote on New Name

The NSTA Board of Directors took a bold step to usher in a new, exciting future for NSTA by voting in February in favor of changing the association's name from the National Science Teachers Association to the National Science *Teaching* Association. The board believes this represents a major shift in NSTA's vision to better connect with a science teaching community that has grown to include many who do not have the formal title of "teacher."

According to NSTA bylaws, the proposed name change requires the approval of the NSTA membership. An electronic ballot will be e-mailed to all members on May 20. Voting closes on **June 20 at 11:59 p.m. Eastern Time**.

Members who want to receive the ballot, but have opted out of receiving e-mails from NSTA should visit the My Account page (*https://bit.ly/2WKd8Lm*) no later than **May 2** and **uncheck the opt out box**. For answers to questions about opting out or about your membership status, send an e-mail to *membership@nsta.org*.

NSTA members can engage in a members-only community forum to connect with colleagues to share ideas, express opinions, and ask questions about the proposed name change. Visit *www.nsta.org/namechange* from April 11 through June 20 to join the conversation.

"The new name reflects a broader view of the science teaching community and the many places where science learning takes place," said NSTA President Christine A. Royce. "We support *all* teachers—including those at the elementary level—as well as curriculum developers; science and STEM administrators; preservice educators; parents; youth science, technology, engineering, and mathematics (STEM) coordinators; museum educators; homeschoolers; and more. By bringing together all stakeholders, we are better able to advocate for science education."

NSTA's transformation includes more than a name change. The association is refocusing its programs, services, and products to be more collaborative, personal, interactive, and responsive.

Throughout the year, NSTA will unveil new ways it will support science teaching and learning with enhanced content, exciting new digital products, more personalized services, and dynamic resources ranging from the printed page to social media and virtual learning opportunities.

The association will launch a new website using technology in innovative ways to better meet the needs of the science teaching community. Efforts are also underway to make finding the right resources simple, easy, and user friendly and deliver targeted, personalized teaching content, including lesson plans and vetted grade-level, subject-specific resources. A new logo that reflects our new direction and vision will also be unveiled.

"The mission of NSTA is an important one," said NSTA Executive Director David E. Evans. "Now, more than ever, we need to support excellence in science teaching and learning for all. We are excited about the new digital environment we are building that will allow all those involved in science teaching to better connect, collaborate, and grow professionally. At the same time, NSTA will continue to provide trusted, high-quality teaching resources and will continue our advocacy work in science so that all students will be prepared to succeed in the workplace and in society." ●

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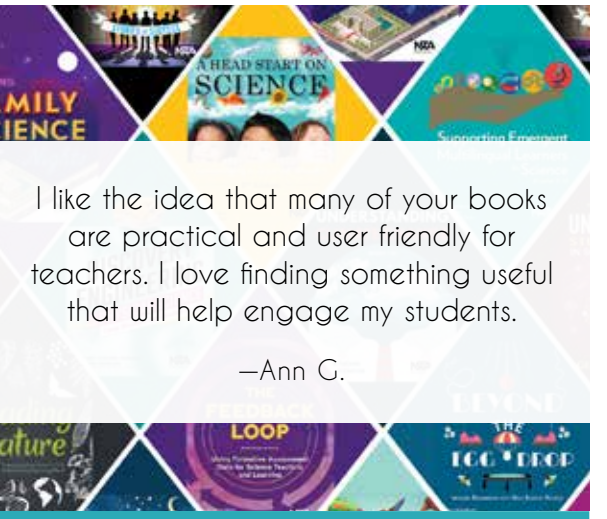
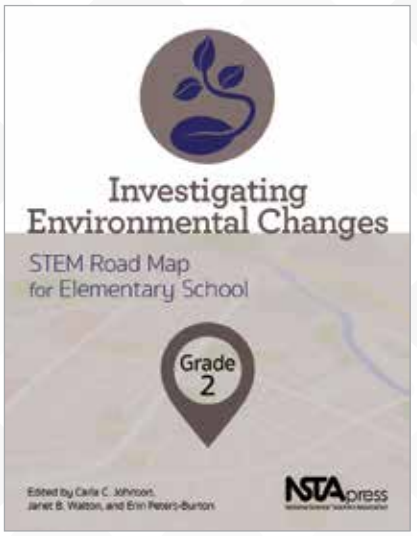


I like the idea that many of your books are practical and user friendly for teachers. I love finding something useful that will help engage my students.

—Ann G.



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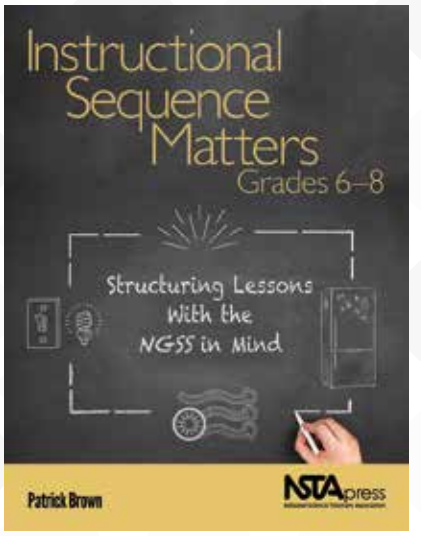

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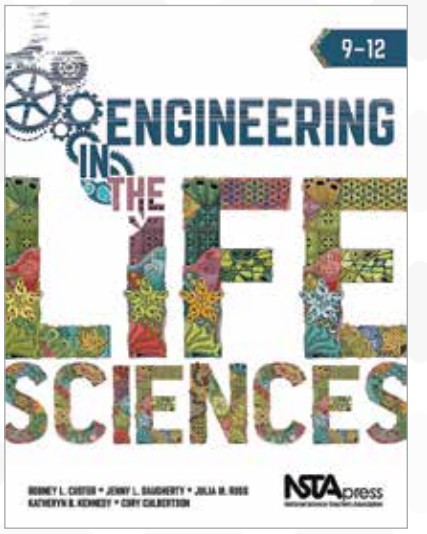

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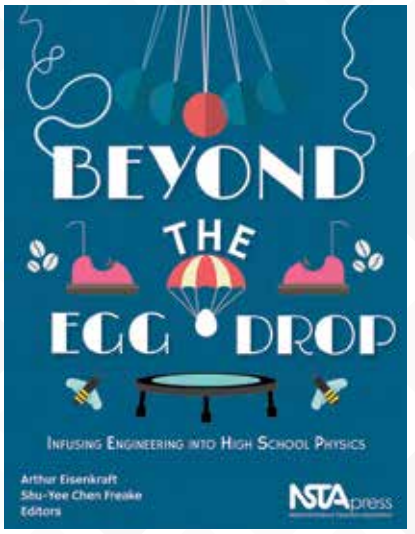

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E-book: Member Price: $26.97 | Nonmember Price: $33.71
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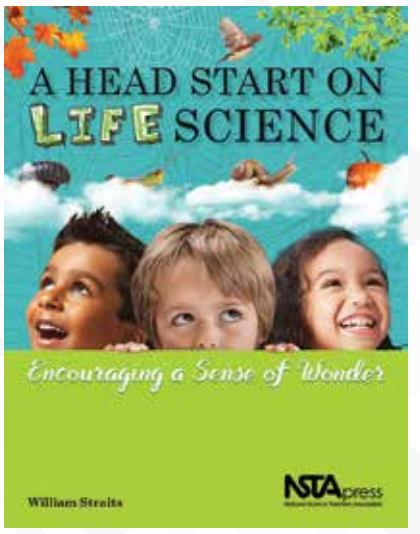
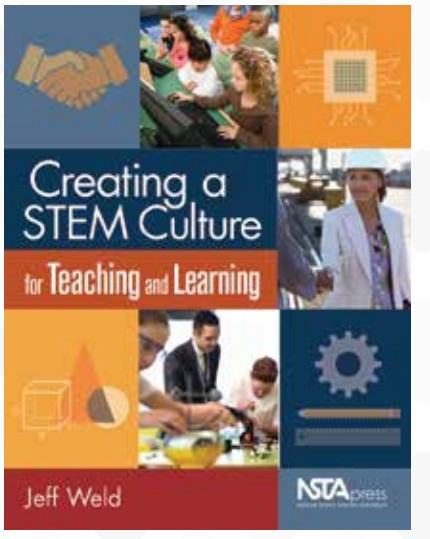


Grades PreK–2

Book: Member Price: $27.96 | Nonmember Price: $34.95
E-book: Member Price: $20.97 | Nonmember Price: $26.21
Book/E-book Set: Member Price: $33.55 | Nonmember Price: $41.94



Grades K–12

Book: Member Price: $30.36 | Nonmember Price: $37.95
E-book: Member Price: $22.77 | Nonmember Price: $28.46
Book/E-book Set: Member Price: $36.43 | Nonmember Price: $45.54

To place an order or download a free chapter, visit
WWW.NSTA.ORG/STORE

NSTA National Science Teachers Association

PULL-OUT SECTION

SCIENCE TEACHERS' GRAB BAG

Inside this Convenient Pull-Out Section you will find:

Freebies for Science Teachers

I-Engineering. M In this project developed by education researchers at Michigan State University and North Carolina State University at Greensboro, middle level teachers and students design and implement energy engineering learning units focused on making classrooms more sustainable. The project website (*http://engineeriam.org*) has lesson plans and activity sheets to guide students through unit creation using the Engineering for Sustainable Communities process and two design challenges. In these customized units, students solve engineering challenges specific to classroom needs (e.g., a light-up student desk, a light-up "occupied" sign for the classroom bathroom, and other projects), learning about engineering design and renewable energy systems, circuitry, and community ethnography along the way. The site also includes supplementary materials to support unit implementation, such as samples of student work, teaching tips, *Next Generation Science Standards* (*NGSS*) connections, and embedded assessments.

EdReports.org. K12 This nonprofit organization aims to improve K–12 education by empowering districts to choose high-quality instructional materials. At *https://edreports.org,* teachers and administrators can access comprehensive reports (reviews) of instructional materials in core subjects, including several middle level science programs. The reports, which reflect an extensive vetting process by education experts nationwide, offer evidence-rich information about a program's support of the standards and other indicators of quality. The site also includes articles (e.g., "Three Ways to Know You Are Using Quality Science Materials") and other resources (e.g., Rubrics and Evidence Guides) to learn more about and ease the curriculum adoption process.

Women in STEM Posters. A Hang these posters in the classroom to introduce students of all ages to female role models in science, technology, engineering, and math (STEM) fields. Created by Nevertheless (a podcast celebrating women transforming teaching and learning through technology), and featuring illustrations by female artists worldwide, the posters showcase eight pioneering women: roboticist Cynthia Breazeal, DNA scientist Rosalind Franklin, astronaut Mae Jemison, technologist Juliana Rotich, biotechnologist Hayat Sindi, chemist Tu Youyou, mathematician Gladys West, and biopharmacist/human rights activist Marie Da Penha. Download the posters, read brief descriptions of the featured scientists, and access recommended readings for both students and adults to learn more about each scientist's work at *https://bit.ly/2UbT2w1*.

BENGT NYMAN

Tu Youyou

Green Trees and Sam, A Landscape Architecture Story. E This whimsical, rhyming e-book from the American Society of Landscape Architects about a girl who aspires to be a landscape architect introduces elementary students to a STEM career. The e-book highlights many of the outdoor spaces in a community that are designed by landscape architects, including playgrounds, splash pads, parks, rain gardens, pollinator gardens, and bike paths. The book also has a glossary of important terms. Read it at *https://bit.ly/2CVPzrN*.

The Vaccine Makers Project. K12 Developed at the Children's Hospital of Philadelphia's Vaccine Education Center, this project for K–12 educators provides lesson plans, videos, and animations exploring how the immune system works, how diseases develop, and how vaccines work to prevent them. With versions for elementary, middle, and high school levels, the materials feature activities that teach students about the nature of science and how to critically evaluate science topics to become informed decision makers. Lessons include Meet the Germs (elementary), which addresses the differences between bacteria and viruses and the discovery of viruses, and Does Size Matter? Comparing Viruses, Bacteria, and Human Cells (middle level), in which students investigate the causes of disease and explore the size of pathogens compared with human immune cells. Two multi-lesson units for high school learners cover The Human Immune System and Disease and Vaccination. Find these resources and more at *https://vaccinemakers.org*.

Physics Footnotes. M H Short, visually stimulating articles ("footnotes") feature an eclectic mix of physics topics, from the world's largest and most energetic particle accelerator (e.g., Superconducting Super Collider) to the torque and angular momentum shown in a cheetah's tail flick (e.g., The Cheetah's Tail). Most appropriate for middle and high school levels, the articles can be used to supplement textbook content, generate interest in physics, and help STEM

See Freebies, pg G2

P: PreK E: Elementary M: Middle H: High HE: Higher Ed A: All K12: K–12

Freebies, from pg G1

educators and students deepen their physics knowledge. Visit the website *https://physicsfootnotes.com/books* to register to receive new footnotes via e-mail. Once subscribed, teachers can access The Best of Physics Footnotes: Volume 1, an electronic compilation of previously published items.

Building by Design Project. H Looking for an engaging experience to introduce high school students to engineering design principles and foster teamwork among lab groups? Check out the Building by Design Project, created by Minnesota physics teacher Joe Cosette. The weeklong project—part of a larger unit exploring engineering and teamwork—challenges student groups to design, build, and test a modular building toy to satisfy various consumer requests. The website (*https://bit.ly/2CLKyBU*) has everything teachers need to replicate the activity in the classroom, including downloadable plans, student worksheets, rubrics, and photos/videos of completed projects. Pair the project with the unit's Engineering Communication lesson, which emphasizes the need for thoughtful planning and the importance of powerful visuals in communicating an idea, to encourage more effective teamwork among students.

Science Storylines for High School Biology. H In 2016, a group of dedicated high school biology educators in Illinois teamed up to teach themselves how to begin shifting classroom instruction toward three-dimensional learning espoused in the *NGSS*. Since then, the group has grown in size and scope, and their efforts have resulted in a series of phenomenon-driven storylines, complete with embedded 3-D assessment pieces, that can be used as curriculum for a full high school biology course. Six multi-week, phenomenon-based storylines are available: Africa (nine weeks), Homeostasis (seven weeks), Melanin (five weeks), Disease (four weeks), Penguin (four weeks); and Canine (four weeks). Access the storyline calendars and other supporting materials at *https://ilscience.org/Storyline*.

MICHAL KLAJBAN

K–12 Solar Energy Activities. K12 Visit the REcharge Labs website at *http://bit.ly/2K7zRjf* for hands-on activities exploring solar energy with K–12 audiences. Several projects teach engineering design skills in addition to solar energy concepts and basic circuity. In Solar Rover (grades 4–12), for example, students build a solar rover, then design wheels to explore different environments on imaginary planets or in the backyard. In Solar Fountain (grades 2–12), students build solar-powered water fountains to observe how solar energy is transformed into electricity we can use. In Solar Lifter, students in grades K–6 investigate which light source can lift the most weight. This activity offers a tangible way to help students understand the abstract idea that different light sources emit different amounts of energy.

31 Classroom Science Projects to Do in 10 Minutes. E M With the simple science experiments in this online guide, you can engage K–8 students in science exploration in just a few minutes! Use the experiments as lab demonstrations, icebreakers, station activities, or group projects. The activities address topics in chemistry, life science, physics and engineering, and Earth and space science; titles include Magic Milk, Lava Lamp, Flower Dissection, Make a Whirligig, and Cornstarch Quicksand. The guide features step-by-step instructions for each activity, a materials list, and a What Happened? section that explains the core science concepts involved in the experiment. Download the guide at *https://bit.ly/2YDHFwg*. (*Note: Free registration is required.*)

Pathogen Tracker Game. M H Players can trace the spread of foodborne illnesses and discover how online databases are used to locate the source of the organisms that cause them. Most appropriate for middle and high school levels, this game from Cornell University researchers takes students through three phases of an outbreak of foodborne illness. Stage One addresses the initial identification of the responsible bacterium and declaration of the outbreak; Stage Two determines the particular food responsible for the outbreak; and Stage Three locates the source of the contaminated food. The game concludes with resources to explore careers in food safety. Access the game and supplementary materials, including a Teacher's Guide with student worksheets and answer keys, at *https://bit.ly/2CLtoUW*.

Earthwatch Podcast: Inspiring the Next Generation of Scientists. A In this approximately 10-minute episode, listeners travel to California's Catalina Island to hear from four educators working alongside researchers studying the effectiveness and health of Marine Protected Areas. During the podcast, the educators reflect on their roles as educators charged with developing scientifically literate students prepared to tackle today's environmental and science challenges. The discussion also touches upon the importance of bringing experiences to the classroom that broaden students' perspective and encourage a scientific mindset. Listen to the podcast at *https://bit.ly/2FFT1Hk*.

LUIS MIGUEL BUGALLO SÁNCHEZ (LMBUGA)

Engaging K–12 Students in Science Through Insects. K12 Teach students about the critical role of insects in the environment and about responsible pest management with the education materials at *https://entfdn.org/resources*. The site presents entomologically themed lesson plans (culled from various university programs and environmental education groups), science fair project ideas, and more to help K–12 educators engage students in science through insects. Highlights include resources such as a backyard insect order chart and lesson plan (for grade 2) from the University of Illinois, as well as access to online issues of *Kansas School Naturalist,* a publication produced by Emporia State University that has numerous issues devoted to insects and arthropods, including monarch butterflies, dragonflies, and ants.

Climate Choices: How Should We Meet the Challenges of a Warming Planet? M H Produced as part of the North American Association for Environmental Education initiative Environmental Issues Forums, which provides teachers and students with tools, training, and support to address difficult issues affecting the environment and communities, this guide for high school educators offers background information on deliberation, information about using the guide in the classroom, and material to help teachers moderate a student forum on the topic. It also includes resources for teaching climate change. Consult *http://bit.ly/2TWBgbR*.

A teacher's guide for middle level educators on the same topic is available at *http://bit.ly/2FSh5H9*.

High School Chemical Laboratory Safety Video Series. H These videos from the American Chemical Society address chemical safety in the high school lab. Each video covers topics such as having a safety mindset, understanding a chemical Safety Data Sheet, dressing appropriately for the lab and using personal protective equipment, and preparing for emergencies. One video discusses RAMP (e.g., Recognize hazards, Assess risks, Minimize risks, and Prepare for emergencies) strategies for teachers and students.

Watch the lab safety videos at *https://bit.ly/2TM5rma*. Each one is approximately seven minutes long. ●

News Bits

- **Stanford University researchers combine physics and real-world driving experiences to help autonomous cars navigate dangerous road conditions more safely. HE**

Niki, Stanford's autonomous Volkswagen GTI, and Shelley, Stanford's autonomous Audi TTS, used a new control system at California's Thunderhill Raceway and performed about as well as an existing autonomous control system and an experienced race car driver. Stanford researchers wrote about this test in "Neutral Network Vehicle Models for High-Performance Automated Driving," published in *Science Robotics*.

J. Christian Gerdes, Stanford professor of mechanical engineering and senior author of the paper, contends that too often the choice has to be between data-driven methods or approaches grounded in fundamental physics. "We think the path forward is to blend these approaches…to harness their individual strengths," he says. "Physics can provide insight into structuring and validating neural network models that, in turn, can leverage massive amounts of data." Although the results were positive, researchers said their "neutral system" does not perform well outside the conditions it has already experienced. As more self-driving cars generate data to train the network, the cars will be able to handle an increasing variety of conditions. Read more at *https://stanford.io/2HSNXDg*.

- **A survey by Florida's Saint Leo University Polling Institute has found that most respondents think climate change should be taught as accepted theory in public schools. K12 HE**

Saint Leo University Polling Institute conducted the survey both nationally and in Florida. Nationally, 64.4% agree somewhat or agree strongly about teaching climate change as accepted theory, while in Florida, a combined 65.2% agreed strongly or somewhat. The national sample consisted of 1,000 respondents; the Florida sample had 500 respondents.

The researchers also studied people's concerns about climate change's effects. In 2019, 35.8% of U.S. respondents said they were "very concerned" about climate change, and another 35.5% said they are "somewhat concerned" about the issue. The survey also found that both nationally and in Florida, one-quarter of respondents believe individuals are capable of preventing causes of global warming through personal choices and actions. The most common choice was the purchase of higher-efficiency appliances. Learn more at *https://bit.ly/2FRoU18*.

- **The University of Texas at San Antonio's (UTSA) graduate architecture programs have received a special science, technology, engineering, and math (STEM) designation. HE**

The Texas Higher Education Coordinating Board has awarded the UTSA Master of Architecture and Master of Science in Architecture programs the Classification of Instructional Programs (CIP) Code 04.090. These programs are the only ones in Texas—and of very few in the country—to receive this code. CIP Codes help students identify areas of study with particular curricular emphases, along with additional benefits such as funding and visa status. The CIP Code will also help the university recruit high-caliber students who want access to STEM-related architecture opportunities and offer faculty members new avenues for research funding. Learn more at *https://bit.ly/2FFJMqI*. ●

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In Your Pocket

Editor's Note

Visit www.nsta.org/calendar to learn about more grants, awards, fellowships, and competitions.

May 25–31

ASM's Living in a Material World Grants K12

The ASM Materials Education Foundation provides these grants to help K–12 teachers bring the world of materials science into their classrooms. Funds should help teachers raise student awareness of the metals, glasses, ceramics, semiconductors, polymers, and other everyday materials at the heart of many new systems.

Applicants can contact local ASM members to help them develop innovative projects. Apply by **May 25;** see *http://bit.ly/2HK8Yjk.*

SPIE Education Outreach Grants K12 HE

SPIE, the international society for optics and photonics—the science and application of light—provides these grants for education outreach projects. Schools, youth clubs, universities, science centers, optics centers, industry associations, and optical societies are eligible for grants of up to $5,000. Projects are judged by their potential to impact students and increase optics and photonics awareness.

Conult *http://bit.ly/2RoiKsr;* apply by **May 31.**

June 1–15

Pets in the Classroom Teacher Grant Program P E M H

These grants are for preK–9 teachers and school librarians who have a classroom pet or would like to introduce one. Funds can be used to buy small pets, pet food, pet environments, or pet supplies. Eight types of grants are available, including $50 sustaining grants to support current class pets and $75 and $125 rebate grants for the purchase of new pets.

Public and private school teachers and school librarians are eligible. Apply by **June 1** at *www.petsintheclassroom.org.*

Safer Brand School Garden Grant K12

This $500 grant is awarded to one K–12 school that plans to create or maintain a fruit, berry, vegetable, flower, or hydroponic garden. The garden should serve as a teaching tool that brings classmates together to work toward the common goal of better health.

Submit a 50- to 300-word essay explaining how your school would use the grant and photographs of the garden space by **June 14.** For details, visit *http://bit.ly/2OHKGXH.*

Mitsubishi Electric America Foundation's Grants for Youth With Disabilities K12 HE

These funds are for innovative projects that help youth with disabilities develop leadership and employment skills—particularly in science, technology, engineering, arts, design, and math (STEAM) fields. Grants range from $10,000 to $75,000, for one to three years. Preference is given to projects involving Mitsubishi Electric employee volunteers or their communities (see the website below for a list of locations).

Take the eligibility quiz to submit a proposal by **June 15.** Refer to the website *http://bit.ly/2WpUGrh.*

June 21–30

Crayola's Champion Creatively Alive Children: Creative Leadership Grants E M

Crayola gives grants to innovative leadership teams planning to build their school's creative capacity through art-infused education. Twenty elementary and middle schools in the United States and Canada will receive $2,500 and $1,000 worth of Crayola products. Projects should focus on collaboration, leadership, sustainability, and visual arts, and include the development of a Creative Leadership Team.

Principals who are National Association of Elementary School Principals members can apply by **June 21.** Those who submit early-bird applications by June 3 get a Crayola product Classpack. For details, see *http://bit.ly/2JToOtY.*

ASM's Kishor M. Kulkarni Distinguished High School Teacher Award H

ASM International, the professional society for materials scientists and engineers, presents this award to recognize one high school science teacher who has made a significant and sustained impact on precollege students. The honoree will receive a $2,000 cash grant and up to $500 in travel funds to attend the ASM Awards Dinner.

Suggested candidates include past recipients of ASM Foundation K–12 Teacher Grants and ASM Materials Teachers Camp. Submit nominations by **June 30** at *http://bit.ly/2WsaBFr.*

Apply Year-Round

VWR/Avantor Foundation Grants K12

The foundation provides these grants to K–12 school science, technology, engineering, and math (STEM) programs that go beyond the textbook (and are not funded by government or tuition dollars); professional development programs for teachers; and science-related camps for students. Funds can be used to support the purchase of supplies and equipment for such programs or for student or teacher scholarships.

At the college and university level, funds can be used for science-related programs—including scholarships, equipment, and products. Science-related institutions (for example, science museums) can also apply for grants to help further science education.

Nonprofit programs that have been established for at least three years are eligible. Take the eligibility quiz at *http://bit.ly/2TNrhpf.* Applications are accepted throughout the year.

Westinghouse Charitable Giving K12 HE

Westinghouse gives grants to nonprofit programs that support K–12 and college or university STEM education, environmental sustainability, or community safety and vitality. STEM programs should enhance the subject matter for students and encourage career interest among youth. Environmental programs should help preserve or protect land, water, air, or biodiversity.

Grantees must be located within 50 miles of Westinghouse sites; locations are available at *http://bit.ly/2U2KTe6.* Visit *http://bit.ly/2CHlzQg* to submit proposals.

High Mowing Organic Seeds Donation Program A

High Mowing Organic Seeds provides free seed to farm and nutrition education programs like school gardens, summer camps, seed libraries, community gardens, and disaster relief groups. The program provides a pre-determined bundle of 25 assorted seed packets. Each bundle includes a variety of vegetables and a few herbs and flowers. Learn more at the website *www.highmowingseeds.com/faq.*

Adopt-A-Classroom Grants K12

Public school teachers who register at the Adopt-A-Classroom website (see *www.adoptaclassroom.org*) can be adopted by an individual, a business, or a foundation. Adopted teachers receive credit to purchase items that enrich the learning environment, including classroom technology. Teachers use the credit to shop online from a network of approximately 40 affiliate vendors that have partnered with Adopt-A-Classroom. Principals and school administrators may also register their schools and raise funds for them. ●

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The NSTA Learning Center

High quality interactive content for K–12 science teachers

Earn graduate credits and advanced degrees

Affordable and user-friendly

Moderated by world-renowned faculty

Gain knowledge specific to your area of instruction

American Museum of Natural History

Seminars on science, six-week online graduate courses in the life, Earth, and physical sciences, incorporate the museum's resources plus interaction with scientists and educators. CEUs and graduate credits.

California University of Pennsylvania

Designed for elementary and middle level teachers, Cal U's online Master's degree focuses on teaching inquiry across the STEM disciplines. Each course in the 30-credit program also develops your teacher leadership skills so you can take your career to the next level.

Montana State University – Bozeman

Take online graduate credit and non-credit courses for professional development, or work toward one of five 12-credit online graduate certificates (Life Science, Physics, Chemistry, Elementary Science and Earth Science) or an online Master's of Science in Science Education.

NSTA Virtual Conferences

A series of live web sessions delivered via an interactive distance-learning tool. Each conference features content and/or pedagogy from experts in a particular topic. Participants can log on from anywhere with an internet connection and interact with presenters and educators from across the country.

http://learningcenter.nsta.org/onlinecourses

National Science Teachers Association

What's New

FROM U.S. GOVERNMENT SOURCES

Fish and Wildlife Service (FWS)

Fish and Aquatic Conservation Web Page K12

The FWS National Wildlife Refuge System Fish and Aquatic Conservation web page is a source for education resources for all ages on Conserving America's Fisheries. Access lesson plans and student activity guides that support state and national standards, as well as videos, activity booklets, handouts, and education guides on conservation topics, at the website *www.fws.gov/fisheries*.

That website includes resources such as the online guide *Freshwater Fish of America* (all ages); an activity, Designing Fish-Friendly Culverts and Bridges (grades 5–8); and information about National Pollinator Week, which takes place June 17–23 (all ages).

FWS Teacher Resources K12

Want to bring nature to your classroom? At *https://bit.ly/2vtH4jW,* K–12 teachers can access links to more than a dozen FWS nature-related resources and curricula in a single location. Annotations describing key features of each resource (grade level, resource type, and program focus, for example) accompany each link. Using these pages, you and your students can experience a range of nature-based activities from creating a unique schoolyard habitat (all grades) to watching Conservation Connect videos to learn about wildlife species and careers in wildlife management (grades 3–7).

Kids.gov

Science Career Spotlight: Archaeologist E M

Do you think it would be cool to dig up a piece of history? Do you like getting your hands dirty and finding out the story behind things? National Park Service archaeologists Joy Beasley and Kate Birmingham do that and more. In this video, targeted for elementary and middle levels, students observe the scientists at work as they explore Best Farm—a piece of Maryland history—and learn what being an archaeologist really entails, from the tools and methods used in the field to insights gleaned from discoveries. See the website *https://bit.ly/1fAQJKZ*.

National Park Service (NPS)

NPS Educator Kits E M

Can't take students to visit a national park? Bring the national parks to your classroom with "traveling trunks" and other resources available for teachers to borrow from the NPS. Most appropriate for upper-elementary and middle levels, the trunks enable teachers to incorporate primary sources, objects, and activities into the curriculum without leaving the classroom. Browse the list of more than 100 themed kits for loan at *https://bit.ly/2WCKYSq*. For example, the Science Discovery Kit from the Lewis and Clark National Historical Park (grades 3–5) contains modern scientific equipment, a resource guide, books, posters, and more to help students learn about the natural scientific observations from the Lewis and Clark Expedition and the impacts of the changes that have occurred over the past 200 years.

Library of Congress (LOC)

African-American Women in the Sciences and Related Disciplines K12 HE

LOC's Science Tracer Bullet Series provides bibliographic guides to help educators find sources for research topics of interest. At *https://bit.ly/2FEMzjW,*

educators can access a guide listing sources documenting the contributions of African-American women in science, technology, medicine, and related disciplines. Sources include basic texts, specialized titles, government publications, conference proceedings, dissertations, journals, and other materials.

While not an exhaustive list, the guide offers a useful starting point for research. In addition, other LOC Tracer Bullets—Blacks in Science and Related Disciplines (TB 89-9) and Women in the Sciences (TB 90-6)—may provide additional sources of interest.

National Oceanic and Atmospheric Administration (NOAA)

Ocean and Coasts Resource Collections K12

NOAA offers resource collections to encourage K–12 educators and students to learn more about ocean topics such as Gulf oil spills, ocean acidification, ocean currents, ocean floor features, ocean pollution, tides, and tsunamis. The collections include data-based resources using actual NOAA data, lesson plans and activities, multimedia resources, background information, and career information relating to each theme. Access the website *https://bit.ly/2FMQlcd* to read an introductory paragraph about each topic, then click on a title of interest to browse the materials within.

National Ocean Service (NOS) Education Resources K12

From the multifaceted Planet Stewards Education Project to an Arcade Portal with games and interactives focused on air, ocean, and other themes, the NOS education website has resources to build ocean, coastal, and climate literacy among K–12 students and formal and informal educators. In addition, the site features science learning modules, videos, and publications. For example, *The Earth Scientist,* an electronic publication, presents vignettes of successful stewardship projects conducted at schools around the country and includes downloadable documents and materials that enable readers to create similar projects. Refer to *https://oceanservice.noaa.gov/education.*

National Aeronautics and Space Administration (NASA)

Universe of Learning A

Developed in partnership by the Space Telescope Science Institute, Caltech/IPAC, the Jet Propulsion Laboratory, the Smithsonian Astrophysical Observatory, and Sonoma State University, NASA's Universe of Learning offers resources to encourage students, families, and lifelong learners to explore fundamental science questions and discover the universe for themselves. View episodes of *Universe Unplugged,* a video series exploring exoplanets and other astronomical science topics; check out ViewSpace, a collection of web-based interactives and videos highlighting the latest developments in astronomy and Earth science; or catch up on monthly Science Briefings, which showcase recent explorations and discoveries from NASA astrophysics missions. Consult *www.universe-of-learning.org.*

Citizen Science @NASA M H

Middle and high school educators can participate in authentic science research and connect students with working scientists through citizen science projects from NASA. The projects cover research areas such as the universe, solar system, Sun, and Earth, and involve participants in activities from validating NASA air quality data to studying images from the Spitzer Space Telescope and WISE satellite observatory to help Measure and Map Our Galaxy. Read descriptions of the available projects and find out how to participate at *https://go.nasa.gov/2WGCoCg*. Educators can also join a Facebook group to share their experiences as a NASA citizen scientist.●

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Summer Programs

Editor's Note

Visit www.nsta.org/calendar to learn about other summer professional development opportunities.

Enhancing Earth Science Education With Educational Technology K12 HE

Ohio State University (OSU) offers classes focused on the Great Lakes for education majors and formal and informal educators. In this field-based workshop, taking place June 20–22, participants will explore how Nearpod, an online learning platform and teaching application, can be used to support Ohio Earth science standards.

Graduate and continuing education credits are available. Apply by **May 31** at *http://bit.ly/2FLn0iA*.

Field Geology for Educators: Geologic Setting of Lake Erie K12 HE

This OSU course invites formal and informal educators to examine geologic features along the southern shore of Lake Erie during a weeklong van trip on July 20–26. Participants start in Columbus and explore Ohio's geologic history in the Lake Erie basin and the relationships between it and human activity in the area.

Apply online by **May 31** at *http://bit.ly/2U4E3ET*. Continuing education and graduate credits are available.

Herring Gut Learning Center's Aquaponics 101 Workshop E M

This workshop at the Herring Gut Learning Center in Port Clyde, Maine, introduces K–8 teachers to aquaponics, the cultivation of plants and aquatic animals in a recirculating environment. During July 9–11, teachers will use the facility's small-scale greenhouse and hatchery and learn how to integrate aquaponics in the classroom through hands-on lessons and experiments. Teachers also receive curriculum materials and an aquaponics kit, which includes a tank, filter, pumps, planting materials, and a classroom manual.

Participants receive 1.5 continuing education credits or 15 contact hours. Register by **May 31** at *http://bit.ly/2uLF1qq*.

Lawrence Livermore National Laboratory Workshops M H HE

The Teacher Research Academy at Lawrence Livermore National Laboratory in Livermore, California, offers professional development programs for middle and high school teachers and community college faculty. Participants engage in a continuum of standards-based instruction, progressing from novice to mastery. Workshops support *Next Generation Science Standards* disciplinary core ideas and science and engineering practices. The following workshops will be offered:

- Technical Writing for Science Class: June 10–11;
- Modeling for Science and Math: June 12–14 and June 17–21;
- Bioscience: June 12–14 and June 17–21;
- Fusion and Astrophysics: June 19–21 and June 24–28; and
- 3-D Print and Design: July 10–12 and July 15–19.

Continuing education credits and graduate credits are available. Register online at *http://bit.ly/2WqznGa*.

Smithsonian Science Education Academy for Teachers: Biodiversity K12

Smithsonian's academies bridge the gap between formal and informal science education programs at the Smithsonian. Each combines science content and pedagogy with behind-the-scenes experiences at the Smithsonian and other research facilities in Washington, D.C. Teachers learn concepts and develop activities to use in their classrooms.

The biodiversity academy will take place June 23–28. Learn more at *https://s.si.edu/2UfMyMv*.

Evolution Education's Workshop M H

This workshop for middle and high school teachers takes place July 10–12 at Mountain Lake Biological Station in Pembroke, Virginia. Participants do field work with biologists to learn about current evolution research, discuss strategies for teaching ecology and evolutionary biology, take part in hands-on demonstrations, and attend evening seminars. Lodging and meals are paid for, and a $200 stipend is available. Apply online at *http://bit.ly/2FLqKz5*.

STEM Educator Certificate Course P K12

This Worcester Polytechnic Institute (WPI) science, technology, engineering, and math (STEM) course for preK–12 teachers and administrators takes place July 29–August 2 on the WPI campus in Worchester, Massachusetts, with two follow-up dates in the fall (which may be completed online). Teachers will gain the knowledge and skills required of STEM educators and see how to adapt the content to their particular students and community. Eleven sessions cover topics like

- framework for high-quality (HQ) STEM,
- STEM unit development,
- standard alignment,
- the engineering design process,
- diversity and equity in STEM,
- real-world connections,
- STEM pedagogy, and
- resources.

Participants present a final STEM project or unit aligned with the components of HQ STEM that they'll pilot in their classrooms.

Professional development points or continuing education credits are available, as are on-campus accommodations. Register online at this website: *http://bit.ly/2I09JnE*.

LEGO Robotics for Educators K12

WPI also offers these LEGO robotics courses:

- an entry-level program for K–4 teachers with no prior experience (July 8–12);
- an entry-level program for grades 5–7 teachers with no prior experience (July 15–19 and July 22–26); and
- an advanced program for grades 5–12 teachers (July 8–12 and July 15–19).

Each program focuses on STEM education pedagogy and LEGO Mindstorms EV3 programming. Teachers will practice using different sensors to program a robot and review robots and engineering–related standards, the engineering design process, and classroom scenarios related to robotics challenges. Participants leave with LEGO robotics and general STEM resources and the experience of working in small teams with middle school students.

Professional development points, continuing education credits, and scholarships are available. Consult *http://bit.ly/2I09JnE*.

POGIL Workshops K12

These three-day workshops help teachers restructure their classroom environments using process-oriented guided inquiry learning (POGIL). On day one, those new to POGIL will learn the fundamentals, and those already familiar with the philosophy will focus on universal application. On day two, all participants will explore POGIL activity structure and how to facilitate a POGIL-style classroom. The remaining days focus on an interest area of the participant's choosing: activity writing, classroom facilitation, or implementing POGIL in the lab. Workshops will take place at

- Simmons University, Boston, Massachusetts, July 16–18;
- Capital University, Columbus, Ohio, July 22–24;
- Vanguard University, Costa Mesa, California, July 23–25; and
- Lewis & Clark College, Portland, Oregon, July 30–August 1.

Graduate credits and some scholarships are available. See the website *http://bit.ly/2WLxbZX*. ●

P: PreK E: Elementary M: Middle H: High HE: Higher Ed A: All K12: K–12

ASK A MENTOR, **Advice Column**

Handling Social Media and Humor, Incorporating Chemistry and Other Subjects

I recently discovered a Facebook post [in which] a parent expressed disagreement over how I graded her son's assignment. This unleashed a torrent of hateful, profanity-laced comments, including one person saying I should be fired. I'm afraid something like this could ruin my good reputation at school. Any thoughts on how to handle this?

— J., Nebraska

Wow!

If this parent posted hateful or slanderous comments, then I think the very first thing you should do is talk to your administrator. Did this parent ever talk to or contact you about this? If not, then I think a face-to-face meeting with the principal present should be arranged. People can be brave online, where they can fire off vindictive statements without having to look anyone in the eye. She may have legitimate concerns, but she has raised them in the wrong way. My guess is that she will not be as nasty when in the same room as you and your principal.

I do wonder, though, why are you reading parents' Facebook posts and comments? You can't control how people talk about you in their homes or with their friends—and social media has become an ersatz kitchen table for many people. *And* you will never be everyone's favorite. The people most likely to post something about you will fall in two camps: those who are angry at you and those who are thrilled with you. You'll never get a *real* idea of what most people think.

Try not to sweat this too much and remain confident that you are doing the best job possible. You will likely teach thousands of students in your career, and some are likely to have parents who won't address problems properly. Resist reading other people's opinions about you.

I was wondering how I could incorporate chemistry into my early elementary classes and what some good resources are to use.

— G., Montana

Chemistry activities for young children are some of the coolest and most engaging for students. Putting on goggles, using measuring utensils, and mixing substances are what most students think of when they hear the word *scientist*.

Elaborate equipment isn't required to teach chemistry. Stick with easy, inexpensive "bucket" or "kitchen" chemistry activities. Before trying any activity, practice it and follow all safety precautions. Insist that students wear goggles—just like you are!

Demonstrations like elephant toothpaste are always a hit with students in all grades, but make sure to incorporate a lesson in the chemistry of what is happening. Ask students to observe carefully, attempt to explain what they see, and ask questions.

While demos are exciting, nothing beats hands-on activities. Making slime or crystals is great. You can find many recipes that your students can experiment with. Inquiry activities like "What dissolves and what doesn't?" enable you to really give students a chance to follow their own paths, making observations all the way.

Search NSTA's Learning Center (*https://learningcenter.nsta.org*) and Freebies for Science Teachers web page (*https://bit.ly/2YrQ1qP*) for ideas, lessons, and activities.

The American Chemical Society (ACS) has developed several free, online and hands-on activities for elementary classrooms, including Adventures in Chemistry (*https://bit.ly/2eoKxcI*) and Science Activities for the Classroom (*https://bit.ly/2HPY8HM*).

I particularly like Janice Van Cleave's books for the multitudes of experiments they contain! NSTA Recommends (*www.nsta.org/recommends*) includes reviews of several of her books.

I like to infuse humor into my classroom. What is your opinion [regarding] teachers and students joking around?

— T., Utah

I, too, am a jokester and like to have fun with my students. I attribute a large part of this to my own teachers who were funny and made their classrooms enjoyable.

Never direct jests at an individual. I went too far early in my career: A teary-eyed boy told me after class that I had hurt him by repeatedly referring to a past incident. During the next class, I publicly apologized to him.

Be aware of the line at which you must stop students and yourself. Insults or "roasting" should never be permitted, even in jest. Stop the telling of any risqué jokes immediately. While almost all students know that racist jokes should never be told, I worry that sexist ones may be overlooked. Stop any teasing, even between close friends. An innocuous tease may be heard by someone outside their circle and repeated.

Know that some students may encourage you to tell jokes to sidetrack you. It can be hard to resist, so be wary of this tactic. I resorted to "Joke of the Week" on Fridays: I selected jokes from a list of science-related ones for a quick laugh at the end of the week, usually told just before dismissing the class. I enjoyed sending the students off for the weekend with a "groaner!"

I have observed a lack of emphasis on science concepts in the elementary classroom. Does this seem to be common practice in other schools? Any suggestions on how to incorporate multiple subjects within a science lesson to help alleviate this?

– K., Tennessee

The sad fact is that science, like many disciplines, takes a back seat to the big subjects: Language Arts (LA) and Math. The tendency to treat all subjects as separate entities instead of incorporating them into many elementary learning activities only makes the disparity worse. When LA and math are emphasized on assessments, it is easy to justify reducing time spent on other subjects to ensure students understand, and hopefully, perform better.

Other factors limiting science education include elementary teachers with very little science background who may fear teaching it; limited budgets for science supplies and resources; and limited professional development funding, which is frequently earmarked for LA and math conferences, resulting in teachers who may not feel confident enough to attempt exciting, hands-on activities.

Many natural phenomena can be used as thematic launchpads for wonderful learning experiences in all subjects. Millions of monarch butterflies descend on specific, isolated valleys in Mexico, but they were born all over North America. They are the grandchildren of the monarchs that hatched in Mexico! Imagine the geography, art, language, math, and science that can all be taught by delving into this story.

Check out the *NGSS@*NSTA Hub (*https://ngss.nsta.org*) for more information about how you can do this.

Hope this helps! ●

Check out more advice on diverse topics or ask a question of Gabe Kraljevic from Ask a Mentor at http://bit.ly/2FpGb1u, *or e-mail* mentor@nsta.org.

MONEY 101

Five Ways to Spring Clean Your Financials

By Kelly Kenneally

With tax season in the rearview mirror, it's a good time to take a broader look at your personal finances, using what you learned from your latest income tax filing to assess your financial position and set goals.

You could create and live on a realistic budget. Or maybe pay down debt or set aside more money for an emergency, a vacation, or your retirement. Reassessing personal financial goals is all the more important given that more and more American workers aren't on solid financial footing. According to Bankrate.com, only 29% of Americans have the recommended six months of expenses stashed away; nearly one in four have no emergency savings whatsoever.

An unexpected major expense can wreak havoc on nearly everyone's long-term financial goals.

Conducting a financial "spring cleaning" doesn't have to be a daunting task. Take these five quick steps for a financial checkup or fresh start:

1. Write it down.

Just like New Year's resolutions, writing down precise financial goals can help make them real. Briefly articulate a few goals, a target timeline, and action steps to get there.

Perhaps you want to buy a home within two years. To get there, you may need to cut excess spending and instead put away money each month into a savings account for the down payment. Maybe you would like to retire early. Define the age you'd like to stop working and plan how to get there: inventory of your retirement accounts, increase savings by 5% each pay period, or pay off your mortgage. Perhaps you're in a good financial position and want to stay on track.

Whatever your goals, take the time to carefully consider them and chart a realistic course that you can revisit and revise annually—or even monthly.

2. Review your tax withholdings.

ISTOCK

How did major changes (including to tax rates and withholdings) to individual taxes in the 2018 tax season affect you? If you had a tax bill or a substantial refund this year, review your withholdings. Your federal tax withholdings are based on the number of allowances you claim on your W-4, and the Internal Revenue Service (IRS) recommends conducting periodic "Paycheck Checkups" to ensure the amount of tax deducted from each paycheck is tailored to your personal situation. According to the IRS, checking withholdings is especially important for anyone who had a large tax refund or bill in 2018, had a major life change (e.g. marital status, dependents, retirement), or has two or more jobs concurrently. Go to the website *www.irs.gov* and search for "paycheck checkup" for more information and to use the IRS withholding calculator.

3. Create an online Social Security account.

Whether you're 25 or 65, it's wise to set up online access to your Social Security benefits. One reason is fraud prevention. Once you establish your online account, no one else can. Creating an account now prevents someone else from doing so fraudulently and filing for benefits in your name.

You also need to make sure there aren't gaps in your earning history if an employer failed to report your earnings. Social Security benefits are based upon total career earnings, and it's much easier to fix an error sooner rather than later.

Finally, an online account enables you to see in real time your projected Social Security benefits at various ages. With an online account, you'll see that benefits typically are substantially higher if you wait until age 70 to claim benefits. These Social Security projections also will help you estimate your income in retirement and whether you need to save more now for retirement. The online account also provides information on any disability, survivor benefits, and Medicare benefits you've earned. Go to *www.ssa.gov/myaccount* to set up your account.

4. Audit your automatic payments.

Technology makes it easy to pay bills and to make purchases. Enabled by technology, automatic payments for everything from a mortgage to music streaming services are increasingly popular. While convenient, automatic payments can be a money pit. Review your bank and credit card statements to confirm that all automatic payments are accurate, and fix those that aren't. Also consider if those goods and services still fit your lifestyle and budget, and cancel any that don't. Many small payments add up, and when you take the time to look at them collectively, you may identify ways to redirect funds to help reach a financial goal.

Speaking of debt, automatic payments billed to credit cards become substantially more expensive if the balance isn't paid off each month.

5. Rethink your retirement contributions.

If you work in the public sector, chances are you contribute automatically to a defined benefit pension plan that will deliver a monthly retirement income. If you work for a private or charter school or in higher education, your primary retirement plan might be a defined contribution plan. In these plans, you may or may not have automatic enrollment and contributions, and you likely have more responsibility for managing your contributions and investments.

Regardless of your employer or retirement plan, it's wise to maximize your retirement savings for two reasons. First, it is important to be fully cognizant of your savings over your career to make sure you're on track to have enough income in retirement. Second, saving early and often helps realize the benefits of compounded interest over time. The earlier you start, the more you take advantage of interest to help fund your retirement, and that means less retirement savings comes out of your pocket. Make an appointment with your benefits office to get educated on your retirement benefits and to learn what options are available to you to maximize your savings.

As an example, public school educators with pensions can add to their nest egg through Supplemental Retirement Plans (SRPs) offered in most states. SRPs are increasingly important because in many jurisdictions, pension benefits are decreasing and the responsibility of saving for retirement is shifting from the employer to the employee. But only a few states offer auto-enrollment in SRPs, so you have to know about the benefit, be proactive in signing up for it, and determine your contribution rates.

Please note, this column shouldn't be considered financial advice, but instead a motivator to think strategically about your financial goals. These steps provide a framework to assess your personal finances in a way that fits into busy lives. Check off one each week this spring—or even one per month—and you'll be more informed and in control. ●

Kelly Kenneally has 25 years of public policy experience including serving in the White House. She has worked for more than 10 years with nonprofit organizations to help improve Americans' financial security.

SAVE THE DATES

2019 NSTA AREA CONFERENCES ON SCIENCE EDUCATION

This Is the Place for Monumental Science	Science: The Bridge to Endless Possibilities	Fostering a Culture for Science
SALT LAKE CITY, UT OCT. 24–26	CINCINNATI, OH NOV. 14–16	SEATTLE, WA DEC. 12–14

PROFESSIONAL DEVELOPMENT STRANDS

Navigating Phenomenal Landscapes: Using Phenomena as a Way to Guide Science Instruction	Bridging the Three Dimensions of Science Teaching and Learning: Practices, Core Ideas, and Crosscutting Concepts	Providing STEM Pathways for the Future
Forming Natural Bridges: Integrating Science Across Content Areas	Constructing Bridges: Building Lifelong Appreciation and Passion for Science	Building Partnerships for Effective Science Education
Hook 'Em for Life: Sustaining Science Teaching and Learning	Building Strong Bridges: Reinforcing the Connection Between Science and Literacy	Finding Joy in Experiencing Science

Learn more about the NSTA Area Conferences at
www.nsta.org/conferences

#NSTA19

75th NSTA ANNIVERSARY

BLICK ON FLICKS

Building With What You Have: *The Boy Who Harnessed the Wind*

William Kamkwamba was just 14 years old when famine struck his home country of Malawi in eastern Africa in 2001. His family grew maize (corn) and relied on the rain for a successful harvest. The crops failed that year, and Malawians suffered terrible hunger for months. William's family lived on one meal each day, a small bowl of nsima, a cornmeal porridge.

William had long been interested in electrical devices; he repaired radios and cassette players for neighbors, and was excited to be entering secondary school. Unfortunately, the famine meant his parents could no longer afford his school fees, and William had to leave school. He continued to read about physics and electronics, borrowing books from the village library. In one book, he read that a windmill could pump water or generate electricity. William realized that a windmill could solve several problems for his family.

Using things he found in a junkyard—including a bicycle frame, a vehicle fan, and lengths of pipe—William built a windmill that could power lights and charge cell phone

ERIK (HASH) HERSMAN FROM ORLANDO

ERIK (HASH) HERSMAN FROM ORLANDO

William Kamkwamba designed and built windmills on his family's farm in Malawi. His story is the basis of the film The Boy Who Harnessed the Wind.

batteries. After that success, he build a second windmill that powered a water pump, making irrigation possible on his family's farm.

The Boy Who Harnessed the Wind, a book published in 2009, was based on this true story. The film based on the book is available on Netflix and stars Chewetel Ejiofor as William's father, Trywell, and Maxwell Simba as William. Regular readers of this column may remember Ejiofor as the star of the film *12 Years a Slave,* which I reviewed in 2013.

Teachers can use William's story several ways in their classrooms. For those who can partner with an English language arts teacher, reading some or all of the book would be a great way to teach an interdisciplinary unit and give students an interesting nonfiction text. William's TED Talk (*https://bit.ly/2HTLyrP*) is short, to the point, and inspirational, and certainly worth showing to your class if you have only a short time to introduce a design challenge.

For those with more class time, the film illuminates what life in Malawi is like in the early 21st century, and I think students should see that. Early in the film, William is told to wash up before dinner, and he uses just a couple of gallons of water (that he had to pull up from the well in a bucket) to bathe. The community has almost no cars; William and his father travel on a bicycle they share. His house lacks indoor plumbing, and all the labor of planting and sowing corn is done by hand.

Most kids in the United States have not experienced the hunger and deprivation that William endured, and I hope that seeing his innovative problem solving will inspire more kids to understand the power of science, technology, engineering, and mathematics (STEM) thinking. The film shows William building a small prototype to test his concept, which is great modeling of the process real engineers use.

By the film's end, William's success with his windmills has garnered international attention. He received a scholarship to attend secondary school, and U.S. donors paid his college tuition at Dartmouth, where he earned a degree in Environmental Science in 2014. Teachers can use his TED talk, his book, or the feature film to excite students about an engineering design challenge, or to support their understanding of life in a very different part of the world. ●

Note: The film is rated TV-PG. It contains instances of violence and threats of violence.

Jacob Clark Blickenstaff is an independent science education consultant in Seattle, Washington. Read more Blick at http://bit.ly/2S2wH2L, *or e-mail him at* jclarkblickenstaff@outlook.com.

Register Now and Save!

8TH ANNUAL

STEM

SCIENCE TECHNOLOGY ENGINEERING MATHEMATICS

Forum & Expo

HOSTED BY NSTA

San Francisco, CA

July 24–26, 2019

If you are searching for ways to immediately and effectively apply STEM education in a preK–16 setting or to implement STEM as a best practice, you should plan to attend this dynamic event. Educators and organizations who are actively implementing STEM programs in their school and districts will come together to share tactics that work.

NSTA Members receive a deep discount, and if you register before the Earlybird deadline, you'll enjoy the maximum savings.

#STEMforum

This year's STEM Forum offers the following strands of programming:

Lower Elementary/Early Childhood

Students in the lower elementary grades are beginning to understand the world around them and the role they play in it. Sessions in this strand will emphasize open-ended and active exploration, learning through play, and hands-on investigations of the real world through the lens of *NGSS*.

Upper Elementary

How do we respond to research that indicates that by the time our students reach the fourth grade, a third of them will lose interest in science? The sessions in this strand showcase hands-on, interactive programs and instructional strategies that support STEM and have been successfully integrated into the elementary core curriculum.

Middle Level

Engaging students through opportunities to explore STEM fields of study is a top priority at the middle school level. The sessions in this strand showcase how STEM learning environments interconnect to serve as a vehicle for discovery, innovation, and independent problem solving.

High School

In preparation for entry to college and industry, students must be able to apply their understanding in the context of real-world problem solving. Workshops in this strand showcase the creative ways educators are addressing the challenges of engaging students in STEM while meeting the *NGSS* and *Common Core* Math standards.

Building STEM Ecosystems: Community Partnerships

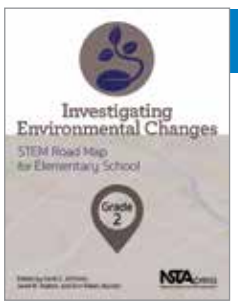
Successful STEM programs incorporate hands-on and real-life applications where students develop the skills and mind-sets needed to answer complex questions, investigate global issues, and develop solutions to real-world challenges. The sessions in this strand highlight select successful preK–16 partnership initiatives.

Post-Secondary

Join our community of post-secondary educators as they discuss important and relevant topics in STEM education in this unique *Edcamp/unconference* format. Sessions in this strand will highlight pedagogical and discipline-based research on STEM teaching and learning.

For information and to register, visit *www.nsta.org/stemforum*

NSTA National Science Teachers Association



NSTA PRESS: *Investigating Environmental Changes, Grade 2*

The EDP in Action: Designing the Outdoor STEM Classroom

Editor's Note

NSTA Press publishes high-quality resources for science educators. This series features just a few of the books recently released. The following excerpt is from Investigating Environmental Changes, Grade 2*, edited by Carla C. Johnson, Janet B. Walton, and Erin E. Peters-Burton, edited for publication here. To download the full text of this chapter, go to* https://bit.ly/2uveKg0. *NSTA Press publications are available online through the NSTA Science Store at* www.nsta.org/store.

Working as a class, you will proceed through the first three steps (Define, Learn, and Plan) of the engineering design process (EDP) as the class addresses the challenge of creating an outdoor science, technology, engineering, and mathematics (STEM) classroom. Begin with guiding students through the Define and Learn stages, working as a class:

- *Define*—What are you trying to accomplish? (Create an outdoor STEM classroom for your class and other students to observe and measure changes over time using a butterfly garden and a sundial.)
- *Learn*—What do you need to know to do this? (How much space is available, how much sun the space gets, what kind of plants attract butterflies, how much water the plants need, how much sunlight the plants need, what kind of materials can be used to make an outdoor sundial, how changes can be measured in the outdoor STEM classroom.) Create a chart of information the class will need.

To collect information about the space availability and access to sunshine, take students outside, and working as a class, measure dimensions of the available space using a tape measure. Have each student create a rough sketch of the space including dimensions and locations of trees, buildings, and any other objects close enough to cast shadows on the outdoor STEM classroom area. Students will use this sketch to create maps of the outdoor STEM classroom that incorporate their own ideas. Discuss as a class how nearby trees and buildings will affect the amount of sunlight shining on the outdoor STEM classroom space.

After returning to the classroom, divide students into teams to conduct research, using the internet, the school media center, or resources you prepared about plants for the butterfly garden and types of outdoor sundials. For example, you may have several teams (3–4 students each) acting as life science researchers conducting research about the butterfly garden (types of plants, need for sunlight and water, types of butterflies that are native to your area) and several teams acting as Earth science researchers conducting research on types of outdoor sundials and weatherproof materials for building a sundial. Student teams should first work together to record the questions they want to answer about their assigned topic. Have students write each question their team decides to research about butterfly gardens or sundials at the top of lined sheets of paper. Students should record the information they collect about these questions on their paper. After students have collected their information, have each team present their findings to the class and add information to two class charts: one titled "Butterfly Garden" and one titled "Sundial."

Next, the class will move on to the Plan step of the EDP. In this phase, students should use the sketches they created of the outdoor STEM classroom space to create maps that depict their vision of the final outdoor STEM classroom. Students should label the dimensions of the space, mark the location of elements to be included (butterfly garden, sundial, and any other features they think should be included), and provide a materials list.

STEM Research Notebook Entry #14

Have students sketch a map incorporating their ideas for the outdoor STEM classroom design. Instruct students to label dimensions using the measurements the class took and include details about the location of the butterfly garden and the sundial.

Remind students that they will need to ensure that plants in the butterfly garden get adequate water and that the soil does not erode. Working in teams of 3–4 students, have students brainstorm ideas for a watering system for the butterfly garden (e.g., have a class schedule of who provides water at what time, planning where the water will come from and how it will be delivered) and ideas about how to prevent erosion in the garden. After teams have brainstormed ideas, have each student add ideas about a watering system and erosion prevention to their garden maps, using both pictures and words.

After students have completed their design drawings, post student drawings around the classroom and have students review the drawings and mark their top three choices. Review the top three designs as a class, determining what features of each drawing appealed to students. As a class, create a single drawing incorporating these features to use as the final design drawing for the outdoor STEM classroom.

Next, students will need to identify supplies needed for their outdoor STEM classroom. Create a class chart with a section for each component of the garden (butterfly garden, sundial, structural components, and watering needs). Revisit the research students conducted and the chart students completed in the Learn step of the EDP.

Create a materials list on a class chart and have students complete STEM Research Notebook entry #15.

STEM Research Notebook Entry #15

Have students list the materials the class will need for the components of the outdoor STEM classroom, including the butterfly garden, the sundial, structural components, and watering needs.

Ask students for their ideas on how they will provide the supplies they need for their outdoor STEM classroom. Ask students to review the list of materials they created and offer guesses about how much those materials will cost. Record student responses on a class chart. Guide students to consider whether they could use any of the recyclable materials the class is collecting or any recyclable materials from home in their outdoor STEM classroom (e.g., using milk jugs to transport water).

Introduce the concept of a budget to students as an estimate of available money and amount of spending that helps people and businesses plan for their activities. Create a budget sheet on chart paper with two columns, one for income and one for expenses, that includes all the expenses students identified for their garden (make estimates of the actual prices of items).

Students will continue to explore money through an interactive read-aloud of *Math at the Bank: Place Value and Properties of Operations* by Ian F. Mahaney. Students will create STEM Research Notebook entries (#16 and #17) after the reading.

STEM Research Notebook Entry #16

After the read-aloud, have students document what they learned about money and budgets in their STEM Research Notebooks, using both pictures and words. ●

We know how hard you work for your students.

We are here to work for you!

Science education is facing some real challenges, and NSTA continues to be the strongest advocate for science education nationwide.

Advocacy and outreach are central to NSTA's mission. NSTA is a leading influencer on science and STEM teaching and learning—both here in Washington, DC and nationwide. With your support we have created a stellar reputation in the education and science communities as a committed advocate for science, STEM, and classroom teachers.

As an NSTA member, you will be supporting NSTA's advocacy work on behalf of science and STEM education (and for you and your students), as well as benefiting from all of the great journals and conference discounts.

We hope you will stay with us—or plan to join this grand adventure as a new NSTA member this year.

Join us and together we can make sure that teachers have a seat at the table and that your teacher voice is heard.

Sincerely,

David Evans
Executive Director
devans@nsta.org

#onlyatNSTA

Learn about all your membership benefits at *www.nsta.org/membership*

National Science Teachers Association

(All dates are deadlines unless otherwise specified.)

May 13—Register for the **Eighth Annual STEM Forum & Expo** hosted by NSTA now to maximize your savings. The STEM Forum will be held July 24–26 in San Francisco, California. Conference strands focus on Lower Elementary/Early Childhood; Middle Level; Upper-Elementary; High School; Building STEM Ecosystems: Community Partnerships; and Postsecondary. Members of NSTA and our STEM Partners who register by this early bird deadline pay $205. For more information and to register, visit *https://bit.ly/2GeGvke*.

May 15—Are you interested in learning the latest information on plastic pollution in the world's oceans? Don't miss **NSTA Science Update: Marine Debris and Microplastics in Our Oceans, a free web seminar.** All participants will receive a certificate of participation and 100 Learning Center activity points for attending and completing the post-program evaluation. An archive and presentation slides will be available when the program concludes. The session will run from 7 to 8 p.m. Eastern Time (ET). For more information on NSTA Web Seminars or to register, visit *http://bit.ly/2RGhr8N*.

May 28—Don't miss today's early bird deadline for the **Picture-Perfect Workshop** on June 18–19 at the **University of Tennessee,** Knoxville. Karen Ansberry and Emily Morgan, the award-winning authors of the NSTA Press Picture-Perfect book series, will guide participants as they explore using picture books in elementary STEM education and model lessons. Attendees also will receive *Even More Picture-Perfect Science Lessons; Picture-Perfect STEM Lessons, K–2;* and *Picture-Perfect STEM Lessons, 3–5*.

The workshop will take place at 8 a.m.–3 p.m. on both days. Early bird registration costs $449 for the basic workshop; with the train-the-trainer component and materials, the early bird price is $999. For more information or to register, visit *https://bit.ly/2zOlVTx*.

June 4—It's your last chance to save on registration for the **Picture-Perfect Workshop in Winston-Salem,** North Carolina, June 25–26. Picture-Perfect authors Karen Ansberry and Emily Morgan will facilitate the workshop on using picture books to teach elementary STEM. Attendees also will receive *Even More Picture-Perfect Science Lessons; Picture-Perfect STEM Lessons, K–2;* and *Picture-Perfect STEM Lessons, 3–5*.

The workshop will take place at 8 a.m.–3 p.m. on both days. Early bird registration costs $449 for the basic workshop; with the train-the-trainer component and materials, the early bird price is $999. For more information or to register, visit *https://bit.ly/2zOlVTx*. ●

Celebrating 75 Years at NSTA

1967 *NSTA News-Bulletin* launches, predecessor of *NSTA Reports.*
1999 NSTA SciLinks initiative begins linking science textbooks to the internet.

Did You Miss NSTA in St. Louis?

NSTA opened its National Conference on Science Education on April 11 with a 75th anniversary celebration. Be sure to check out the NSTA Blog (*http://nstacommunities.org/blog*) and our Facebook page for news and pictures of the conference from attendees and NSTA staff. Search #NSTA19 on Twitter to see what was trending on the internet.

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Specially Dyed Thread Senses Gases

Gas-sensing thread could put a new twist on the "sniff test." Researchers at Tufts University in Massachusetts have developed thread using a two-step technique that can detect certain gases in concentrations as low as 50 parts per million.

Three types of dyes, two that detect ammonia and one that can detect hydrogen chloride, were used in combination with a hydrophobic silicone coating to prevent the dye from being washed away. Because ammonia and hydrogen chloride are often found in chemicals such as cleaning supplies and fertilizer, the researchers said fabric made from the gas-sensing thread could be used as part of workplace safety measures. They noted the silicone coating on the thread would allow the fabric to be worn in wet locations, suggesting it could be used to monitor "exposure to hazardous spills in the laboratory environment, or greenhouse gas emissions from ocean environments and ecosystems, as well as the overall health of aquatic ecosystems."

The researchers noted that "threads are especially suitable for sensing applications." They contend the work could lead to the "next generation of wearable environmental sensors."

Read the article "Colorimetric Gas Sensing Washable Threads for Smart Textiles" in *Scientific Reports* at *https://go.nature.com/2TXZYsC*.