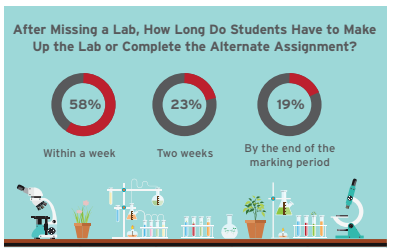

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NSTA Reports
National Science Teachers Association

NATIONAL HUMAN GENOME RESEARCH INSTITUTE, NATIONAL INSTITUTES OF HEALTH (*www.genome.gov*)

Teaching About Genetic Genealogy 10

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Podcasting in the Science Classroom

"When my students are unable to attend a field trip, I typically create a podcast, so those students can listen to what was learned. Then I post the podcast in Google Classroom, so they can access it," says Kurtz Miller, who teaches geology, physics, and physical science at Wayne High School in Huber Heights, Ohio. He says podcasts work well "for my upper-level, college-credit geology students because it helps them really digest and consider what was said…It gives them a firsthand account and additional information besides other students' notes."

TERRI REUTTER

Two of Ramona Jolliffe Satre's sixth graders at Ogden Middle School in Ogden, Iowa, review a podcast they created using an iPad.

Miller gets permission in advance from the speakers on the field trips to record their talks. He uses a mono digital voice recorder with built-in USB. "It costs just [less than] $50 [and] records in MP3 audio format," he explains. "It's an example of something a teacher without a lot of tech savvy could do, a starting point for teachers to try."

"I first started using student-made podcasts along with a sixth-grade yearlong project about famous scientists," says Ramona Jolliffe Satre, former fifth- and sixth-grade science teacher and now a K–12 instructional science coach for Ogden Community Schools in Ogden, Iowa. Each month, "chosen students presented orally to their class about a famous scientist in history. This usually involved a slide presentation to guide their talk. This oral presentation also involved the student using a mic to present; another learning experience."

Next, her students "record and upload a podcast, allowing peers absent from class to share in the presentation. The podcast is logged in their Google Classroom for future reference at assessment time. Students also enjoy using the podcasts for reviewing the information," Satre maintains.

Her students also produce three- to five-minute podcasts to accompany "a poster about a classroom concept. We just completed posters about natural disasters in class. Each poster has a [two-dimensional barcode] on it that attaches a student-made podcast offering further information about the natural disaster. We share these posters in our hallways and community locations like the public library," she relates. "It gets the community involved and gives students another audience," she notes.

"I encourage students to write a script first, to connect the written word to the brain. Repetition helps them remember," Satre contends. She emphasizes the importance of "talk[ing] like scientists" and says podcasting "is a way to reinforce that, [having] correct grammar…a presentation voice."

Because of the ease and popularity of texting, "a lot of students are not as verbal as they once were. Students need to practice talking. In Iowa, part of our literacy standard is speaking. Students have to be able to communicate for their careers," Satre asserts.

"I've been podcasting as an instructor and have had students create podcasts," reports Laura Guertin, professor of Earth science at Penn State Brandywine in Media, Pennsylvania. She says she was sold on podcasting after attending

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National Science Teachers Association

COMMENTARY: **Amy Belding**

A Case for Global Competency in Education

By Amy Belding

Amy Belding

Telling me that I seemed "like a global person," my former boss assigned me a new department six months into my first year as a curriculum coordinator for Career and Technical Education (CTE). I had been a classroom teacher for nine years, and this was my first experience in administration. She decided in those six months that I was *global*, so I became the coordinator for World Languages and Globalization in addition to CTE.

In all honesty, she was right: I *am* globally minded. But this got me thinking: *How do you know if someone is "global"? What does global look like?*

Being curious, I polled my CTE teachers. I asked them one question: "Are you global or not?" The result: Half of my teachers identified as global and half as not global.

I wondered about the role of global competencies in preparing students for future careers. Take a look at these findings from *Career Pathways: Five Ways to Connect College and Careers 2017,* published by The Georgetown University Center on Education and the Workforce:

- In 1985, there were 410 postsecondary programs of study; in 2010, there were 2,160;
- In 1949, there were 2.4 million college students; in 2014, 20.2 million; and
- In 1950, there were 270 occupations; in 2010, there were 840.

Why is this important? Because students need more support than ever in navigating the complexity of options in a world that is clearly more competitive than it ever was before. Mark Zuckerberg's 2017 Harvard commencement speech illustrated the point that our current workforce of millennials should focus on globalism over nationalism. "Progress now requires coming together, not just as cities or nations, but also as a global community...This is not a battle of nations; it is a battle of ideas." (*https://bit.ly/2rXkQ6x*)

Global competency is the currency by which our students can compete in the most diverse workplaces. In May 2018, Nish Parikh wrote in *Forbes* (*https://bit.ly/2tyLt3s*) that *"Discoveries in science and technology have empowered us to think differently, act quickly and purposefully, and explore more efficient ways to improve health care, education, and employment for billions of people globally."*

What Does This Mean?

Kids are global by nature. This is the world they grew up in. A search on any social network of #globalready will provide a sense of how kids see beyond the borders of individual countries. How do we meet our students where they are when the world seems to change daily? By getting to know them, to really know them. High school students discussed being a diverse student in a more U.S.-centric school in this Globalization Cohort Project video (*https://bit.ly/2C5GZX1*). They shared a common trait: They want to be heard and acknowledged.

Technology makes connections easier and more expansive. Our students have far more opportunities to connect globally than the vast majority of us had.

As educators, we need to become global savages—challenging ourselves and our own ideas. Connecting with local and national organizations can foster a sense of global competency within yourself and also in your classroom, school, and community. Look for these opportunities wherever you go. Diversity at the table creates a bonus in problem-solving.

Professional development around global competency can help equip teachers and administrators for this changing landscape. Some of my favorite resources include these:

- CTE and science, technology, engineering, and mathematics (STEM) online courses from the Asia Society (*https://bit.ly/2EtAQHD*) to learn how global competency can help your students become career- and STEM-ready;
- The Association for Supervision and Curriculum Development's Global Competency Continuum (*https://bit.ly/2T7hiPd*), for a self-assessment to determine where you fall on the Global Competency Continuum and resources; and
- The Longview Foundation Global Competence Certificate (*https://bit.ly/1tAd8tf*), for graduate-level training to K–16 educators on how to teach for global competence and prepare students to be globally informed, engaged citizens.

In 30 years, globalization has emerged as a greater theme in our schools. If I were asked today whether I would consider myself to be global, my answer would be absolutely. But in 2019, that should be everyone's answer. It's not an option for us to think that our students will live in a U.S.-centric world. When we embrace the idea and lifestyle of global citizenship, we realize that we are more alike than we are different. ●

Amy Belding is the coordinator of Career and Technical Education, Choice Programs, World Languages, and Global Studies for the Parkway School District in St. Louis, Missouri. She has worked in education for more than 13 years as a high school CTE teacher, A+ Schools coordinator, and instructional leader. She focuses on systemic and sustainable integration to prepare students for a global society and an ever-changing world.

NSTA Reports

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a summit on undergraduate science education and hearing from employers of recent graduates that "students' weakest skill is their ability to listen."

Guertin contends that students "don't get enough opportunities to show their knowledge matters and makes a difference in others' learning. Students can be teachers and students at the same time." For example, her students created podcasts about tree identification for Ridley Creek State Park in Newtown Square, Pennsylvania, and podcasts focusing on basic geology and sustainability for the Pennsylvania Earth Science Teachers Association.

Podcasting is "a tool to enhance learning of content without it taking away from the objectives of the course, without having technology be a barrier or a burden," Guertin observes. "It can help students learn a transferrable skill outside [my] Earth science courses... When students create podcasts, they can post them on their LinkedIn pages to impress employers."

Allowing students to choose topics of interest related to the course "gives them ownership of the project," Guertin points out. She has her students work with librarians to research their scripts. "The information has to be current, reliable, and unbiased. Students learn how to evaluate good sources and how to write a script…I have them listen to examples of [quality] podcasts and review [one another's] scripts and podcasts, which helps improve their writing and recording abilities."

Guertin also records podcasts for her students. "They can listen to them in the car or while riding on buses," she notes. "I put in natural breaks so students can pause the podcast and return to it later."

She will also pose the same questions she would in class during the podcast. "They can hit pause to think about the answer, then restart the podcast. It gets them to think and apply what they're learning," she maintains.

'Another Podcast Boom'

While noting that technological advancements in schools have made it easier for students to record audio and video together, students are making quality audio podcasts now mainly for "car rides and workouts," reports science teacher Brian Bartel, co-host of NSTA's Lab Out Loud podcast series (*https://laboutloud.com*). He and science teacher co-host Dale Basler speculate that "not a lot of students are listening to audio podcasts yet."

However, the co-hosts foresee "another podcast boom now because you can make them with many devices. The apps allow it," Basler asserts. "Video is king, but telling a story using audio gets students thinking about all the aspects."

"This is important because you can't mow the lawn while watching video, but you can while listening to a podcast," Bartel points out.

Teachers are having students listen to Lab Out Loud podcasts "and put their images to the narration, which allows them to synthesize and interpret the content and remix it," reports Basler. "This results in a deeper understanding for students."

The co-hosts agree that having students make their own podcasts "is not done enough," perhaps because teachers "have to give up control of the classroom. It's an isolating task, but gives students agency if done right."

"I love to hear students ask, 'Can I do a lab report in a different way?' There are many ways" for students to showcase their learning, including podcasts, Bartel notes. "Trust students to make the right decision to express their learning, and have a good microphone if you're doing this on a regular basis."

"Make sure [you convey] what you want students to learn [when they make podcasts]. The content is more important than the technology; learning outcomes are more important," Basler emphasizes. He adds that schools and teachers also are responsible for "giving students guidelines on making meaningful content."

Logistics is a factor. "At the elementary level, you may have 20 to 30 students trying to record in one classroom. We don't have schools designed for this," Bartel points out. Teachers may need to "stagger these podcasts so not all students are recording them at the same time." He also advocates finding ways to diminish background noise by "creating recording tents to isolate sound, or having students record in the hallway."

Teachers also need to decide how to share their students' podcasts with other students and teachers, parents, or the public. Basler urges teachers to ask themselves, "Where will the content end up? Does it follow a student forever?" ●

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Teaching the Science Inside Law Enforcement

Law enforcement officers visiting the classroom can demonstrate some real-world applications of science concepts and give students firsthand insight into career options—and their requirements—that students may not have considered.

Ryan Renee Rudkin, an eighth-grade physical science teacher at Rolling Hills Middle School in El Dorado Hills, California, has been inviting officers from the California Highway Patrol (CHP) to her classroom to "teach students about radar, LIDAR [light detection and ranging], and how they check [a car's speed]. We go out in the parking lot and mark off distance. Kids run, skip, ride bikes, or skateboard, then calculate their speed. We verify it with radar. It's a really good connection to real life," she explains. "It's kind of cool to play with radar and LIDAR guns. [The officer] will demonstrate how to use them, and then let [my students] use the radar and LIDAR guns. That's what makes it more hands-on; they get to do something rather than just watching.

"It's not a very rigorous activity… [but it helps] my connections with students. They know I try hard to make class interesting…and build rapport," Rudkin continues. "I try to bring in guest speakers [frequently]. There's a good connection with the community, too."

She started inviting CHP officers to speak to her students about five years ago, after a student's parent who worked for the California Department of Transportation brought a crash test dummy to the classroom. "That got me thinking about what else I could do," she recalls. "The officers are always excited to speak to my classes."

Ray Heinz, a science teacher at Owatonna Middle School, in Owatonna, Minnesota, spends a lot of time discussing conditioning with his seventh- and eighth-grade students during his Animal Behavior elective science class, "from simple stuff to… getting animals to do a job." His students design a conditioning training program for their pets at home as a project for the unit. For the past few years, the K9 officer from the Owatonna Police Department has visited the school, demonstrating the police dog's skills in scent tracking and restraining suspects and discussing training techniques.

Heinz prepared his students by explaining concepts such as clicker training (a form of positive reinforcement) and researching different types of work that dogs do. "It's fun to show [students] videos and then show [it happening] in real life. I got them ready so [the officer] could go into deeper levels of conditioning…They would ask him questions and kind of reshape how they were doing experiments at home," he says.

"It's a cool opportunity for them to see law enforcement in a setting with no negative interaction. My kids are sometimes scared because they've had no interaction [with police officers] before, so they start off reserved, but by the end, they're comfortable and talking [to the officer]," Heinz says. "They get a direct connection [to the content by] seeing somebody on the front line using these skills on a daily basis. I'm not just teaching them words like 'conditioned and unconditioned stimulus' for no reason."

Before the K9 team would visit, Heinz would have his students create lists of questions to ask. "They would have a ton of questions for [the K9 officer] and completely fill up sheets on what they learned," he recalls.

The presentation was conducted outside, in part to minimize concerns about allergies. When he had two students who were uncomfortable being outside with the police dog, Heinz made sure they were able to observe the presentation from a window, and the officer went inside to speak with them.

Since the K9 officer accepted a position in another town last year,

Heinz invited Tom Meagher, STEM coordinator for the school district, to do a similar demonstration of conditioning training with his hunting dog, but Heinz is hoping to find another K9 team to speak to his students, noting, "They got more invested in it [with the K9 officer] versus someone they're familiar with from the school."

Criminalist's Perspective

Renee Armstrong, a supervising criminalist in the forensic science division of the Washoe County (Nevada) Sheriff's office, has been visiting elementary, middle school, high school, and college classrooms for more than a dozen years, teaching students how to collect fingerprints and discussing how her department gathers and processes evidence.

"My lecture includes information about myself, how I got into the career, what it takes to get into the career, and time for [a question-and-answer session]. I make sure I have at least 30–45 minutes for the students to try their hand at fingerprint collection. Depending on the[ir] age, I will tell them stories about some cases I assisted in if the case is adjudicated or has already gone to court," she says.

When invited to speak to a class, Armstrong discusses the educator's goals so she can adjust her presentation. "If they are [in] high school or college, [I talk about] the proper education and career track and the real expectations and demands of the job. With elementary or middle school [teachers, I try to] ignite an interest and/or passion in their students, or if they have an interest, really help them to know the difference [between] reality vs. television."

"I am motivated by my passion for the job; I love applying science to solve problems and seeing results. I love helping passionate kids discover their joy in a career in science. I am also motivated by the interest from the children," Armstrong maintains. "To date, I have not presented to a room that didn't become engaged swiftly with my topic. I guess I have the TV shows to thank for that. So many students want to hear if what they saw on television is real or used by our lab." ●

Quotable

We are now at a point where we must educate our children in what no one knew yesterday, and prepare our schools for what no one knows yet.

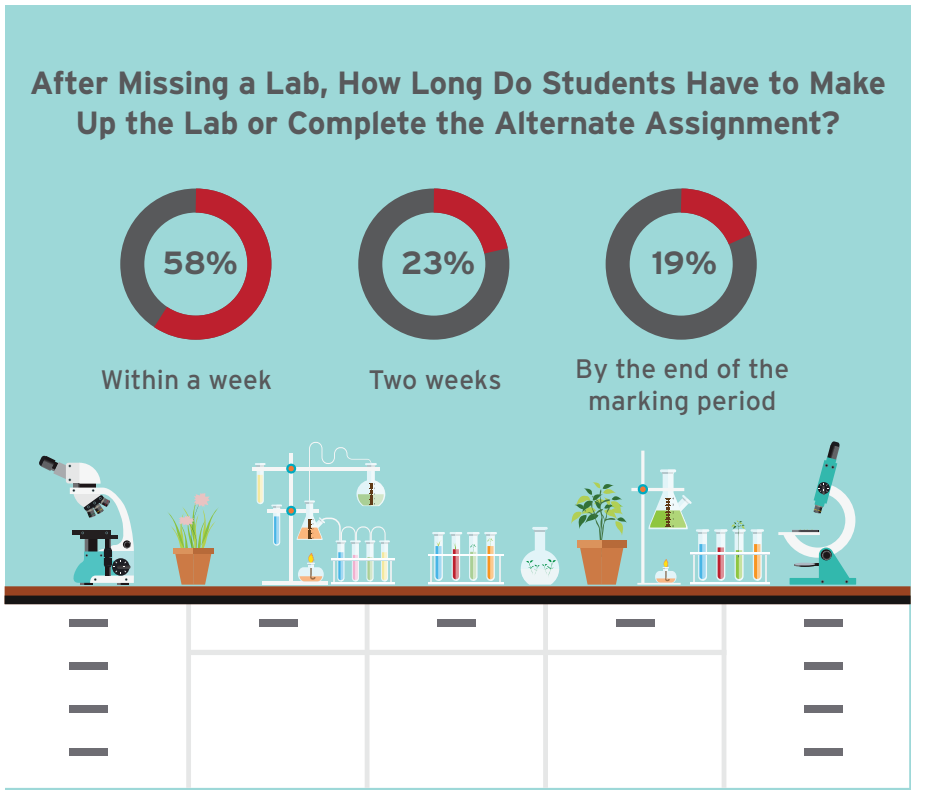
—Margaret Mead, U.S. anthropologist (1901–1978)

Educators Value Making Up Labs

When students miss a lab, educators employ multiple options to help them make up the work, according to a recent informal *NSTA Reports* poll. Participants say they provide an opportunity to make up the lab before or after school (59%) or during a free or study period (59%); provide data from the lab and have the student complete a lab report (58%); give an alternate assignment (38%); or allow students to do so during class time (19%). Twenty-two percent report offering other opportunities, such as making labs up during lunch periods, watching video recordings of the lab, and using shared data from lab partners.* Of educators who provide alternate assignments, 38% say they assigned worksheets; 27%, research papers; and 60% assigned other types of work, including alternate versions of the lab with supplied data and online simulations.*

Forty-five percent say students make up labs outside of class time 75% of the time or more often, but 37% report students complete the labs less than half the time. Half report that students will complete alternate assignments 75% or more of the time, and 22% that students do so less than half the time. More than half (58%) of respondents say labs or alternate assignments must be completed within a week, 23% allow two weeks, and 19% accepted them by the end of the marking period.

**Participants could choose multiple answers to these questions.*



Here's what science educators are saying about the importance of labs:

Given the hands-on, active learning nature of labs, they act as a foundation for our learning to take root in each unit. We do have one lab [for] which [it] is cost prohibitive to run a make up,…so we video the lab for the students who miss that one.—*Educator, Middle School, Massachusetts*

[Labs are] not very [important], because I can always excuse [students] from [them].—*Educator, High School, New Jersey*

It depends on the lab. Labs that reveal fundamental concepts are much more important.—*Educator, Elementary, Middle School, Oregon*

Very important for most labs. [For some] of the smaller ones (what I call "mini-labs"), [it's] okay to just give them data and let them process, but 80% or more of my labs must be made up by the students.—*Educator, High School, New Jersey*

It depends on the lab, and if that was the only way that the material was covered. If the lab was more of an illustration of something we went over in class, then I am less worried about it.—*Educator, Institution of Higher Learning, Minnesota*

We reference the labs and their results throughout the unit, and those who do not have that shared experience are often lost. Also, labs are part of the assessment questions.—*Educator, High School, Michigan*

It is very important for them to either make up the lab, or watch the lab video and complete the lab questions. Many of the questions on the test are application questions based on what was learned in the lab.—*Educator, Middle School, North Carolina*

If students fail to complete 1,200 minutes of satisfactory labs, they are barred from the [New York] Regents Exam and fail the class.—*Educator, Middle School, High School, New York*

I don't even know how they would make it up. I'm not setting up the whole thing again after it's been used for the lab, and often I buy materials that I would have to buy again. Usually I exclude them [from] it.—*Educator, Middle School, Florida*

Usually very important, since it gives a practical purpose or example of the concepts in action: [T]his is essential to science. It often also requires students to use critical-thinking skills that many labs rely on.—*Educator, Middle School, High School, Minnesota*

They may not take the New York State Regents Examination in the subject without having documented the successful completion of 1,200 minutes of hands-on laboratory time. If this is a non-Regents class, lab and experimentation adds to the experience of the class. Without gaining experience and learning from doing, they tend to do less well overall in the class.—*Educator, High School, New York*

Labs are *extremely* important for understanding, [higher-order thinking skills], and assessments. The problem is that you *cannot* make them come in outside of class time.—*Educator, Institution of Higher Learning, Iowa*

I feel it is very important for them to have the experience of actually doing the lab. Learning how to properly use glassware and learning techniques like decanting while I can watch them will benefit them later in their education when they take other science classes in college. I want them to see the gas produced, the substance changing color, a precipitate forming, [and so on].—*Educator, High School, Institution of Higher Learning, California*

It depends on the lab and its placement in the course. If it is a lab that they are designing and collecting the data for, then it is important for them to make this up. If it is a shorter one to introduce a topic or used as an application of what we have learned, I am less worried about them completing it, as we often do more than one or see the concept in different ways.—*Educator, High School, Maine*

It depends on the lab: [I]f we're using it as a "discovery" of something, then it is very important. If we are doing it to validate something we've already come up with but need more evidence to support, than I just give them the data.—*Educator, High School, Illinois*

It is important, but not always possible. I don't have the class time to set up and run a lab before or after school, because that's when I tutor struggling students. —*Educator, Middle School, Rhode Island*

If they miss the lab but are present for the discussion, it's not too big a deal.—*Educator, High School, Ohio*

As we do not have a practical exam, practicing the analysis skills of the write-up is generally more important than the in-class activity.—*Educator, High School, Florida*

If they miss one lab, it is not that vital, but if they miss multiple labs, then they either need to physically do them before or after school or not get credit for the lab part of the class.—*Educator, High School, Georgia* ●

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Teaching About Genetic Genealogy

Discussing commercial DNA databases (such as Ancestry or 23andMe, for example) in her genetics and evolution units "is not something I spend a lot of time on, but as we do [the units], students will ask about [the DNA databases]," says Lisa McAlpine, who teaches Biology I and Biology II/AP at Blythewood High School in Blythewood, South Carolina. "This year, it's come up two or three times in every class."

Some students have asked McAlpine if the DNA testing could be done as a class lab. "I tell them no because the curriculum doesn't cover it," she reports.

She also explains that commercial DNA tests "only [focus on] parts of [genetic] markers," so the test results are uncertain. "It's a hard concept for both students and adults to understand [because] they may not know about variability within DNA," she observes. In her AP Biology class, for example, she says she gave students "an article about sisters who [took the 23andMe test], and it came back that they were only 15% to 20% related…We had to discuss independent assortment and variability…It was a real eye-opener for students."

"Next year, I'll probably plan [to teach about commercial DNA databases] because [students are bringing up the topic] more frequently, but I won't devote a huge amount of time [to it]," McAlpine notes. "If we don't start talking about it and explaining [DNA] complexity and variability, [students] will assume it's an infallible kind of testing."

In addition, "I [want to discuss] the social consequences of the tests. You have to be prepared for surprises," McAlpine contends. Another challenge is that "reliable, accessible, usable information for teachers is hard to come by," she reports. "A teacher may or may not get reliable info easily on a simple Google search as a first means of access. Having access to reliable info is going to be key moving forward."

Sarah Faulkner, eighth-grade science teacher at East Granby Middle School in East Granby, Connecticut, was "given the 23andMe reports for one of my students and members of his family, and I have my students read, analyze, and jigsaw the results. The student is a carrier for cystic fibrosis, and the results help us see the passage of the trait and get into both the ethics of what to do and the future of genetics, such as CRISPR [specialized stretches of DNA]." Using the family's reports "shows students disorders like cystic fibrosis are real concerns, and you can use the information from the tests in a positive way," she contends, adding, "I don't want students to think the reports are a blueprint for their future; the test only shows probability. It shows a *likelihood,* not a promise."

Faulkner says she is "careful to e-mail parents about what will be covered" before teaching the unit, makes sure all her students understand what cystic fibrosis is, and spends four weeks giving them the necessary background in genetics to understand the reports. While her students learn a lot from genetics simulations she uses in class, Faulkner says, "Knowing that the student whose family provided the reports is a real person makes it a very real concern for my students."

Using the reports also "lets students analyze characteristics and do a pedigree chart," Faulkner relates. "It forces them to do the Punnett Square; they have to figure it out themselves" instead of relying on her to give them the answers, she points out. Eventually "some students [are able to] determine the father doesn't have the cystic fibrosis gene; it's a recessive trait, so it must have come from the mother," she explains.

She asks students to reflect on what the student carrying the cystic fibrosis gene should consider if he wants to have children. "There are ethical questions that students realize and know they have to be answered and they can be answered. It makes for authentic conversation," she maintains.

Janet Lee, Biology Honors and Biotechnology II teacher at Gilroy High School in Gilroy, California, says she teaches about genetic genealogy "using [some of] my own information [from 23andMe] as a template and as something to think about in terms of bioethics, nature vs. nurture, and SNPs [Single Nucleotide Polymorphisms, a shorter form of DNA] in biotechnology for personalized medicine and the potential for misuse." Using SNPs as a math tool, Lee says she explains to students that "one letter in SNPs can be inaccurate" and produce very different results.

"Most companies sequence the entire genome, but which SNPs they [focus on] influence results," Lee relates. "Different companies can choose different indicators. The more indicators [selected], the more accurate the results [can be]."

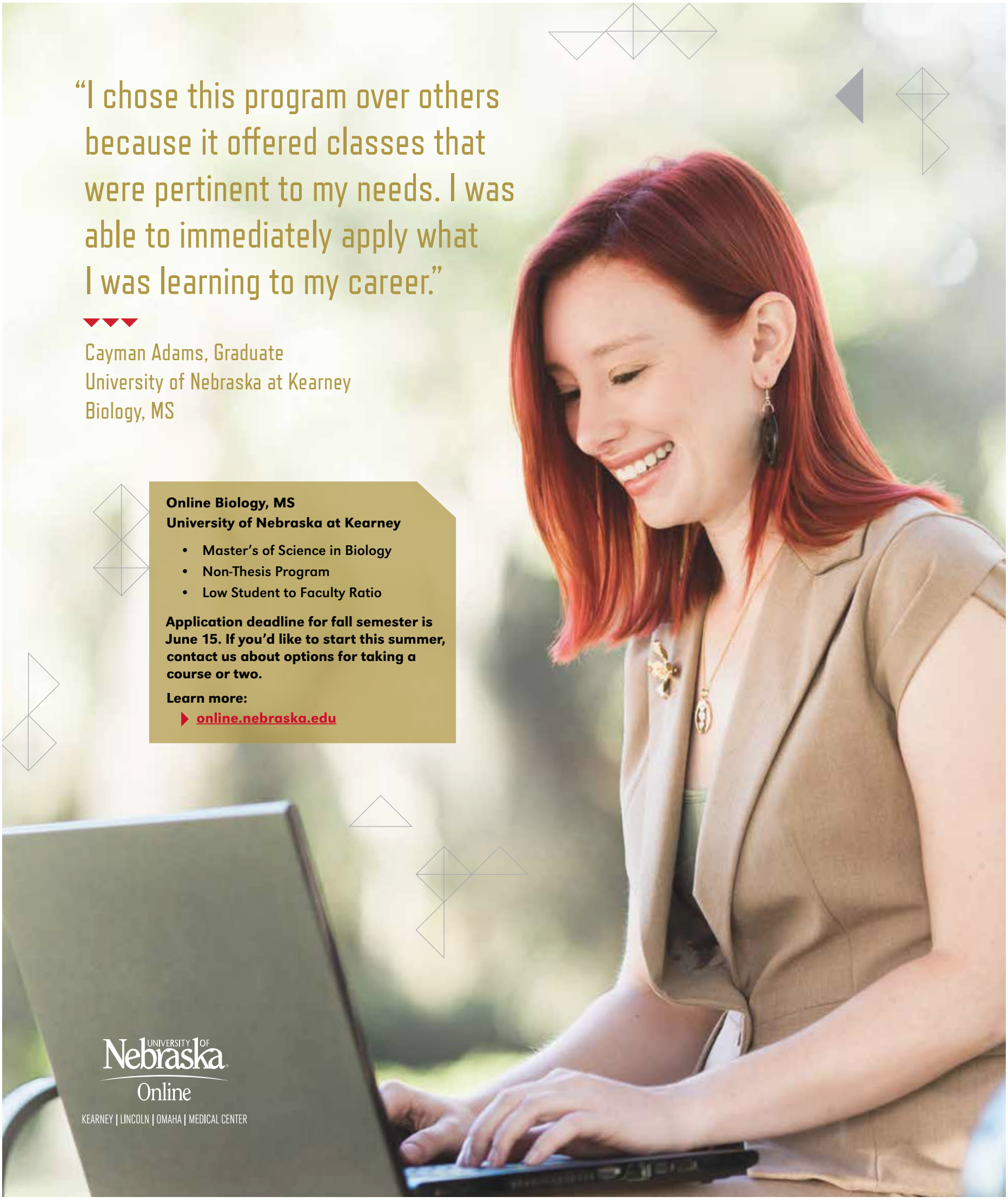
Genetic genealogy "is a good phenomenon: personal, relevant, and students can explain it," says Lee. Teaching about it provides opportunities for studying "cause and effect, analyzing and interpreting data, and engaging in argument from evidence."

DNA and Forensics

Patricia Nolan Bertino, who taught forensics and biology at Scotia-Glenville High School in Scotia, New York, before retirement, says that "teaching about forensic genealogy is a way to get lots of math and science to students…So many students think they can't do math and science, but when we give them problems in forensics to solve, they realize they can."

Using case studies about high-profile criminals and how DNA evidence led to their arrest can capture students' interest and serve as phenomena for three-dimensional learning, Bertino contends. "In addition to using CODIS [the Combined DNA Index System, an FBI database of DNA from convicted—and in some states, arrested—individuals], to identify criminals like the Golden State Killer, the police looked at public genealogy databases that use SNPs to see if they could find a partial match from close relatives," she says, noting that the Golden State Killer's relative used the public DNA database GEDmatch.

"It's important to have students debate [issues] of privacy," Bertino maintains. "Who owns the DNA? Is my DNA available to police? Do insurance companies get access to it?" DNA could possibly be used to discriminate and invade people's privacy, but on the plus side, "it can be used to solve cold cases and may save lives," she emphasizes. ●



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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

PULL-OUT SECTION

SCIENCE TEACHERS' GRAB BAG

Inside this Convenient Pull-Out Section you will find:

Freebies for Science Teachers

Resisting Scientific Misinformation. M H Developed by science educators in collaboration with PBS *NOVA* staff at WGBH-TV, this one-week science unit teaches students in grades 6–12 how to evaluate scientific information and distinguish facts from "fake" science. Through standards-supported (*Next Generation Science Standards* [*NGSS*] and *Common Core*) lessons, students identify misleading advertising; create a misleading advertisement based on science; learn appropriate questions to ask to determine a scientific claim's credibility; and learn about scientific processes, how scientists develop confidence in their conclusions, and the role of scientific and professional organizations in communicating research findings. Designed to be completed within a 45-minute period, lessons incorporate brief narrated videos and include student activities. Consult *https://bit.ly/2GXMfQy.*

Climate Kids. E M H This Canadian-based website's games, articles, and information empower students ages 8–15 to address climate change issues. Climate Kids introduces climate science and presents action steps for students to take in their homes, schools, and communities. Highlights include the Climate Science Brain Buster quiz; an interactive about renewable energy sources, My Energy Superhero; and an educational game, Plastics and Ocean, which explores plastics pollution's impact on marine animals. In addition, teachers can download a PDF of simple conservation measures to help protect the planet and reduce the impacts of climate change. Visit *https://climatekids.ca.*

HubbleSite. K12 Stay current on the Hubble Space Telescope and its discoveries with blogs, videos, images, and K–12 classroom materials on this website from the Space Telescope Science Institute. Most appropriate for middle and high school educators, the site has something for everyone interested in learning more about our universe. Identify constellations, planets, and other deep sky objects in Tonight's Sky, a monthly video guide highlighting images from HubbleSite; browse an gallery of photos taken from the telescope; or see what the telescope is focusing on right now. Refer to *https://bit.ly/2VwgYag.*


NASA

DNA Decoded. M H Explore genomics in everyday life with digital resources developed by Illumina Corporate Foundation and Discovery Education. Targeted for middle and high school levels, the curriculum program features ready-to-use digital lessons and activities that show students how genes interact with one another and the environment through genomics. The lessons, which support the *NGSS,* teach students how genomics is being used to fight diseases like sickle cell anemia and cancer, as well as to boost the health of the world's food supply. In addition, the lessons introduce students to potential careers. See *www.dnadecoded.org.*

The Phylo(mon) Project. K12 Explore biodiversity and related topics with an ecosystem trading card game based on the concept of Pokémon. Appropriate for K–12 students, the Phylo Trading Card Game highlights species that live on planet Earth while addressing threats to ecosystems such as wildfires, oil spills, and climate change. Students use the Phylo cards to build food chains, create stable ecosystems, sabotage opponents' ecosystems, and gain points. Printable card decks feature themes like pond biodiversity, microbes, and dinosaurs. Access card templates and rules at *https://phylogame.org.*

4-H Science Program Checklist. K12 The 4-H Science in Urban Communities website has a checklist to help K–12 teachers and informal educators evaluate the quality and effectiveness of after-school science, technology, engineering, and math (STEM) programs. Developed as part of a national initiative to enhance the quality and quantity of 4-H science programs, the checklist asks questions such as these: Does the program support national science learning standards? Does it provide opportunities to improve children's science abilities? Are learning experiences led by trained adults who believe youth are partners and resources in their own development? Do activities use inquiry to foster natural creativity and curiosity?

The website also presents information about practices that support students' science readiness and case study examples of successful programs. Consult *http://bit.ly/2VUgif8.*

***NGSS* Instructionally Embedded Assessments.** M The Stanford *NGSS* Assessment Project

See Freebies, pg G2

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

Freebies, from pg G1

(SNAP), a California-based initiative to support the implementation of the *NGSS* in California and other states, has created Instructionally Embedded Assessments (IEAs) addressing *NGSS* performance expectations (PEs) in Earth, life, and physical sciences at the middle level. The assessments, which are woven into the instructional sequence, are designed to assess the three dimensions of a core PE, as well as other dimensions, and in some cases, other PEs. Teachers who visit *https://stanford.io/2H6bTSV* can view a selection of SNAP-developed IEAs and their supporting materials, including student and teacher versions of each assessment, scoring rubrics, and sample student work. Assessments include Evolution of the Andes and Extreme Weather (Earth science), Got Tuna? (life science), and Sound Scrubber (physical science).

Online Evolution Course for High School Educators. H Check out the Howard Hughes Medical Institute's BioInteractive's professional learning course on evolution. The self-paced course at *https://bit.ly/2SL6sdv* features three units covering evolutionary mechanisms, sources of evidence supporting evolutionary theory, and patterns of evolution. The course provides classroom resources from BioInteractive for teaching about evolution. Educators also can download certificates documenting course completion at the end of each approximately five-hour unit segment.

NADER MOUSSA

Physics Resources @AP Central. H Help advanced high school students perform their best on exams in Advanced Placement (AP) Physics 1 and 2 courses with the resources on *https://bit.ly/2SDKLw8*. The College Board's AP Central web portal has resources including Course and Exam Descriptions, free-response questions from previous tests, and updates on changes in course curriculum and upcoming tests.

In addition, the site's curriculum modules (Rotational Motion, Electrostatics, Graphical Analysis, and others) and articles (e.g., "Critical Thinking Questions in Physics" and "Teaching Strategies for Limited Class Time") can help educators enhance their content instruction. Teachers can also join the online AP Teacher Community to share successes and challenges of teaching AP Physics.

Buck Institute's Project-Based Learning (PBL) Videos. K12 To help schools and districts visualize high-quality PBL in the classroom, the Buck Institute for Education (BIE) has videos at *http://bit.ly/2HsJK8c* showcasing PBL projects from K–12 schools nationwide, including several STEM-themed projects. The projects employ BIE's research-based Gold Standard PBL model, which emphasizes student learning goals and the incorporation of Essential Project Design Elements (a challenging problem, sustained inquiry, reflection, critique and revision, student voice and choice, and a public product). Teachers can view videos of successful PBL projects that feature teacher interviews and actual classroom footage and highlight projects from a range of grade levels, settings, and subject areas, including STEM.

LabWrite. H HE Advanced high school and college students can use this interactive online tool to create lab reports. Developed at North Carolina State University, with funding from the National Science Foundation, LabWrite offers content for students, lab instructors, and professors. Student users are guided through four stages of the lab experience: PreLab, InLab, PostLab, and LabCheck. Lab instructors can access a descriptive overview of the tool, a teaching guide for introducing LabWrite, tips and teaching strategies to apply during lab work, a program tutorial, and printable versions of the online guides to share as handouts or course packs. Professors' content includes an overview of the LabWrite components and the rationale for its creation. A link to a control-group study that demonstrates the tool's benefits is provided. See *https://labwrite.ncsu.edu*.

ThemeSpark.net. K12 K–12 educators can quickly build lessons from a rubric or standard using this website. Great lessons have four components: a clear learning objective, a way for students to access new material, a way for students to practice new ideas, and a way for students to apply new learning. ThemeStart's QuickStart Lesson Builder provides a structure and resources for teachers to create lesson components and a prompt to engage students. Teachers can share lesson components with colleagues or create them collaboratively. Visit the website *www.themespark.net*.

JOHN W. EARLY

NSI: Nature Science Investigator. E M This activity book can inspire elementary and middle level students (ages 8–14) to become outdoor scientists. Produced by the U.S. Department of Agriculture, and available in both English and Spanish, the downloadable booklet features Forest Service scientists from different fields (entomology, soil science, ornithology, atmospheric science, hydrology, plant ecology, and others) and simple outdoor activities for students to learn about the kinds of work done in each field. Download the book at *https://bit.ly/2TnP2Ji*.

Learning to Give. K12 Empower K–12 students as givers and community activists with the educational resources at *https://bit.ly/2SOSybv*. Watch an introductory video about philanthropy, then search for lessons, activities, and project ideas that connect science, language arts, and social studies content to a purpose that resonates with students. Resources cover many topics, and include short- and long-term experiences, from one-period, standalone lessons (e.g., Impact of Giving, all grades) to multi-week interdisciplinary curriculum units (e.g., Earth Connections, grades 3–5; Food for Thought Middle School Unit, grades 6–8; and Advocacy—Getting the Job Done, grades 9–12) and year-long programs (e.g., Water Quality and Community Action Toolkit, grades K–12). (*Note: Free registration is required to access the materials.*)

Antibiotic Resistance Education Resources. K12 Developed by the Michigan Antibiotic Resistance Reduction coalition, resources at the website *https://bit.ly/2GnctKZ* can help K–12 audiences better understand antibiotics and antibiotic resistance and how to use antibiotics appropriately. Antibiotics and You (elementary and middle levels) features PowerPoint presentations, an activity guide, coloring pages, and pre-and post-tests to teach about what the differences between bacteria and viruses are, how germs spread, what happens when you get sick, how antibiotics work, what antibiotic resistance is, and what measures to take to prevent infection and illness. Viruses and Bacteria, Antibiotic Development, and Antibiotic Resistance—for high school students—addresses these topics in more depth through two learning modules, PowerPoint presentations, and student and teacher materials.

Flipping Physics. H This site can help high school AP Physics teachers flip their classrooms. Resources range from content-based videos on both algebra-based and calculus-based physics topics to how-to videos on making "flipped" videos and teaching students how to learn from them. The video *Showing the Differences Between a Traditional and a Flipped Classroom* simultaneously shows two classes, filmed one year apart, teaching similar content in a traditional (lecture-based) style and in the flipped classroom. The differences were obvious: Students in the flipped classroom were more actively engaged and had more time for questions, and the teacher spent more time directly interacting with students in small-group settings. Visit *www.flippingphysics.com*. ●

News Bits

- **A new comic book series, Ella the Engineer, will expose girls to science, technology, engineering, and math (STEM) in a unique way.** E M H

Launched by consulting firm Deloitte and mentorship network The Ella Project, the series features Ella—a young, female role model—and aims to interest students in a character with whom they can identify. Ella will solve problems, use emerging technology, and collaborate to determine, for example, the whereabouts of a stolen class pet using analytics. Nishita Henry, Deloitte's chief innovation officer, says, "These adventures with Ella show that developing STEM skills is a gateway to a great career and empower girls to have a deeper understanding of solving problems in our day-to-day world."

The series will consist of four comic books and a graphic novel. It will also feature stories about real-life Deloitte female leaders. Learn more at the following websites:

- *https://prn.to/2T45JJF;*
- *https://bit.ly/2StHcbI;* and
- *https://bit.ly/2XBR5YG.*

- ***NASA Science Live,* a new monthly television/web series, takes a behind-the-scenes look at the universe with experts.** A

The first episode, "To the Moon and Beyond," explored how science conducted on the lunar surface in the past informs current missions studying the Moon, and future plans to send science, robots, and humans to Earth's nearest celestial neighbor. The second episode, "Going Interstellar," took viewers to the edge of our solar system where interstellar space begins—starting with the Voyager mission at the boundary and traveling to some of the closest and brightest stars. The episode discussed how we currently explore outside our solar system and plans for the future of interstellar space travel.

Viewers can submit questions on social media using the hashtag #ask NASA or by leaving a comment in the chat section on Facebook. Visit *www.nasa.gov/nasasciencelive.*

- **A shortage of certified professionals is forcing some school districts to use online programs, like Edgenuity, to replace teachers.** K12

The lowest-scoring school district in Mississippi, West Bolivar Consolidated, is in an isolated, low-income rural area. Superintendent Beverly Culley says she can't recruit properly certified teachers. She views Edgenuity as a better option for students than a long-term substitute who might lack content knowledge. But students say the lack of an in-person expert teacher who can answer questions, lead discussions, and spend extra time when they are struggling has negatively affected their education. Tom Arnett, a K–12 education researcher for nonprofit think tank Clayton Christensen Institute, which supports increased technology in education, contends the best option is combining technology with direction from a teacher knowledgeable in the content areas.

In Edgenuity courses, instruction consists of short videos of a teacher talking and working out problems on the screen, followed by practice problems and a unit test. The company says it offers comprehensive, in-person, and online professional development training for educators. But students and parents have complained that children who primarily receive instruction through Edgenuity have seen their grades decline. Read more at the website *https://bit.ly/2T5Is9g.* ●

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

In Your Pocket

Editor's Note

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

April 22–27

World Wildlife Fund's Wild Classroom/Scholastic Sweepstakes E

This program provides a social and emotional learning lesson plan and activity in which students in grades 3–5 explore how the needs of endangered species are similar to their own. Teachers who create a fundraising page with Panda Nation and raise $25 by Earth Day—April 22—will also be entered into a sweepstakes to win $500 worth of Scholastic library books. Register for the sweepstakes by **April 22** and download the lesson plan and activity at *http://bit.ly/2Vqig6L*.

Eileen Fisher Community Partnerships Grants K12

These $2,500 grants go to local nonprofits that focus on their communities' needs and work in the following areas: the environment, women and girls, or human rights. Organizations must be located within 25 miles of an Eileen Fisher office, showroom, or retail store. Submit applications online by **April 26** at *http://bit.ly/2GPv5UP*.

Siemens and Discovery Possibility Grant Sweepstakes K12

This $10,000 grant will help one Title I school "fab" its science, technology, engineering, and math (STEM) lab. Funds can be used to refurbish an existing lab or buy STEM-related equipment, supplies, and technology. K–12 teachers can enter their school in the contest, and parents, teachers, and community members can vote for it once a day until **April 27.**

Visit *http://bit.ly/2tGLTVB* to enter and vote for your school. STEM activities that accompany the contest are also available for elementary, middle, and high school levels.

April 30

Dominion Energy's Environmental Education and Stewardship Grants K12

These grants go to public and private K–12 schools and nonprofit organizations in areas Dominion Energy serves in Colorado, Connecticut, Georgia, Idaho, Maryland, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Virginia, West Virginia, and Wyoming. Schools with projects that educate students about environmental stewardship can request up to $5,000. Short-term environmental projects with measurable results that help protect and preserve natural habitats or improve open spaces and make nature more accessible can receive $25,000.

Apply by **April 30.** See the website *http://bit.ly/2T6wRrt*.

SeaWorld and Busch Gardens Conservation Fund Grants K12

Teachers, students, researchers, and others working at the grassroots level to preserve and protect the environment may apply for these grants. Funds go to conservation education, habitat protection, species research, and animal rescue and rehabilitation projects. Most grants range between $10,000 and $25,000.

Create a log-in to apply at the website *http://bit.ly/2C0pIhQ* by **April 30,** to receive funding for the last two quarters of 2019.

The Lawrence Foundation Grants K12 HE

Public schools, libraries, and nonprofit organizations that support the environment, human services, and other causes may apply for these grants. Both program and operating grants are available; the average amount ranges from $5,000 to $10,000. Apply by **April 30.** See *http://bit.ly/2XuD0w5*.

Voya Unsung Heroes Grants K12

Each year, Voya Financial provides $2,000 grants to 100 educators with innovative project ideas for their classrooms. Projects should be creative and positively influence students. At least one grant is awarded in each of the 50 states. The top three winners will receive additional prizes of $25,000 (first place), $10,000 (second place), and $5,000 (third place).

Full-time teachers, principals, paraprofessionals, and classified staff at accredited K–12 schools are eligible. Apply by **April 30** at the website *https://go.voya.com/2UcEsRw*.

CenterPoint Energy Safe and Smart Teachers Program K12

K–12 teachers in CenterPoint Service areas can enroll in this program to get free access to games, books, teaching aids, and other fun and interactive ways to teach students about natural gas conservation and safety. In addition, elementary teachers from CenterPoint Service areas who register will be entered into a drawing to win 1 of 10 $250 gift cards for their classrooms. Visit *http://bit.ly/2EkNlSv* to enter the contest by **April 30.**

Apply Year-Round

Patagonia Retail Grants Program K12 HE

These grants go to small, grassroots activist organizations aimed at preserving and protecting the environment in places near a Patagonia store. Projects should address root causes of environmental problems with an eye to long-term change. Those with direct-action agendas and measurable outcomes are particularly encouraged to apply.

Grant amounts range from $8,000 to $12,000. The program accepts applications on a rolling basis during its fiscal year (May 1 to April 30), though applicants should contact their local store for details, as deadlines may vary by location. Visit *http://bit.ly/2SvFA1g*.

Patagonia World Trout Grants Program K12

These grants go to groups working to restore and protect wild trout, salmon, and other fish species within their native range—including both indigenous freshwater and saltwater fish. Projects should provide innovative, long-term solutions and address root causes of the problem. Those with measurable outcomes are preferred.

Grants range from $5,000 to $15,000 and are awarded on a rolling basis during Patagonia's fiscal year (May 1 to April 30). See *http://bit.ly/2EARm6y*.

ARRL's Victor C. Clark Youth Incentive Program K12

This American Radio Relay League (ARRL) Foundation program provides mini-grants to groups that promote high school–age (or younger) students' participation in amateur radio. High school radio clubs, youth groups, and general-interest clubs with programs for young people are eligible. Grants of up to $1,000 may be used for equipment, training materials, and local service projects; preference is given to those with matched funding that is raised locally. Refer to the website *http://bit.ly/2QHRMev*.

The Meemic Foundation's PopIn2Win Grant K12

PopIn2Win is the foundation's monthly opportunity to quickly apply to be considered for a resource or tool that will enhance your school or classroom learning for your students. These grants are open to teachers in Michigan, Wisconsin, and Illinois. Applicants must be Foundation Club members (membership is free of charge).

To apply, log in to your Foundation Club account and nominate yourself or a local school or educator to enter the current month's PopIn2Win classroom enhancement opportunity. Winners will be announced on the fifth business day of each month. Visit *https://bit.ly/2RhEfdA*. ●

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

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

What's New

FROM U.S. GOVERNMENT SOURCES

U.S. Fish and Wildlife Service (FWS)

Native Fish in the Classroom A

Raising native fish in the classroom is a hands-on project adaptable for all ages that connects students to real-world water quality, fish, and wildlife issues, and inspires them to seek solutions. At *https://bit.ly/2UsD3qr,* educators can access *Native Fish in the Classroom Manual and Activities Guide to Fishes in New Mexico* to discover how to conduct similar projects with students at any location. Developed by FWS, and modeled after the Trout in the Classroom program, the guide provides background information and classroom activities on topics such as fish rearing, journaling, water testing, and fish anatomy, to teach students about native fish and their habitats, watershed health, and local aquatic ecosystems. Though the guide emphasizes New Mexico fish species and is correlated to New Mexico Curriculum Standards for grade five, teachers of any level in any location can use the content as a starting point to design projects.

U.S. Geological Survey (USGS)

Women in STEM Career Spotlight: Research Ecologist M H

Meet Toni Lynn Morelli, a research ecologist at the Department of the Interior Northeast Climate Adaptation Science Center. In this short video, Morelli discusses her work and how her childhood passion for animals led to a fulfilling science, technology, engineering, and math (STEM) career. Her research on the impacts of climate change on animals and plants in ecosystems in the Northeastern United States enables her to explore many natural areas in the United States and involves plenty of hands-on field work, whether it's tagging red squirrels in the New Hampshire forest or studying moose in the Appalachian Mountains. Share the video with middle and high school students to introduce new STEM careers. See *https://bit.ly/2UASXic.*

National Oceanic and Atmospheric Administration (NOAA)

NOAA Photo Libraries A

Did you know most of NOAA's photos and slides are in the public domain? NOAA asks only that credit be given to NOAA and the photographer and his/her affiliated organization. More than 40,000 images—housed in the NOAA Photo Library and on Flickr—reflect the expansive reach of NOAA programs and address topics from global climate change to geophysics. They also show NOAA staff at work worldwide, on ships or aircraft. Access both libraries at *https://bit.ly/2TyNMCt.*

Ocean Today Website A

At *https://oceantoday.noaa.gov,* teachers can access current and archived videos from NOAA's Ocean Today multimedia exhibit at the Smithsonian Institution's National Museum of Natural History and exhibit kiosks in other locations worldwide. Suitable for all ages, the short videos highlight all aspects of the ocean realm: exploration and discoveries, ocean health, marine life, and science. Teachers can search for videos by category, or access curated collections, including Animals of the Ice, Endangered Ocean, Trash Talk (Marine Debris), Tsunami Science and Safety, The Adventures of a Maritime Archaeologist, and Coral Comeback?

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

National Aeronautics and Space Administration (NASA)

Space to Ground Web Series A

NASA's web series Space to Ground has weekly video summaries of International Space Station (ISS) activities posted on YouTube every Friday (*http://bit.ly/2HuIKAm*). Each video episode ends by answering a viewer's ISS-related question. Past questions include these: How many rooms does the ISS have? How do astronauts stay clean in space? In addition, the videos often contain information for educators on episode-related learning tools.

Mars in a Minute A

This series of 60-second, animated videos for students of all ages teaches key concepts about Mars and missions to the Red Planet. Produced by NASA's Jet Propulsion Laboratory, the videos answer frequently asked questions about Mars: How do you choose a landing site for a Rover? Are there quakes on Mars? Is Mars really red?

Visit *https://go.nasa.gov/2Hko0va* to watch the videos and read transcripts.

National Park Service (NPS)

Geoscience Teaching Resources K12

Explore geology in national parks with these K–12 lessons developed at NPS sites nationwide. The interdisciplinary lessons address numerous topics and showcase the unique environments of national parks. Elementary lessons include Life on Sandy Shores, a guided beach exploration at Maryland's Assateague Island National Seashore; From Core to Crust, an Earth-layers modeling activity developed at Idaho's Craters of the Moon Monument and Preserve; and Roca, Roca, Roca, an introduction to rock types developed at the Colorado National Monument park in Colorado.

Middle level students can do activities like Rock Cycle, Plate Tectonics, and Devils Tower, developed at Wyoming's Devils Tower Park, or Explore the World of Crystals, Fossils, Rocks, and Caves, produced by educators at South Dakota's Wind Cave National Park. Mine Over Matter: Environmental Science, developed at Virginia's Prince William Forest Park, shows high school learners how freshwater resources are influenced by geologic processes and human activity. Visit *https://bit.ly/2VLLi10*.

U.S. Department of Agriculture (USDA)

Blast Off! Nutrition Education Game E M

Teach K–6 students about the importance of a healthy diet and daily exercise using Blast Off!, an online game from the USDA's MyPlate nutrition education program. The game challenges students to fuel a MyPlate spaceship with enough smart food choices and physical activity minutes to fly to Planet Power. Along the way, students read facts about the foods in various food groups and learn the requirements of a healthy diet. See *http://bit.ly/2Hi12p2*.

U.S. Department of Energy (DOE)

Fuel Cells and Hydrogen Infographics E M H

Created by scientists and educators at the DOE's Fuel Cell Technologies Office, these infographics—Fuel Cells and Hydrogen—explain how fuel cells work and describe the properties of the element hydrogen, a key factor in why fuel cells have several benefits over combustion-style technologies. Featuring brief text and simple illustrations, the posters are useful for giving students in grades 4–12 a basic understanding of how fuel cells work. Refer to *https://bit.ly/2EWJSed*. ●

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Summer Programs

Editor's Note

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

AGI/ExxonMobil Exploration K–8 Teacher Leadership Academy E M

This week-long academy aims to develop K–8 teachers into Earth science and science, technology, engineering, and math (STEM) education leaders and mentors. Attendees receive Earth science content, hands-on activities, educational resources, and real-world science experiences they can use with their students and colleagues at their schools.

The program will host 30 teachers in Houston during July 7–12. School administrators can nominate individual teachers, though teams of two to four from across grade levels or science subject-matter areas are encouraged. Grants reimburse participants' travel, lodging, and subsistence costs. Apply by **April 30;** visit *http://bit.ly/2NyK7ir.*

Green Eggs and Sand Aquatic Curriculum Workshop K12 HE

During the full and new moons in May and June each year, thousands of horseshoe crabs come ashore to spawn in the Delaware Bay area at the same time that migrating shorebirds descend and feed on their eggs before continuing on to their breeding grounds. The interaction between these birds and crabs—and the surrounding controversy about how to manage it—is the subject of this two-day workshop from the New Jersey Department of Environmental Protection.

The workshop will take place at the Wetlands Institute in Stone Harbor, New Jersey, during June 1–2. Participants receive a copy of the accompanying curriculum and other resources. New Jersey teachers can register for the separate Horseshoe Crabs in the Classroom program, which provides hatchlings for their classes in the fall.

The curriculum is for middle level through college teachers, but elementary teachers, environmental educators, and others may apply (deadline **May 7**). See *http://bit.ly/2IGZUwL.*

North Carolina State Forest to Classroom E M

This program aims to connect educators with forest resources in North Carolina and help them implement forestry education in the classroom. This year's program focuses on STEM and how teachers can combine it with environmental education. During July 22–25, participants will experience field days, mill tours, and classroom instruction at Haw River State Park in Browns Summit, North Carolina, to learn more about these topics.

Formal and informal educators of grades 1–8 may apply, though STEM teachers and formal educators have preference. Apply by **May 31.** Consult *http://bit.ly/2tI1bJG.*

MindSpark Learning's Exploring STEM Through Problem-Based Learning A

Participants in these institutes learn how to incorporate problem-based learning and STEM and partner with industry leaders in their communities to create authentic learning experiences for students. Workshops will be held in

- Houston, June 3–7;
- Denver, June 24–28;
- Missoula, July 22–26;
- North Denver, July 30–August 3; and
- Seattle, August 5–9.

Teachers, administrators, and educators at all levels may apply. Refer to *http://bit.ly/2GWhKKP.*

GEEO Teacher Travel Programs K12 HE

The Global Exploration for Educators Organization (GEEO) sponsors programs to help teachers study abroad at a reduced rate. Programs take place in China; India/Nepal; Ireland; Kyrgyzstan, Kazakhstan, Tajikistan, and Uzbekistan; Paris/Rome; Morocco; Jordan; Bolivia; Vietnam/Cambodia; Greece; Iceland; Borneo; Ethiopia; Camino de Santiago; Egypt; Central Europe; Peru; Mongolia; Bangkok/Hanoi; Galapagos; Balkans; Baltics; Maldives; Chile/Argentina; and Oman.

GEEO programs are open to K–12 teachers and university faculty, school administrators, and retired educators. Participants can earn graduate and professional development credit. Apply by **June 1.** See *www.geeo.org.*

BioBuilder's Synthetic Biology Workshops A

These workshops help biology teachers incorporate engineering in their classrooms, labs, or science clubs. Co-taught by a practicing synthetic biologist and a high school teacher, the workshops feature classroom, lab, and design activities. Participants receive ready-to-teach lesson plans, handouts, and the BioBuilder textbook. Workshops will take place at

- West Palm Beach, Florida, June 11–13;
- Chapel Hill, North Carolina, July 10–12;
- San Diego, California, August 5–7; and
- Cambridge, Massachusetts, August 6–8.

Scholarships are available. Though workshops are intended for high school teachers, all educators (including STEM educators) may apply. Visit *http://bit.ly/2EBcA4r.*

NOAA Teachers on the Estuary Workshops M H

The National Oceanic and Atmospheric Association (NOAA) sponsors research- and field-based training programs that take teachers to estuaries nationwide to improve their understanding of the environment. Workshops offer at least 15 contact hours and enable teachers to explore coastal habitats, conduct field investigations, interact with local scientists, and learn how to integrate estuary and watershed topics in the classroom.

Workshops will take place in Alaska, California, Ohio, Virginia, and Washington in June and July. Consult *http://bit.ly/2Thxlu5.*

ASM Materials Camps M H HE

Sponsored by ASM, the professional society for materials scientists and engineers, this week-long, hands-on lab experience shows teachers how to use applied engineering techniques in their classrooms and make core science and math principles more engaging and accessible for students. Participants work with metals, ceramics, polymers, and composites to learn how to use them with students. The camps are geared toward middle and high school science teachers, though preservice science, art, math, and community college teachers may apply.

Teachers can complete the program as residential participants or commuters at college campuses nationwide in June, July, and August. The camps are free for attendees, and continuing education and graduate credits are available. Apply online at *http://bit.ly/2EhIuBu.*

Knowles Academy Courses H

These courses are designed and facilitated by experienced teachers and include one semester or year of mentoring to help participants implement what they learn. Participants also gain access to a national network of teachers who share resources and support one another. This summer's courses are Engaging Math and Science Students in Engineering Design; Using Effective Group Work to Maximize Learning for All Students; Implementing Teacher Coaching to Improve Classroom Practice and Student Learning; Designing Instructional Tasks to Increase Student Engagement and Learning in Science; Physics for the Next Generation: The Patterns Approach; and Designing Instructional Tasks to Increase Student Engagement and Learning in Math.

Financial assistance is available. Visit *http://bit.ly/2H8HxyE* to learn more. ●

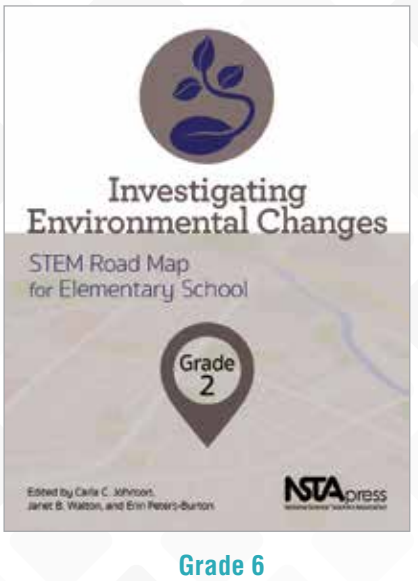
75th ANNIVERSARY

Between now and **May 31, 2019**, get free shipping when you order $75 or more of NSTA Press and NSTA Kids books. Use promo code **BOOK19** when you checkout in the online Science Store.*

*Offer valid only on orders for NSTA Press and NSTA Kids books or e-books purchased in the online NSTA Science Store and shipped to U.S. addresses. May not be combined with any other offer.

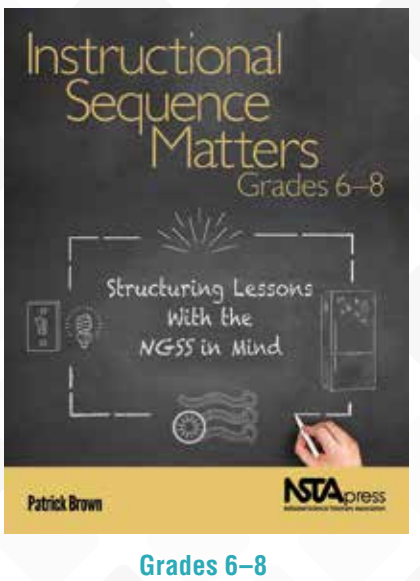
I like the idea that many of your books are practical and user friendly for teachers. I love finding something useful that will help engage my students.

—Ann G.



Grade 6

Book: Member Price: $23.96 | Nonmember Price: $29.95
E-book: Member Price: $17.97 | Nonmember Price: $22.46
Book/E-book Set: Member Price: $28.75 | Nonmember Price: $35.94



Grades 6–8

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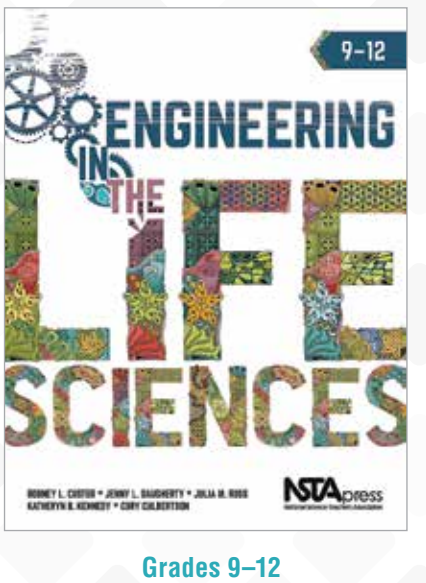

Grades 9–12

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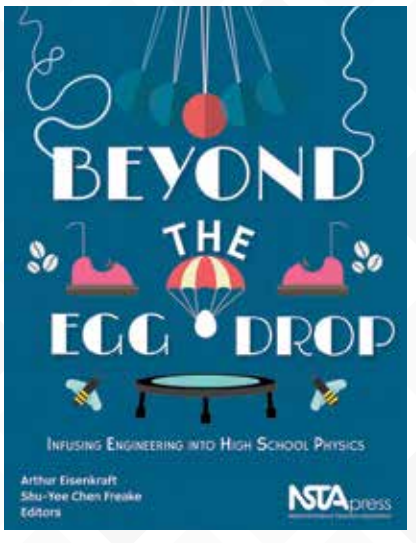

Grades 9–12

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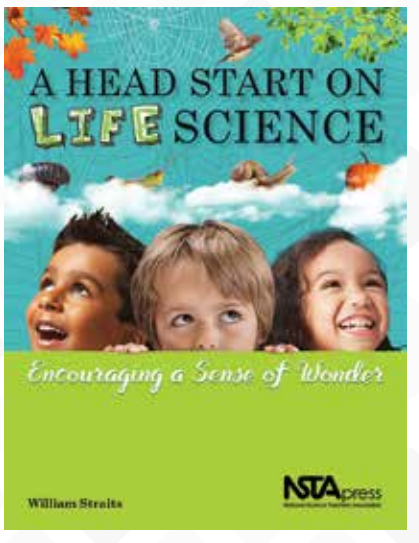

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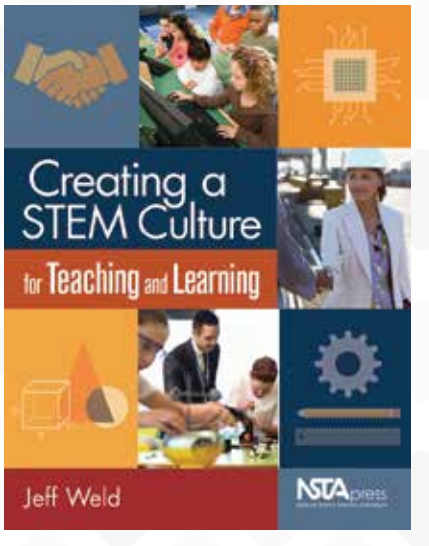

Grades K–12

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NSTA National Science Teachers Association

ASK A MENTOR, **Advice Column**

Finding Ways to Engage All Students

How do I motivate students who don't want to do anything at all?

—B., Utah

If you ever solve this, you'll be up for a Nobel Prize!

There is no surefire method that will motivate every student. So use several methods. You can engage students' interest in the content you are teaching by having them suggest their own ideas to investigate. For instance, a student who is interested in basketball could wonder how a ball's pressure affects how high it bounces, which would be conducive to an experiment.

Flexibility in how some assignments are completed allows students to demonstrate their strengths and their knowledge. A rapper or musician could summarize a lesson in a music video. An artist might want to create a graphic novel. Look up multiple intelligences and universal design for learning for more ideas.

Bring in some speakers who can act as role models, particularly school alumni, if possible. Ask your speakers to discuss their challenges and how they got to where they are now. Likely education would have been the key to their success. This may have more impact than you might expect.

Good luck, and please let me know if you ever find the right answer!

I am sick of using cookbook labs in my chemistry class and want my students to conduct more inquiry labs. However, my principal thinks that this might be a recipe for disaster. What do other chemistry teachers do to incorporate more inquiry into their chemistry labs?

—R., Kansas

I spent several years using cookbook labs and being frustrated that students had no clue what they were supposed to be learning, did not understand their data, and were constantly worried about whether they got the "right" answers!

One of the simplest ways to convert a cookbook lab into an introduction to inquiry is to cut off your pre-lab handout after the materials section! The students will have an introduction, a purpose, and a list of materials they can use, but they have to figure out the rest. How they will perform the experiment, what they will measure, what variables to control and manipulate, how they will record and present the data is all up to them (with your approval)! With the scaffold at the beginning and a list of materials, less "mayhem" occurs, but the students are thinking, analyzing, predicting, and doing all that neat nature-of-science stuff. They will need to make sense of their data and determine the best way to communicate their results.

Later on, you can have the students investigate questions they, themselves, have about a phenomenon or topic you're teaching by creating their own labs from scratch. Now you're at a full-blown inquiry.

What is the best way to introduce science, technology, engineering,

and mathematics (STEM) through literacy lessons in kindergarten?

—Y., New Mexico

To young children, education is a single entity: They don't make distinctions among disciplines until adults get involved! I think teachers of young children can easily capitalize on their innate curiosity and willingness to experiment to incorporate science, technology, engineering, mathematics, or any combination of them into almost any other activity.

A wonderful way to integrate the subjects is through solving engineering problems. Many excellent children's books include all manner of scientific phenomena and topics. Check out NSTA's Learning Center for dozens of ideas for kindergarten. NSTA's Picture-Perfect series provides amazing resources to use with some popular children's books.

For example, after reading a story about birds, a simple activity like "Let's build a bird's nest" can inspire young students to think hard as they experiment with materials to keep eggs safe. Use the engineering design process to get students to analyze their creations and propose improvements. Reporting on what they have tried, their conclusions about different materials, and a description of the design they ended up with will be excellent ways to teach communication, physical properties, measurement, gathering data, research, drawing, and more. They can compare their crafted items with real bird nests and propose why they are the same or different. Along this journey, they communicate with their team members, learn new vocabulary, and work on fine-motor skills.

What are some interesting ways to introduce some of the major players in scientific discoveries so that my students can have a better grasp at who these people were and that they can aspire to be just as innovative and crucial to the world of science?

—T., Ohio

I would often hold a series of student presentations called Who's Who in [insert subject here]. These consisted of one 10-minute presentation per week, typically on "Wacky Wednesday." Students were encouraged to be as creative as possible and use all their varied talents. These presentations were often the highlight of the week. I graded their one-page, written biographies, which they also shared with the class.

We watched many impersonations. Other students ran game shows, created music videos, performed raps, demonstrated experiments, conducted mock interviews, and more. One student set up a dinner table and gave a monologue on "My Dinner With Tesla."

You can join in the theatrics. I would act out scenes such as "Gregor Mendel—Party Animal" in which I demonstrated the dedication needed to control the pollination of thousands of pea plants; introduced Newton's laws of motion in an English accent and curly wig; and re-enacted the apocryphal cannonball experiments of Galileo. Some were cautionary tales like "Watson and Crick—Brilliant Jerks," which alluded to their treatment of Rosalind Franklin, and "Don't Jump the Gun! The Fleischmann and Pons Cold Fusion Experiment."

You can have a lot of fun with this. The out-of-the-ordinary things you do in class are much more memorable than the mundane.

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.

BLICK ON FLICKS

Taking a Closer Look at *Science Fair*

Spring is the usual season for science fairs, so I thought I'd check out 2018's documentary film from National Geographic, *Science Fair.* After a quick introduction from Jack Andraka, the 2012 Intel International Science and Engineering Fair (ISEF) winner, the film jumps into the 2017 science fair season. We see young people from the United States, Germany, and Brazil who all aspire to qualify for the 2017 ISEF finals event in Los Angeles. Within the United States, we see students from Kentucky, South Dakota, West Virginia, and New York, which is a nice cross-section of the country.

I never competed in a science fair as a student, though I did participate in other academic competitions like math tournaments and Academic Decathlon. I've advised students for Science Bowl and judged Science Olympiad and science fairs in the past, so I have a good sense of how the various systems work. I have to admit that I have never been a big fan of science fairs for reasons I'll outline later, and *Science Fair* did little to assuage my concerns. That said, if you enjoy seeing smart kids being recognized for doing some amazing work, the film is worth a look.

For What Purpose?

I have seen and heard a few arguments for why science fairs are important:

1. They help to identify the best and brightest science students at an early age, so they can be supported to do even better things in the future;
2. They get kids inspired to learn about real science and do science on their own; and
3. They bring attention to science education and inspire the public to care about improving science teaching.

If those arguments are valid, then these are worthwhile reasons to devote time, effort, and money to science fairs.

Supporting the first argument for science fairs, the film introduces us to a few past science fair participants who cite the event as being important in their development as professional scientists. While that is certainly the case for those individuals, research into awards and motivation has shown that early recognition can actually make for less productive academic careers in the future. I learned about this from a recent episode of the podcast Hidden Brain (*https://n.pr/2EwFBy8*). Research on recipients of the Fields Medal in mathematics shows that recipients are less productive (as measured by publications) than their colleagues who were runners-up for the award.

At best, then, I think science fair succeeds at finding strong students who have the resources to do difficult and expensive projects on their own. I don't think science fairs are good at finding high-potential students from underrepresented groups in science,

though, since doing an award-winning project requires a lot of financial and family support.

Do science fairs motivate kids to do science on their own? I'm sure they do, at least for students who already have some interest in the topic and family support to do the work. I think *Science Fair* would be great to share with relatively strong and motivated students to excite them about the possibilities of ISEF.

However, I don't think it would be motivating for students who are merely curious about science and engineering. The students in the film are academic superstars, not average kids. (Though it's worth noting that Kashfia, who placed third during the previous year, is unknown at her school in South Dakota. When she ranks even higher in 2017, the school still fails to recognize her achievement.)

When I judged local science fairs, I found very few students had done more than follow a recipe they found online. The most polished-looking projects were kits that parents had purchased for kids to build, not original creations. All the projects we see in the movie are new, student-driven, creative contributions to science and engineering, but that is my point: Two very different populations of science fair participants exist.

And how about the third argument, that ISEF brings attention to science and engineering education? This is where I think the movie makes its strongest case for big events like ISEF.

The main event for those 1,700 students is aptly described as their Olympic Games. The film states that 7 million students participate in ISEF-affiliated fairs each year, and 1,700 are selected from those fairs to attend the ISEF finals event. Very talented teens from all over the world spend a week in a major U.S. city with other kids like them. Major news outlets devote time to announcing the winners, some of whom go on to meet major world leaders. Students who make it to the finals compete for a share in approximately $4 million in scholarships and awards. This is great, but it is a stark contrast with the roughly $3 billion in athletic scholarships that go to 150,000 student athletes at U.S. colleges. Anything that brings more attention to supporting the science, technology, engineering, and math (STEM) education of strong students is worth doing.

Big Picture

I think the best takeaway message from this film is the success of the team from Jericho, New York. One teacher, Serena McCalla, puts in countless hours mentoring her students and guiding their preparation. With her support, several students make it to ISEF, and a significant fraction of those win awards. McCalla's very high expectations for her students and her understanding of how to prepare them bring success. In contrast, the young man from West Virginia who throws his presentation together at the last minute, and has never practiced it, goes home without a prize. The benefits of preparation and mentorship are made clear.

In the end, I have mixed feelings about this film, just as I have mixed feelings about science fairs in general. This film could inspire strong students with the resources to pursue innovative research on their own, but may intimidate average students. If this *Science Fair* motivates people to consider STEM events as worthy of the levels of support that athletic events now receive, that is a good thing. ●

Jacob Clark Blickenstaff is an independent science education consultant in Seattle, Washington. Read more Blick at http://goo.gl/6CeBzq, *or e-mail him at* jclarkblickenstaff@outlook.com.

Educators Share Why They Teach

NSTA's second #Science60 asked science educators to share the reasons why they teach. The 60-day initiative collected responses from educators around the United States, sharing the stories of notes from students, support from colleagues, and student growth in the classroom that brought them into the field and motivates them to continue. Read more #Science60 What's Your Why? stories and share your own at *https://bit.ly/2tVSIms.*

I teach introductory undergraduate science courses online. I do my best to make sure my students know they're not out there alone and that I'm available to support their work in the course. Just like the traditional classroom, it sometimes feels like I'm bending over backwards for no reason. But then a gem in an end-of-course evaluation reminds me why I'm doing it. In my general chemistry course, a student emphasized how clear it is that I love my subject as much as I love teaching and people. The student actually recognized—and communicated—that they recognized that I actually want students to learn and succeed. They ended their comment by disclosing something they hadn't told me during the course—that they had taken a break from their degree and considered walking away from the degree altogether after a string of disappointing course experiences, but that my efforts demonstrated that the degree is worth completing.
—Emily Faulconer, professor, Florida

One of my former preservice candidates, now a cooperating teacher whom I continue to collaborate with, just nominated me for a NSTA service award. She shared with me a letter about how I have impacted her as a student, a teacher, a continuous learner, and colleague. We have been able to co-present together at NSTA [conferences]...She has inspired me to continue to challenge my preservice candidates and share NSTA with them. I became a member of NSTA in the late 90's, and it changed my teaching and research. As I continue to teach, now at the university level, I find at least one or two candidates who continue to deepen their science education knowledge and skills, and make NSTA a lifelong part of their professional experience. This is an amazing community. Additionally, we collaborate across garden-/project-based learning. Exposing candidates as preservice teachers and then continuing these outdoor projects with them as teachers in their schools, I have been truly inspired and remain connected to alumni. This is my why. This is why I love what I do.
—Michelle Fleming, professor, Ohio

I showed my students an episode of *Girl Meets World*. The episode discussed how once girls hit middle school, they lose confidence in [science, technology, engineering, and mathematics]. At the end, we had a discussion about why this happens, and I stressed over and over that girls are just as good at math and science as the boys. We discussed why I had certain activities [in which] girls could only work with girls and boys could only work with boys to stop the boys from taking over and the girls letting them...One of my students sent me a thank-you card. It said, "Science may not be my favorite subject, but I will *never* let a boy do it for me."
—Christine Hopkins, middle school teacher, Virginia

As a preservice teacher, you seem to be constantly asking yourself, "Why did I decide to teach?" One day, during my level-two field experience, I had one of the students come up to me and tell me that I would be a great teacher. I asked him why, being honestly curious as to why he thought so and to see what I needed to continue doing. He told me, "You listen to us and know how to teach us." I told him thank you and proceeded on with the rest of the day. When I got home that night, I started thinking about what he told me again. By listening to my students' interests and making connections with them, I found that I was building relationships. My mentor teacher had told me previously that it was hard to build relationships with her students that year, since their schedule was so tight; however, I found a way to talk to each student and get to know them personal[ly]. [This] was a teacher-win in my book!
—Stephanie Kohls, preservice teacher, Iowa

One of my favorite student-impact stories is when I had a sixth-grade student who was reading at a second-grade level work [her] way all the way up [to] the sixth-grade reading level. Every single day, we sat at the computer completing iReady lessons. There were many times the student wanted to give up, but decided to push through out of the desire to make her family proud. This student's primary language is not English, and [she] is therefore an English Language Learner. The student immensely struggled with reading, and the fact that the student progressed so much in just a matter of a year made me so immensely proud. At the end of the year, [she] came to me to tell me that [she] couldn't have done it without my help. It is because of this student that I get up every morning and make an effort to make a difference.
—Sami Smolzer, middle school teacher, Illinois ●

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
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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

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75th NSTA ANNIVERSARY

NSTA PRESS: *Staging Family Science Nights*

Inviting the Community

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 Staging Family Science Nights, *by Donna Governor and Denise Webb, edited for publication here. To download the full text of this chapter, go to* https://bit.ly/2Cci83B. *NSTA Press publications are available online through the NSTA Science Store at* www.nsta.org/store.

Integrating other stakeholders into the Family Science Night event at your school can help build a culture of science that spans disciplines and departments and is the key to building a sustainable program. The more stakeholders are involved, the more support you receive and the greater the attendance. Inviting participation from nearby schools and the community means you can offer more activities for your attendees. There are multiple ways that your school and community can be involved. You might want to invite clubs and other organizations. You can also pull from community resources for guest speakers, for donations, or to sponsor activities. Regardless of how you broaden your event, the more involvement you have, the more successful it will be. In this chapter, we will present you with some ideas for reaching out and including school and community resources, describe how to share your program with the community, and discuss one of the most useful reasons to cast a wider net: getting donations to support your program.

School Resources

There are many groups and organizations at your school that might want to take on a role at your event. Teachers in the arts can integrate their content areas into science, while clubs and other organizations can also broaden the experience. Your art teacher can display student work in an art gallery, as ours did. A drama teacher might want to have students perform skits that tell the story of a famous scientist or discovery. The music teacher can include a recital in a common area. Technology teachers can demonstrate educational or theme-based interactive websites. Student-created multimedia presentations can enhance the atmosphere in common areas. Be sure to ask teachers to participate early, especially if you are using a themed event, so that they can prepare and help suggest ways they can add to your event.

The Family Science Night event is a great time to collaborate with your media specialist by holding a book fair during your event. He or she will appreciate your attendees spending time browsing the latest paperbacks during an activity break. You might even be able to persuade your media specialist to highlight a special section of science or science-fiction books. Suggest that your health or physical education teacher hold a health screening. In addition, career education teachers can facilitate student demonstrations of everything

from culinary science to dramatic performances.

Most schools have after-school STEM clubs, such as science and math competition teams, and other clubs. Invite these groups to hold a demonstration, display recruitment materials, or host an activity. Sometimes a specific class, department, or grade level will be involved in academic competitions, such as a science fair or math bowl. Let these groups take a place in the spotlight. Set aside a common area, such as a part of the cafeteria or the entrance hallway, for these groups to put up display boards that show off their accomplishments and achievements.

Former students returning to help run events has been one of the biggest surprises of our experience, and we've found that some keep coming back to help for years. Assigning them roles such as making announcements, monitoring halls, and assisting with ticket sales and surveys helps free up current students for providing more activities. In addition to inviting STEM-related clubs and organizations from the middle and high schools that your school feeds into, you might also consider asking those schools to send your former students to provide an orientation station for rising students and share information that next year's students will need to know. Encourage these schools and programs to provide information for your students about the opportunities that they will have for clubs and organizations in their new middle or high school. Former students who have moved up are perfect for this role!

Community Resources

Each community has its own flavor and a unique variety of science-related opportunities. Larger cities may have zoos, aquariums, science centers, museums, or performing arts centers that can bring a novel element to your program. Even smaller cities often have nature preserves or environmental centers. State parks located near smaller communities can offer unique resources. Businesses, especially STEM-oriented ones, may be able to enhance your program in multiple ways.

For astronomy themes or events without a theme, just showing the stars that are visible and how to find them in the night sky is sufficient. However, you might need to get creative to tie this into other themed events. An Ocean Adventure program can focus on celestial navigation. This session also works for a biome theme, as celestial navigation has historically been important to traveling across the desert, as well as the seas. For the discovery-themed event, the focus was on astronomical discoveries.

There are dozens of other ways to include community-sponsored activities in your Family Science Night event. Having a "career fair" as part of your program is a great way to include the community. You might set up tables in the cafeteria for people in STEM fields to meet and greet your students or hold a brief demo or activity. Electricians could show students how to create simple circuits, and doctors could set up a microscope with slides of different cells. If you are holding your event during the day, perhaps on a Saturday morning, you might consider including a "vehicle day" component. Invite local public service organizations to bring a fire truck, a police cruiser, an animal rescue vehicle, recycling trucks, and other vehicles to display.

Every community has local business and service organizations that can offer ways to enrich your event. Parks and recreation departments offer special programs or activities. Wildlife rescue could provide a birds-of-prey demonstration, and environmental organizations might offer other opportunities such as water-quality testing. Businesses such as tech companies, medical labs, and landscapers can be contacted to see how they might participate in your event. The sheriff's office might be willing to set up a crime scene. One way to successfully involve these organizations is to reach out to the parents of your students and your school's partners in education. Let them know that you want them to participate in the fun! And of course, fostering a good relationship with the community helps as you consider how to fund your program. ●

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

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

NSTA National Science Teachers Association

(All dates are deadlines unless otherwise specified.)

April 16—Do you teach preservice teachers? Don't miss NSTA's **free web seminar, Increasing Preservice Teachers' Ability to Become Lifelong Learners!** The authors of "Increasing Science Teacher Candidates' Ability to Become Lifelong Learners Through a Professional Online Learning Community," published in *Innovations in Science Teacher Education,* will share their strategies to create online professional communities with their students by using the NSTA Learning Center. The session will run from 6:30 to 8 p.m. Eastern Time (ET). For more information on NSTA Web Seminars or to register, visit *http://bit.ly/2RGhr8N.*

April 23—Delve into the current status of the Kilauea eruption during **NSTA Science Update: Kilauea Summit and Lower East Rift Volcanic Eruptions, a free NSTA Web Seminar.** The session will run from 7 to 8 p.m. ET. 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. For more information on NSTA Web Seminars or to register, visit *http://bit.ly/2RGhr8N.*

May 1—Do your students "tinker" in science? Is it different from hands-on engineering? *Science and Children* (*S&C*), NSTA's elementary-level journal, will explore these and related topics in the February 2020 issue. Share **your manuscript on "Tinkering vs. Engineering" with elementary students** by today for consideration. General-interest manuscripts may be submitted at any time. Read the call for papers at *http://bit.ly/2StzkHq.*

May 4—Discover new ways to challenge and engage your English Learner students in science, technology, engineering, and mathematics (STEM) during the **English Learners in STEM Subjects: Contemporary Approaches to Classroom Instruction virtual conference.** Presenters include Cory Buxton, professor and program chair of STEM Education at Oregon State University; Christine Cunningham, educational researcher, vice president at the Museum of Science, Boston, and founding director of Engineering is Elementary; Okhee Lee, professor in the Steinhardt School of Culture, Education, and Human Development at New York University and leader for the *Next Generation Science Standards* (*NGSS*) Diversity and Equity Team; Renae Pullen, science specialist for Caddo Parish public schools in Shreveport, Louisiana; and Amy Stephens, a program officer for the Board on Science Education of the National Academies of Sciences, Engineering, and Medicine.

The virtual conference will be held at 10 a.m.–2 p.m. ET. Registration costs $63 for NSTA members; participation certificates may be purchased for $9.95. Save $10 if you register by April 19. For more information or to register, visit *https://bit.ly/2XFsYs2.*

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

May 28—Don't miss today's earlybird 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 Picture-Perfect book series, will guide participants as they explore using picture books in elementary STEM education. 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. both days. Earlybird registration costs $449 for the basic workshop; with the train-the-trainer component and materials, the earlybird 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. Earlybird registration costs $449 for the basic workshop; with the train-the-trainer component and materials, the earlybird price is $999. For more information or to register, visit *https://bit.ly/2zOlVTx.* ●

Celebrating 75 Years at NSTA

1952 NSTA launches the *Elementary School Science Bulletin,* predecessor of *Science and Children.*

2016 The inaugural issue of *Connected Science Learning*¸ NSTA's first electronic journal, is released.

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Layering Nickel Could Be Key to Stable Saltwater Electrolysis

Researchers around the world are working to identify new ways to generate renewable energy, in no small part to reduce environmental impacts. Hydrogen fuel holds much promise, but usually requires the use of freshwater to maximize equipment life. Stanford researchers have found a way to generate hydrogen from salt water while reducing corrosion.

Electrolysis splits water into hydrogen and oxygen by passing an electric current between a negatively charged cathode and a positively charged anode. Negatively charged chloride (found in seawater) can quickly damage the anode. The team created an anode with layers of nickel sulfide, nickel–iron hydroxide, and a porous nickel foam. The team was able to "achieve a current density of 400 mA/cm^2 under 2.1 V in real seawater or salt-accumulated seawater at room temperature" with "unmatched durability" using the layered anode. The layered anode "showed a structural integrity similar to that before electrolysis" after 1,000 hours of seawater electrolysis.

Read the article, "Solar-Driven, Highly Sustained Splitting of Seawater Into Hydrogen and Oxygen Fuels" in the *Proceedings of the National Academy of Sciences* at *https://bit.ly/2TiVVGW.* ●