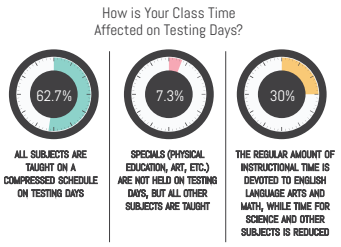

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Teaching About Science in the News

"To be a good science teacher, it's important to keep on top of the latest news and innovations in science," says Dean Goodwin, grades 9–12 biology and environmental science teacher at The Tatnall School in Wilmington, Delaware. "If any of this can be related to topics we have just covered, or are about to cover, or is just an amazing piece of science news, I share [it] with my classes…My aim is to ensure that students understand that science is not at all static, but we are continually learning and expanding our knowledge in science…It also helps to separate some of the misinformation about science that seems to abound in some areas of the media...The students question, and critically think, about what is presented."

Goodwin says he aims to "[get] students energized to differentiate between science fact and science fiction" by comparing "what pops up on Facebook" to legitimate science news sources like the National Science Foundation. Sometimes he has students design and conduct their own experiments based on ones they've read about in the news—such as the 2013 experiment by ninth graders in Denmark to test the effect of cellphone radiation on a plant—and compare their data with the data they read about. "I want to get students to think and behave like scientists," he explains. "I want them to have the courage to [test a seemingly] crazy idea. This is what scientists do."

Goodwin has designed—and will teach next year—two trimester elective courses that incorporate current events. In Science Today, students will research science news from journals, websites, television, radio, and social media and analyze the authenticity of the news sources. They'll discuss the science behind the news and learn how to differentiate between real science and junk science.


KATHRYN KENNEDY

Tenth graders in Kathryn Kennedy's science class at Prairie Seeds Academy in Brooklyn Park, Minnesota, discuss current events related to a Bioethics unit.

Students taking The Science of Climate Change will use websites to keep abreast of the latest effects of climate change on the planet and produce materials that will be disseminated through the school's 350DE at Tatnall climate education group, which is also the Delaware chapter of 350.org, an international environmental organization that publicizes the increasing levels of carbon dioxide to encourage world leaders to address climate change. Tatnall students worked with Goodwin to found 350DE at Tatnall. "This is a very passionate group of students who want to correct bad information about science," he observes.

When she taught high school science, Kathryn Kennedy says she "constantly saw the need to include current events in my lessons, to give students the big picture in science." This was especially important in her Bioethics unit, which touched on issues like "should stem cell research be conducted, whether individuals should be able to refuse medical assistance due to religious conflict, [and] whether or not paralympians should be able to compete in the Olympics." Students "practiced creating logical responses using evidence…to support their argument on an issue," she adds. The unit helped them "determine what they valued," that "others have different opinions, and why," and that "they can have an opinion based on

Science News, pg 2

Science News, From pg 1

their values, but they need to look at scientific evidence to justify [it]."

Kennedy, now senior laboratory supervisor for the General Chemistry labs at the College of the Holy Cross in Worcester, Massachusetts, is creating The Periodical Table (TPT; refer to *https://goo.gl/6stfPa*), a website for middle and high school teachers with lessons that incorporate current events, reading resources, and eventually, science-themed books. TPT's lessons include Climate Change as a National Security Issue, in which students read the transcript of a National Public Radio interview of Retired Brigadier General Gerald Galloway about how climate change will affect the military in protecting Americans at home and abroad. Students then analyze the enacted 2016 budget and requested 2017 budget for the Department of the Defense. "It is powerful to tell students to keep up with current events so they can vote responsibly and be informed citizens," she maintains.

To prepare her students to discuss controversial news topics, Kathleen Chesmel, ninth-grade physics teacher at New Egypt High School in New Egypt, New Jersey, has them conduct peer reviews of their projects. "We work on drafting comments that help improve the work being reviewed and avoid focusing on personal attacks or statements [unsubstantiated by] evidence…Once they have become comfortable with peer review (both giving and receiving), it is easier to allow open discussions of [these topics]," she explains.

Sensitive topics arise "as part of my science news class opener," says Diana Allen, seventh-grade life/environmental science teacher at Sanford Junior High School in Sanford, Maine. From "a list of well-known science news websites" she has vetted, she invites students "to find a sci/tech–based article that is of interest to them…Then they [briefly summarize it] and what about it [that] interested them." During discussions, she highlights "careers being touched upon in the article" to get students to begin exploring career options, she notes.

Science news engages students "in some of the *Next Generation Science Standards* (*NGSS*) practices," says Allen. "I'm doing more media literacy" since the *NGSS* were developed, she adds. The "three-dimensional learning [of the *NGSS*] brings about more independent student thinking."

"Current events are incorporated in specific units" in grades K–6 science, says Ana Appel, associate director of Lower School Science at Ascend Public Charter Schools in Brooklyn, New York. In a fifth-grade unit, for example, "we will be framing one performance expectation (PE) around current events in global warming and climate change." Students will do "a case study on Rachel Carson and the creation of the EPA [Environmental Protection Agency] and compar[e] it to the recent hearings of [EPA Administrator Scott] Pruitt before the Senate subcommittee. Students have already learned about global warming and will be able to relate this to the idea of Earth's resources and the environment."

Next, students will "read about communities that are currently intervening to protect the resources and environment from recent news sources…and learn to differentiate about community impact on a local, regional, national, and international level (the clarification statement for the PE)," Appel explains.

"I find it is important to connect science to policy" using current events, Appel contends. "I recently held a professional development with my teachers on how to teach policy and science while remaining unbiased. I used a video clip and had teachers analyze how the politicians discussed science using opinion versus fact and how this plays out in the classroom. We then discussed how to best teach our scholars to develop their own opinions about difficult concepts that impact laws, especially when we have our own opinions." ●

COMMENTARY: **Deena Pierott**

Educational Blindspots: Implicit Bias

By Deena Pierott

Deena Pierott

As the parent of African American sons, I learned the power and pernicious impact of implicit bias early on. These biases can impact not only learning skills, but also students' psychological health. When I asked my colleague, James L. Mason, PhD, chief diversity officer at Providence Health and Services, Oregon Region, for his thoughts on educational bias, he commented, "Bias has many forms; it is often separated into unconscious and conscious dimensions. The conscious bias is often apparent or visible, and people are willful in their discriminatory or biased behavior. Unconscious bias is often not intentional, yet has the same discriminatory impact.

"Examples of unconscious bias exist in health care, criminal justice, media, business, and other disciplines. In education, it may impact whom we choose to inspire or direct, what careers and opportunities we foresee based on race, ethnicity, gender, sexuality, or even outward appearance. Unwittingly, educators might steer male, mainstream, native-born, and English speakers toward specialty careers without any intent [of] doing so. Engaging in anti-bias education for teachers is a great way to ensure we are preparing today's youth for tomorrow's future."

In an educational environment, implicit racial bias can influence a teacher's expectations for academic success. Research found statistically significant evidence that teachers hold lower expectations—either implicitly or explicitly, or both—for African American and Latino children compared to European American children. Some teachers hold students of color to much lower academic expectations than those of their peers and are less likely to select them for gifted and talented programs. The slights that our youth see almost daily can include teachers being less responsive to inquiries from students of color and awarding lower grades on their work than those of white students submitting identical work.

Acknowledging cultural differences as assets to build upon would result in a classroom environment that supports greater success for more students. For example, if a black male student does not have a father living at home, he may be the oldest male in the family, a role that may mean that he has responsibility for and respect from his siblings, attributes that make him highly suitable for leadership in the classroom. His willingness to speak up, and his tendency to challenge what does not feel right to him, does not come from disrespect for his teachers, but from a heightened sense of accountability and a thorough understanding of consequences for errors in judgement. (Kikanza Nuri-Robins 2016)

These leadership traits may be viewed as disruptive in the classroom even as early as preschool, particularly if implicit bias goes unaddressed. A recent Yale study of preschool classrooms concluded that implicit bias led preschool teachers to track black students more closely, especially black boys, from whom they expected more challenging behaviors.

Are You Biased?

A great primer on the universality of this well-established psychological phenomenon is Harvard University's Project Implicit. Researchers have found ways to measure implicit bias by gauging one's ability to make associations between a personal characteristic (race, gender, sexuality, etc.) and an evaluation (e.g. positive or negative adjectives) or stereotype. An implicit bias reveals itself, for example, when people are faster to categorize a white face with a positive adjective or vice versa. Take the test; you might be amazed at what you discover about yourself at *https://implicit.harvard.edu/implicit*.

You also can consider implicit bias at your school. Ask yourself:

1. Do you agree or disagree that implicit bias occurs at your school? Why?
2. How does bias show up in your school?
3. How do the impacts of bias show up in your classroom?
4. How can you practice unbiased behaviors?

Several strategies can counter implicit bias, including

- **Stereotype replacement:** recognizing when one is responding to a situation or person in a stereotypical fashion, and actively substituting the biased response with an unbiased one.
- **Counter-stereotypic imagining:** identifying one's stereotypical responses and visualizing examples of people who are famous or known personally who prove the stereotype to be inaccurate.
- **Individuating:** gathering specific information about a person, so that person's particulars replace generic notions based on group membership.
- **Perspective taking:** adopting the perspective of a member of a stigmatized group. This strategy can be useful in assessing the emotional impact on individuals who are often being stereotyped in negative ways.

Everyone wants to feel valued and that they belong. For students to feel valued and have successful learning experiences, it's crucial for educators and school administrators to continue to work on removing biases, first by learning about their own biases and how to counteract them. Educators can share what they've learned about implicit bias with other teachers and create learning circles for their colleagues around biases awareness, implications, and counteractions.

My younger son, now attending college with plans to become a teacher, has listened to me talk about bias and students over the years. Now he's looking to become part of the solution. ●

Deena Pierott is a parent and grandmother and the founder of iUrban Teen, a STEM+Arts Educational program with an intentional reach to male youth of color. Learn more at www.iurbanteen.org.

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University Makerspaces Open Doors to K–12 Schools

The University of Wyoming's WyoMakers is one of several makerspaces around the United States that are hosted by university colleges of education and invite K–12 teachers and students to use their facilities for science, technology, engineering, and math (STEM) and design projects. With funding from her two-year Mary Ellbogen Garland Early Career Fellowship, Tonia Dousay, assistant professor of instructional technology, launched WyoMakers to provide equipment, tools, and software to teachers seeking to give students more opportunities for hands-on learning. Though the university's education majors have priority in using WyoMakers, "I wanted the space to be open to the community and to be accessible like the Maker movement [is]," she maintains.

"Our first priority is to introduce teachers to making. Our second priority is providing a facility for schools that don't have a makerspace," Dousay asserts. "We don't charge fees yet, but we will eventually."

An adult must be present when K–12 students are using the space, and only the university's work study students, who have had safety training, can operate the 3D printer. Former College of Education students often lead activities with K–12 students. "They present a safety talk, teach the lesson, then write a reflection about the experience. They can post it on their public website so that principals interested in hiring them can read it. It's a credential for them," she notes.

WyoMakers helps teachers calculate the costs of equipment, find open-source lesson plans, and integrate equipment in their curriculum. "I introduce teachers to my Maker network so I can connect them with those who have the expertise to help them as well," Dousay relates.

"We're part of the Make Schools Alliance," she points out. The alliance's website, MakeSchools.org, is a resource for sharing best practices in Maker education.

A Mobile Makerspace

The MAKE (Making Awesome Knowledge-building Experiences) Lab at the Texas State University-San Marcos College of Education is mobile to give the area's classroom teachers "a lower-cost entry point. They're more likely to get administrators to purchase smaller equipment," says Shaunna Smith, assistant professor of educational technology. All of the lab's equipment "is small and mobile, on small rolling carts," she explains. "We want people to see there are options for easy access to hardware."

Though some area schools "are starting to invest in one 3D printer or a laptop or iPad cart to leverage 3D modeling or other software, and a few districts are investing in their own makerspace, generally not all teachers feel they have access to a makerspace and equipment," Smith contends. "They can use free design software, but the hardware pieces can make or break the success of the experience."

Smith teaches her "graduate-level, inservice teachers earning master's degrees" about "how makerspaces look in the classroom and after school," and how to integrate technology to facilitate making and multidisciplinary learning, she relates. "They can take the equipment home with them to play with it because there's only so much time in class to get comfortable with machines…The goal is to help them see the potential for their content area."

Though the university has a collaborative, on-site makerspace, Smith points out that "in terms of education and K–12 integration, formal or informal, using smaller equipment shows that creative things can be made while learning different concepts along the way. [Students] can learn while doing something unrelated to classroom teaching and learning."

As part of a service-learning experience, her students hold free workshops at libraries and other sites, along with a professional development event for teachers. "We've done this for four years now, and I've seen children growing up from elementary- to middle school–age. When [MAKE Lab] returns to their area, they can try something else that they didn't get to do before," Smith points out.

Getting Started

Indiana University, Bloomington's (IUB) School of Education opened The Make, Innovate, and Learn Lab (The MILL) in 2015. "This was an opportunity to have our own teaching and research space for our students and faculty,…and keep our preservice teachers abreast of trends," says IUB Associate Professor of Science Education Adam Maltese, The MILL's director. "Our main focus is on our own students and student teachers, but we have an eye toward what we can do for educators in the community."

ADAM MALTESE

Local elementary teachers build and wire e-birdhouses at Indiana University, Bloomington's The MILL.

During The MILL's first year, "the dean's office invested in mini-grants to encourage faculty to partner with teachers," says Krista Glazewski, associate professor of Instructional Systems Technology. "We worked with teachers to do something meaningful and authentic in the classroom, to take advantage of the classroom technology and [The MILL's] resources."

Glazewski worked with two middle school teachers on a year-long, cross-disciplinary project dealing with food and sustainability issues. As part of that project, the teachers brought their students to The MILL to design and build tabletop aquaponics systems. "It's been a true partnership in every way. The resources from the IU MILL helped support the aquaponics project. In addition, we collected video of the teachers' maker practices, which we in turn showcase for our preservice teachers," she notes.

The MILL has received requests from area teachers for tours and workshops, but Maltese says, "We're not set up to offer a lot of those activities yet… We're looking forward to determining how we can help the broader community." This summer, he adds, "we're going to work on [addressing] safety issues, creating training modules, and establishing procedures."

Budgetary concerns, such as the costs of maintaining equipment, also need to be addressed, Maltese notes. "We started The MILL with internal funding. Now we need to find out if IUB will continue to support it," as well as "how we can be more sustainable."

He adds, "We're not charging fees now, unless someone wants to produce a quantity of items that will deplete our stock. Then we ask them to buy materials." Larger jobs will be "passed on to other facilities with sufficient equipment…Our facility will be for tinkering and testing, not for doing large jobs," he emphasizes. ●

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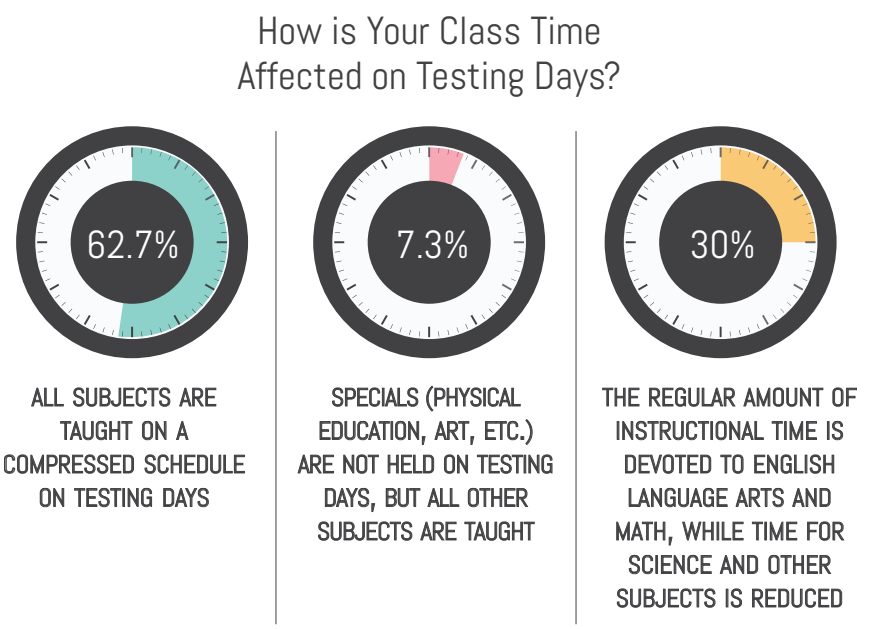
State Testing Days' Impact on the Science Classroom

In a recent informal *NSTA Reports* poll about how state-mandated testing affects the science classroom, 74% of participants said testing impacts more than four class days. More than 60% reported all subjects are taught on a compressed schedule during testing days; 30% reported English language arts and math receive regular instruction time, while time for science and other subjects is reduced; and 7.3% said specials such as physical education and art are not held, but all other subjects are taught on testing days.

During state testing, 29% said they will continue with the curricula, including introducing new material; 18.5% review recent material; 13% plan "fun" activities such as trivia games; 11.4% show educational videos related to the subject; and 1.3% have students explore a new technology or introduce a new tech device. Twenty-seven percent report taking different approaches, including having students work on research projects or class portfolios; assigning science, technology, engineering, and mathematics (STEM) projects; teaching "mini-lessons" with extension activities; allowing students to "play" with manipulatives and blocks; or just "treading water." About 51% report planning lessons with more opportunities than usual for physical movement on testing days.

Here's what educators are saying about incorporating more physical movement during testing:



I conduct labs [because] it allows students to experience science instead of sitting and writing.—*Educator, High School, Louisiana*

Students are generally more active following testing. I can fight them or join them.—*Educator, High School, Louisiana*

If it is not planned, the kids will do it anyway!—*Educator, Elementary, Ohio*

We integrate a brain break into every day because brain research suggests it is good for learning.—*Educator, Middle School, Iowa*

I try to add more, even though we move a lot simply to give the kids and me a brain break and let them release some anxiety and stress.—*Educator, High School, Georgia*

Students learn better when moving. Also, if they are the ones being tested, it is good to get their "wiggles" out.—*Educator, High School, Virginia*

[I do p]roject-based learning as well as investigations and challenges that require them to move and talk.—*Educator, Elementary, New Jersey*

Keeping Students Engaged During Mandated Testing

Using centers, review games, technology.—*Educator, Middle School, New York*

Anything that involves students discussing material with other students; think/pair/share is a good go-to strategy.—*Educator, Middle School, Pennsylvania*

Plan lessons that take students outdoors and involve small-group rotations.—*Educator, Elementary, California*

Often tell jokes that require some of the skills intertwined.—*Educator, Elementary, Florida*

Give them art projects to work on after test.—*Educator, Elementary, California*

Plan so that naturally engaging topics fall during testing weeks.—*Educator, High School, Massachusetts*

Conduct the science lesson outside if possible; plan engineering component, kinesthetic activity.—*Educator, Elementary, Washington*

Running engineering challenges or giv[ing] them [m]akerspace time.—*Educator, Middle School, New Hampshire*

Labs that might get cut due to cramming in material before the testing window hits.—*Educator, High School, Georgia* ●

Quotable

Optimism is essential to achievement, and it is also the foundation of courage and true progress.

—Nicholas Murray Butler, U.S. educator, philosopher, and diplomat (1862–1947)

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PULL-OUT SECTION

SCIENCE TEACHERS' GRAB BAG

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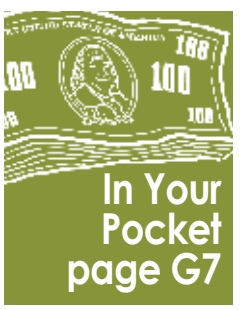
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Freebies for Science Teachers

KnowAtom.com Webinars. K12 Two webinars from KnowAtom.com offer guidance for K–12 administrators and educators seeking to meet the demands of the *Next Generation Science Standards* (*NGSS*). In New Science Standards Challenge Grit and Rigor (*https://goo.gl/R0JK9D*), participants re-examine rigor through the lens of the *NGSS,* discover what it means to be "gritty," and learn how to develop these traits in a science team or classroom. In Designing Science Class for a Growth Mindset (*https://goo.gl/yEQOP9*), participants use a new definition of rigor to help students become more invested in their own learning. (Free registration is required to view the webinars.)

The Laser Classroom Resource Exchange. K12 Teachers can share K–12 lessons, demonstrations, tips, and tricks for teaching about light, lasers, and optics on this community platform. Visit *http://goo.gl/eb7ssP* to join the community and browse a collection of downloadable activities or upload optics-related activities of your own creation. The activities address topics relating to the properties of light (e.g., color, reflection, refraction, and shadows), as well as how lasers and fiber optics work. Each activity features targeted grade levels, step-by-step instructions, and embedded instructor tips. Titles include Classroom Cave (grades 1–5), Color With M&Ms (grades 3–8), and Invisibility for Muggles (grades 9–12). The platform also allows teachers to set up classes, assign activities, and track student progress.


PORT OF SAN DIEGO FROM SAN DIEGO, CA

BioEd Online's Resource Collections. K12 These K–12 teaching resources from the Baylor College of Medicine cover a wide range of science topics from the brain to bird flu and butterflies in space. Each collection has teachers guides, individual lessons, digital slides, video presentations, and other related content, including current research news and reading comprehension materials and activities, to provide a detailed look at each topic. Highlights from Neuroscience: The Learning Brain and BrainLink include *The Senses* teachers guide and the *Making Sense!* storybook (grades K–1), which explores the connections between the brain and senses. The *Train Your Brain* teachers guide (grades 3–5) presents activities investigating how we learn and remember things. Other guides in the collection address *Brain Comparisons, Memory and Learning, Motor System,* and *Sensory System* (grades 3–8) and *Brain Chemistry* (grades 6–12); these guides include take-home student magazines and mystery narratives that bring each topic to life. Find this collection and others at *https://goo.gl/k4VlfF.*

Greenhills Renewable Energy Dashboard. M H Middle and high school educators can access data, documentation, and related resources describing the development of the Greenhills Renewable Energy Dashboard (GRED) at Greenhills School in Ann Arbor, Michigan, at *https://goo.gl/V1lb6t*. The GRED initiative involved the installation of a rooftop wind turbine, a solar array, a green roof, and a rooftop weather station at the school. The setup performs continuous collection, display, and archiving of data from the apparatus, enabling students to work with real-world data to compare and contrast the performance of a wind turbine and solar array subject to the identical environmental conditions and to observe the impact of changing environmental conditions (as captured by the weather station) over periods of minutes, days, and months. The website features information and videos to support educators and administrators interested in duplicating the basic GRED capability (i.e., renewable energy assets, data acquisition hardware, real-time display, and on-premises data archive) at their schools.

Green Schools Catalyst Quarterly. K12 This publication, focused on making healthy, sustainable K–12 institutions the rule and not the exception, can be downloaded from *https://goo.gl/75y6Ce.* Produced by the Green Schools National Network (GSNN), the first issue presents a summary of the current state of the green schools movement while highlighting the history and successes of various efforts among private, charter, and public schools and school districts to "go green." The publication includes articles, columns, and book reviews that promote

See Freebies, pg G2

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

Freebies, From pg G1

the idea of "greening" the nation's schools as a way to save money, improve student health and achievement, and protect the environment.

JogNog. E M H This game-based quiz program offers assessments for students in grades 2–12 in a variety of core subjects, including science, math, language arts, and history. Teachers can use the website's pre-existing quizzes or create their own. The science quizzes employ the key vocabulary and concepts in the *NGSS,* providing useful practice for students preparing for standardized science assessments. The quizzes' game-based nature makes reviewing the material fun for students. Consult *https://goo.gl/46aMhw.*

Science Learning Center at Western Illinois University. M H Access this online resource portal for middle and high school students and educators at *https://goo.gl/fQMtoU.* The site features science resources organized by topic, such as Nature of Science, Science Safety Techniques, Biology, Chemistry, Earth and Space Science, Physics, General Resources for Science, Study Strategies, and Professional Development. Within each topic, users will find Resources (e.g., links to websites and other materials) and Learning Pages, which contain questions, subpages, and short activities that explore each topic more deeply. In addition, the document How to Use this Site provides useful navigation tips.

GOLDOM

Enviro Science for High School. H Two environmental science units from the Nature Conservancy's Nature Works Everywhere program help high school students (grades 9–12) gain a global perspective on conservation. Both units include a teachers guide, lesson plans, student handouts, links, and videos and can be found at *https://goo.gl/tbIf0u.* In Recording the Rainforest, students discover how science and acoustic technology can be used to protect the land, plants, and animals in one of the world's most biodiverse regions: Indonesian Borneo. Students learn about the topic through an interactive story map and a video highlighting The Nature Conservancy's research there. They also analyze real data to examine how sound can be used to assess landscape health and prescribe land management techniques that support biodiversity.

Nature's First Defenders addresses various perspectives and issues involved in conservation, including how we relate to nature, how culture influences our viewpoints, and how we can address and reconcile differences. Students explore the issues through a video describing how indigenous people are reviving traditional stewardship in Canada; a Socratic seminar; and classroom discussions around human relationships with nature, environmental justice, indigenous rights, and environmental policy.

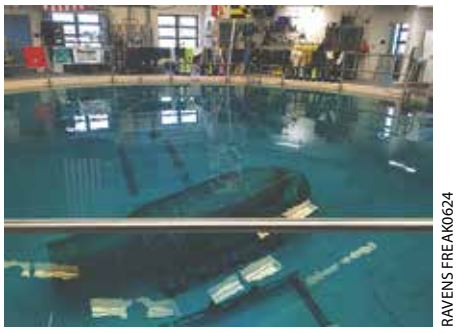
Safety Guidelines for Chemical Demonstrations. K12 These guidelines from the American Chemical Society's Division of Chemical Education are based on current best practices and provide a checklist of key issues for K–12 educators and others to assure that chemical demonstrations are conducted safely and without incident. The document covers safety measures required before and during a chemical demonstration as well as measures required when conducting demonstrations in outreach or public settings. Download the guidelines at *https://goo.gl/uCE3iD.*

Above the Noise. M H A YouTube video series produced by San Francisco's public broadcasting station KQED empowers teens (ages 13–18) with the facts behind real-world issues affecting their lives. Each four- to five-minute episode uses animation, music, news, and archival footage to analyze multiple perspectives, grab viewers' attention, and make complex subject matter relevant to teens' everyday experience. Recent episodes have examined how to identify misleading science reporting; whether social media platforms like Snapchat influence mood; and whether energy drinks should be banned for kids and teens. Learn more and watch the premiere episode on spotting bad science reporting at *https://goo.gl/YdMMl3.*

Early Childhood STEM: Nature-Based Learning. P E Nature provides an endless source of dynamic materials with an infinite variety of applications encouraging exploration, problem-solving, and discovery. The Natural Start Alliance's training webinar, Early Childhood STEM (Science, Technology, Engineering, Math): Using Nature to Drive Learning, delivered by educators at Fiddleheads Forest School, can help teachers capitalize on nature's bounty in their preschool and early childhood classrooms. The hour-long webinar examines STEM learning in the context of early childhood development and models hands-on experiences using nature to inspire children's sense of wonder and build science understandings. Consult *https://goo.gl/1D2j4x.*

From Seed to Seed: Plant Science for K–8 Educators. E M This online course from the National Gardening Association is for teachers seeking to learn more about plants and incorporate gardening (indoors and outdoors) into their science curriculum. The content is divided into two parts. From Seed to Seed explores important processes in a plant's life cycle and the structures (plant parts) that are essential in these processes. Exploring Plant Topics focuses on more complex topics, including plant diversity, plant relationships, plants and people, invasive plants, and genetics and genetic engineering. In addition to botanical information for teachers, the course includes numerous activities and experiments for the classroom. Learn more and access the course at *https://goo.gl/gPbFeo.*

STEM Activities for Middle School Students: Special Focus on Girls. M Written by faculty at Illinois Valley Community College, this publication



RAVENS FREAK0624

contains numerous hands-on activities to spark interest and build confidence in STEM skills. The activities can be used with both boys and girls and feature titles such as Buoyancy and Surface Tension, Edible Car Contest for Kids, Candy Math, and Soda Geysers. In addition, the publication includes pre- and post-assessments that allow students to reflect on STEM perceptions before and after the experiences. Refer to *https://goo.gl/ChQner.*

Phenomena for *NGSS.* K12 Phenomena are observable events in nature (or in our lives) that connect to multiple *NGSS* disciplinary core ideas, such as Finnish Snow Trees or the behavior of bees. When teachers use phenomena as part of science instruction at any level, students work toward explaining the science concepts behind the phenomenon. For the experience to be "academically productive," the questions students raise should be directly connected with the core ideas teachers want the students to engage with using the science and engineering practices. In this way, the phenomenon is driving the unit, and students are "figuring out" rather than "learning about" it. At *https://goo.gl/bTx3cw,* teachers will find a collection of interesting phenomena to incorporate into instruction, as well as guidance on how best to do so.

Who, Me? A Scientist? E Targeted for students in grades 3–5, this STEM lesson from *Teaching Tolerance* helps students see themselves as scientists. In the activity, students watch a short video and a demonstration of a discrepant event. The follow-up classroom discussion helps students understand that curiosity, perseverance, and the ability to solve problems are qualities they possess. Access the activity at *https://goo.gl/ROL0KU.* ●

News Bits

- **A report on women in science, technology, engineering, and math (STEM) programs at two-year colleges finds that their intent to transfer to a STEM program at a four-year university may be linked to both their self-efficacy beliefs in science and math and their transfer-oriented interactions.** HE

The study—led by Xueli Wang, an associate professor at the University of Wisconsin–Madison's School of Education—followed nearly 700 women in STEM programs at two-year colleges in the Midwest and found that students' ethnic background, marital status, and childcare obligations influenced their decision to transfer to a four-year institution. For example, though a positive relationship existed between black women's transfer-oriented interaction and their intention to transfer, they were less likely than white women to declare their intent to transfer until they reported a moderate level of transfer-oriented interaction, such as using campus resources or having contact with advisors or instructors to gather information about transferring.

The researchers think their findings could help increase women's upward mobility in STEM at two-year colleges, and their number and diversity in STEM. Read more at *http://goo.gl/sLcwU0* and *http://goo.gl/4nRnBb*.

- **A standard robotics kit can now be transformed to a system capable of transferring precise amounts of fluids—even smaller than a microliter—among flasks, test tubes, and experimental dishes, says a *PLoS Biology* article.** K12

Using a plastic syringe and a LEGO Mindstorms kit, Ingmar Riedel-Kruse, a Stanford University assistant professor of bioengineering, and his team developed liquid-handling robots that approximate the automation found in real labs. "We really want kids to learn by doing," he says. "[W]ith a few relatively inexpensive parts, a little training, and some imagination, students can create their own liquid-handling robots and ...run experiments on [them]—so they learn about engineering, coding, and the wet sciences [like biology, chemistry, and medicine] at the same time."

The article provides instructions for building the system and for experiments K–12 students can do using household items like sugar and food coloring. Learn more at *http://goo.gl/nx0T0s*.

- **If an Indiana bill is approved, eighth graders there will have to take an online career exploration course that includes an aptitude test to help identify potential careers and provides information about training and available positions in the state.** M

In the proposed Indiana Career Explorer program, if students show aptitude for manufacturing, for example, they "would next begin to assess what particular area of manufacturing [they] might like or be best suited for," Indiana Senator Doug Eckerty, who sponsored the bill, tells *The Star Press*. Information on certificates, credentials, or degrees and associated costs is included.

The program's creators say it isn't meant to dictate career choices, but to inform students about options they might not otherwise consider. If the bill is approved, 15 districts will participate in a one-year pilot program, and the rest of the state would follow suit the next year. Eckerty says he hopes the bill will help Indiana fill one million jobs over the next decade. Read more at *http://goo.gl/kbSDYc*. ●

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

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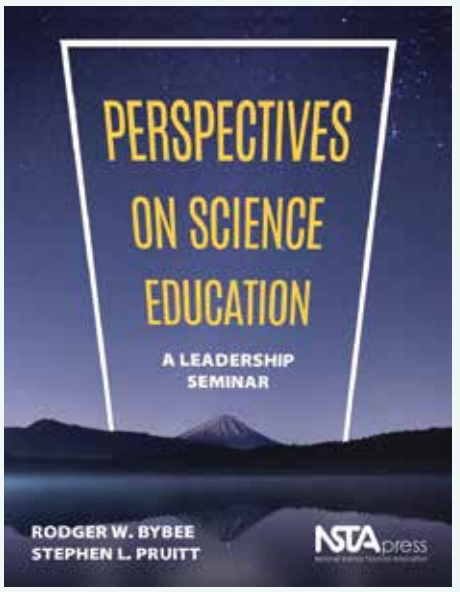

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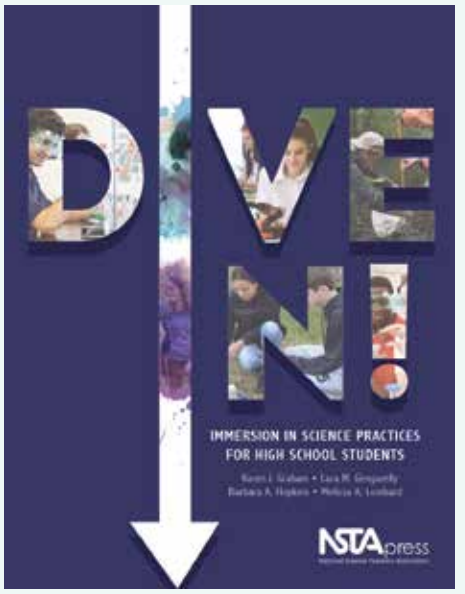

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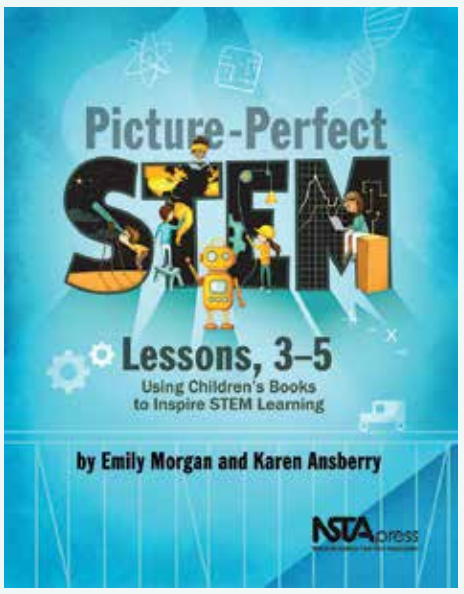

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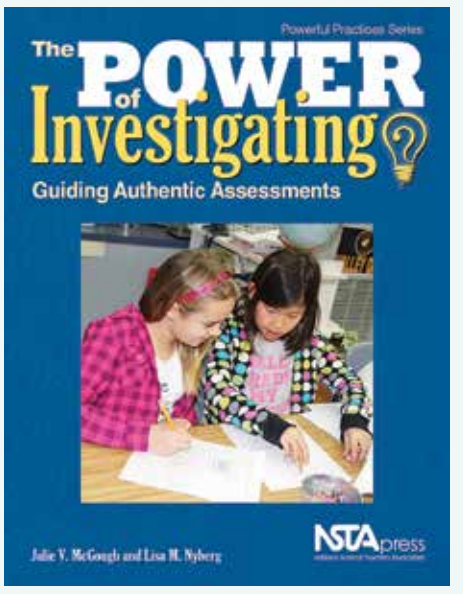

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NSTA National Science Teachers Association

What's New

FROM U.S. GOVERNMENT SOURCES

National Aeronautics and Space Administration (NASA)

Martian North Pole Layered Bean Dip E M

Model the layers of the Martian arctic terrain in this fun—and edible—activity for students in grades 5–8. Using meat, bean dip, sour cream, cheese, and salsa, students create a layered dip that represents the components of the terrain found at the Martian North Pole. Students use tortilla chips to model the scooping action of the Mars Phoenix Lander's robotic arm. The activity includes a fact sheet on the Mars Phoenix Lander and Reflection Questions. Refer to *https://goo.gl/3L4Aq8*.

Comet Models M

These model-building activities from NASA's Stardust mission educator's guide—see *https://goo.gl/gn21aX*—provide a "stellar" opportunity to teach middle level students about comets and how they form. In Cookin' Up a Comet, students and their teacher create a comet model from dry ice and other inexpensive materials (e.g., sand, cola, water, and ammonia), learning the basic parts of a comet and how its head and tail forms in the process. Afterward, students compare the model's parts to a comet's parts. The activity includes Reflection Questions.

Similarly, in The Incredible Edible Comet, students learn about a comet's anatomy as they construct a model comet from ice cream (representing ice in a comet), crumbled candy bars (for silicon), finely chopped nuts (for the rock and dust within the comet nucleus), caramel syrup (for the organic molecules, such as simple sugars), whipped topping (for a tail), and ginger ale (to represent carbon dioxide, one of the gases observed escaping from comets). The activity includes a Comet Fact Sheet and Reflection Questions.

NASA Women of Color Lithograph K12 HE

Women at NASA serve as role models to young women in their pursuit of science, technology, engineering, and mathematics (STEM) careers. The lithograph "Women of Color: Pioneers and Innovators" features astronauts, pilots, mathematicians, and administrators—past and present—who make significant contributions to aeronautics and astronautics. The poster front features portraits of 21 female air and space scientists, while the back features mini-biographies of them. Share the lithograph with students of all ages to remind them the sky's the limit when pursuing a STEM career. See *https://goo.gl/TqAhOl*.

U.S. Environmental Protection Agency (EPA)

Exploring Fuel Economy and the Environment H

In this lesson for grades 9–12, students learn to read fuel economy and environment labels, then apply their understanding to compare and contrast the labels for various vehicles and fuel types. The lesson plan includes background information, procedures, teacher and student worksheets, discussion questions, assessment, extensions, and related links. The lesson can help students become more informed citizens and helps teach them real-world skills and understandings. Refer to *https://goo.gl/ROKSCQ*.

The Quest for Less E M

This giant K–8 teachers guide contains educational resources relating to reducing, reusing, and recycling waste. It features hands-on lessons, activities, enrichment ideas, journal writing assignments, fact sheets, teaching notes, and more. The content is divided into three units: At the Source explores where products come from, how they are made, and the waste they produce; Waste Management addresses source reduction, recycling, composting, landfilling, and combustion; and Putting It All Together presents waste reduction activities. See *https://goo.gl/3BA6aY*.

National Oceanic and Atmospheric Administration (NOAA)

Encyclopedia of the National Marine Sanctuaries A

This online guide has photos, streaming video, and biological information for more than 100 marine species found in each of 14 marine sanctuaries nationwide, including sites in the Channel Islands, Florida Keys, Monterey Bay, Olympic Coast, and Northwestern Hawaiian Islands. Read a short description of each sanctuary, then click on tabs to learn more about the plants and animals found there. The site also features a short video about the National Marine Sanctuary Program. Refer to *https://goo.gl/c6LG21*.

National Marine Sanctuaries Media Library A

The National Marine Sanctuaries Media Library (*https://goo.gl/dhaUDq*) is a comprehensive collection of public-domain photographs and short video clips from all 14 marine protected areas managed by NOAA. The images provide an up-close look at unique wildlife and habitats and remind us of the need to protect these areas. Educators of all levels can visit the library to peruse a photo gallery of interest—Human Impact, Recreation, Citizen Science, Maritime Heritage, Education and Outreach, or Scenic Beauty—or enter various parameters in the database to refine their search.

Understanding Ocean Acidification E M H

NOAA's Channel Islands National Marine Sanctuary has educational resources for learning about the effects of increased acidity in the oceans. Watch video lectures on ocean acidification, or download hands-on activities to explore the topic. For example, the game Help Nemo Find His Home! (grades 4–8) teaches students how specific species such as the clownfish can be affected by the increased acidity in the ocean. Or show middle and high school students firsthand how carbon dioxide increases the acidity of water with a dry ice demonstration. The website also offers workshops and links to learn more about ocean acidification. Visit *https://goo.gl/RMr2SD*.

U.S. Department of Energy (DOE)

Pizza Box Solar Oven K12

This lesson from the DOE's Office of Energy Efficiency and Renewable Energy can be adapted for all grade levels K–12 and provides instructions for building a solar oven from a pizza box and other inexpensive materials. The oven will not generate enough heat to bake something, but it will become hot enough to warm up treats such as cookies and s'mores. Use the model to show students firsthand how solar energy works. See *https://goo.gl/XET8Eo*.

Girls of Energy Video Series M H

The series is designed to inspire the next generation of STEM professionals by spotlighting women, students, and leaders who are transforming the energy sector, from addressing the growing threat of climate change to advancing clean energy technologies like wind and solar. At *https://goo.gl/IbLnOV*, middle and high school teachers and students can watch video profiles of women like Rebecca Erikson, a senior scientist at Pacific Northwest National Laboratory who helped develop an inexpensive way to turn a cellphone into a high-powered, high-quality microscope that helps authorities determine if a white powder is anthrax. ●

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NSTA National Science Teachers Association

In Your Pocket

Editor's Note

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

May 26–June 30

Colocation America's STEM Grant K12

Through its STEM (Science, Technology, Engineering, Math) Grant, Colocation America works with nonprofits within the community to provide the educational background needed for youth wishing to enter the STEM workforce. Four to 10 grants of up to $7,500 will be awarded to K–12 educators with STEM programming for their new or recurring program and to nonprofit charitable organizations classified as a 501(c)(3) public charity. Programs must serve students in Los Angeles, San Francisco, Chicago, Miami, Philadelphia, Boston, and/or New York City.

The application deadline is **May 26,** and the funds must be used before August 15, 2018. See *https://goo.gl/Ge0pnq*.

Bank of America Foundation Grants A

These grants go to projects that help support healthy neighborhoods by creating, preserving, or restoring parks and green spaces. Projects should contribute to the overall vitality of the community where they're located. Nonprofit organizations may apply by **June 2.** See *http://goo.gl/h9hhda*.

Butler-Cooley Excellence in Teaching Award K12

The Turnaround Management Association (TMA) honors teachers who have demonstrated their capacity to change students' lives and the communities in which they teach. Two teachers will receive $5,000 cash prizes and up to $1,000 for travel, lodging, and meals while at TMA's annual conference, taking place October 23–25 in Fort Worth, Texas. Active K–12 teachers at an accredited public or private school with at least five years of teaching experience may apply.

Entries must be e-mailed by **June 12.** See *http://goo.gl/hgJ7uf*.

Mitsubishi Electric America Foundation's Grants for Youth With Disabilities A

The foundation funds innovative projects that help youth with disabilities develop the leadership and employment skills needed for success—particularly in science, technology, engineering, arts and design, and math (STEAM) fields. Grants range from $10,000 to $75,000. Preference is given to projects involving Mitsubishi Electric employee volunteers or their communities in Cypress, Garden Grove, and San Diego, California; Vernon Hills, Illinois; Northville, Michigan; Mason, Ohio; Maysville, Kentucky; Suwannee, Georgia; Cambridge, Massachusetts; Warrendale, Pennsylvania; Memphis, Tennessee; and Arlington, Virginia.

Take the eligibility quiz and submit proposals by **June 15.** Refer to *http://goo.gl/zxIhTS*.

NAGT Outstanding Teaching Assistant Awards HE

This National Association of Geoscience Teachers (NAGT) award honors 30 outstanding teaching assistants (TAs) in geoscience education. Winners receive a one-year NAGT membership, including subscriptions to the *Journal of Geoscience Education* and the *In The Trenches* quarterly magazine. Both graduate and undergraduate TAs are eligible.

Awardees must be nominated by the department chair or faculty member who coordinates TAs. Submit nominations by **June 15** at *http://goo.gl/6VPLj7*.

Crayola's Creative Leadership Grants M H

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

Principals who are National Association of Elementary School Principals (NAESP) members can apply by **June 23.** Visit *http://goo.gl/EZmWjX*.

Kishor M. Kulkarni Distinguished High School Teacher Award H

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

ASM members can nominate colleagues for these awards. Suggested candidates include past recipients of ASM Foundation K–12 Teacher Grants and graduates of the ASM Materials Teachers Camp. Submit nominations by **June 30** at *http://goo.gl/ZjC1WY*.

July 15–August 1

United States-Japan Foundation Precollege Education Grants K12

These grants support K–12 projects that help American and Japanese students learn about each other's society, culture, and country and work together on common concerns. The foundation welcomes Letters of Inquiry anytime, but no later than **July 15** for the fall grant cycle. Consult *http://goo.gl/exVMvS*.

American Legion Child Welfare Foundation Grants K12

The foundation accepts proposals from nonprofit organizations that contribute to the mental, emotional, physical, and spiritual welfare of children through new or established programs designed to benefit youth. Grants are awarded for one year and must have the potential to help American children in a large geographic area (more than one state). Postmark applications by **July 15;** see *http://goo.gl/rcKxtE*.

From Failure to Promise K–12 Educator's Grant K12

Schools, libraries, and community-based organizations can apply for grants of $500 to help move students "from failure to promise" in science, math, literacy, or technology. K–12 educators and youth group leaders with creative ideas for motivating students may apply by **July 31;** visit *http://goo.gl/qcBqhk*.

Chichester duPont Foundation Grants P K12

These grants of up to $50,000 support nonprofit organizations with programs focused on the environment, education, healthcare, social services, and the arts. Preference is given to those with new initiatives, special projects, or expansions of current programs, and projects in which the foundation's funding will play a pivotal role. A separate fund also exists for projects serving underprivileged children in Delaware.

Interested organizations must submit a letter of inquiry by **August 1.** Consult *www.chichesterdupont.org*.

Core Fulbright U.S. Scholar Program HE

This program provides 800 teaching or research grants to U.S. faculty and experienced professionals in a variety of disciplines. Grants are available for teaching and research in more than 125 countries worldwide for durations of between 2 and 12 months, though a limited number of flexible options are available. U.S. citizens with a PhD or equivalent professional or terminal degree (including a master's, depending on the field) may apply by **August 1.** See *http://goo.gl/0T77ub*.

Campbell's Labels for Education Program K12

Through this program, schools get free educational equipment or Visa prepaid gift cards in exchange for labels from Campbell products with the "Labels for Education" logo. The labels will appear on Campbell products until **August 1**. See *www.labelsforeducation.com*. ●

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

Summer Programs

Editor's Note

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

ASM Teachers Camps M H

Sponsored by the professional society for materials scientists and engineers, these five-day summer camps help teachers explore ways to make core science and math principles more engaging and accessible. Topics covered include metals, ceramics, polymers, and composites. Teachers can complete programs as residential participants or commuters at college campuses nationwide in June, July, and August.

Continuing education and graduate credits are available. Registration is first-come, first-served; apply online at *http://goo.gl/xiU0RU*.

Teacher Research Academy: Biotechnology Research M H HE

The Teacher Research Academy offers programs for middle and high school teachers and community college faculty at Lawrence Livermore National Laboratory (LLNL) in Livermore, California. Participants engage in a continuum of standards-based instruction, progressing from novice to mastery.

The Biotechnology Research Academy prepares teachers to conduct biotechnology research with their students. Level I (June 19–21) introduces them to the field and its basic tools, such as DNA extraction, gel electrophoresis, and DNA fingerprinting. Level II (June 26–June 30) provides the skills and knowledge teachers need to meet California Content Standards for evolution, genetics, and immunology. Level III prepares teachers to work as part of a practicing research team. And at Level IV, they participate in an eight-week mentored research internship and present their work at the LLNL Summer Research Symposium.

Graduate credits are available. Register online at *http://goo.gl/wGVfcz*.

National Agriculture in the Classroom Conference K12

This year's conference will take place June 20–23 in Kansas City, Missouri. Workshops, tours, keynote speakers, and networking events will help educators increase their comfort level with agricultural topics and learn how to integrate agricultural content into instruction to support academic standards in science, math, health, language arts, and social studies. Visit *http://naitcconference.usu.edu*.

Hamline University Rivers Institutes E M

These field-based professional development opportunities are meant for teachers of grades 3–8 seeking to engage students in science, technology, engineering, and math (STEM) investigations at local watersheds. One institute will take place on the St. Croix River June 26–28, and another on the Mississippi River July 24–26. Participants receive experiential instruction, 21 continuing education units (CEUs), and additional classroom resources. Full scholarships are provided for teachers, and graduate credits may be purchased.

Apply at *http://goo.gl/iBhANm*. E-mail questions to Sara Robertson at *srobertson01@hamline.edu*.

Teaching in the Outdoor Classroom K12

The U.S. Fish and Wildlife Service and the Prairie Wetlands Learning Center in Fergus Falls, Minnesota, host this immersion workshop for K–12 teachers June 26–29. Participants lead the Summer Explorers Biology Camp for fifth and sixth graders in a team-teaching environment. Educators get free lodging, a certificate for 30 hours, and practice using field guides, field journals, and weather-monitoring equipment while exploring the prairie pothole ecosystem with students.

All who teach children, including preservice teachers, licensed educators, homeschool teachers, informal educators, and park rangers, may apply. Visit *http://goo.gl/JBfY0S*.

University of Cambridge's Science Summer Programme A

Located in the United Kingdom, the university's Science Summer School offers courses for teachers, other professionals, and undergraduate and graduate students. One-, two-, and four-week options are available. Term 1 (July 9–22) features courses in microbiology, physics, genetics, and more. Term II (July 23–August 5) includes courses on spectroscopy, cryptography, and fossils.

Those with a strong interest in science but little formal training may apply. Visit *http://goo.gl/laSMLi*.

SEE Turtles Cuba Sea Turtle Volunteer Expedition A

During July 9–16 or August 5–12, expedition volunteers work with Cuban biologists to study and protect the nests of green and loggerhead sea turtles. Volunteers explore Guanahacabibes National Park; at night, they do conservation work. Individuals, families, groups, and student field trips may register at *http://goo.gl/bXgWOX*. Participants must be age 14 or older, and proceeds from the trip will save at least 500 hatchlings per participant at the nesting site.

San Diego Zoo's Teacher Workshops in Conservation Science M H

Middle and high school teachers can experience a week in the life of a conservation scientist. Teachers work with zoo staff members and one another to frame content standards in the context of wildlife conservation and develop ways to help students apply their textbook knowledge of the life sciences to real biodiversity challenges. The following workshops will be held:

- July 10–13: High School
- July 17–20: Middle School
- July 31–August 3: High School
- August 7–10: Middle School
- August 14–17: High School

Participants receive a $500 stipend, and free room and board. School teams of two to four educators, including at least one science teacher, are encouraged to apply. Teams can be cross-disciplinary and cross–grade level. Apply online at *http://goo.gl/KcM2v4*.

BioBuilder Bioengineering Workshops H HE

The BioBuilder Educational Foundation offers workshops to help biology teachers incorporate engineering in their classrooms, labs, or science clubs. Participants will receive ready-to-teach lesson plans and 45 professional development points. Workshops will take place at these locations:

- Rockefeller University, New York: July 11–13
- Chesterfield Village Research Center, Missouri: July 18–20
- Penn State Hershey Medical Center, Pennsylvania: July 26–28
- Northwestern University, Illinois: August 1–3
- MIT, Massachusetts: August 2–4

High school biology teachers, college instructors, and science club leaders may apply. Preregistration is required; scholarships are available. See *http://biobuilder.org/workshops*.

Worcester Polytechnic Institute's Professional Development Programs P K12

Worcester Polytechnic Institute's STEM Education Center offers these programs for preK–12 teachers:

- LEGO Robotics for Educators I: July 10–14, July 17–21, or August 7–11
- LEGO Robotics for Educators II: July 17–21, July 24–28, or July 31–August 4
- Engineering a Story (preK–8 educators): July 18
- Teaching With the 2016 MA STE (Massachusetts Science, Technology, Engineering) Framework (K–12 teachers and administrators): July 19
- Developing and Using Models (K–12 teachers and administrators): July 25
- STEM/STEAM (Science, Technology, Engineering, Arts, Math) Projects (grades 4–12 teachers and administrators): July 26
- VEX Robotics for Educators (grades 5–12 educators, VEX team coaches): August 7–11

Register at *http://goo.gl/B9WqI6*. ●

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Montana State University – Bozeman

Online graduate credit courses for K–12 science teachers through National Teachers Enhancement Network, as well as online offerings for Masters 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

BLICK ON FLICKS

Kong: Skull Island

By Jacob Clark Blickenstaff

Many versions of *King Kong* have been produced since the original 1933 film. The films have a few essential features: Kong is a huge male gorilla-like creature living on a remote jungle island (Skull Island), usually with other supersized creatures. Kong is typically worshiped as a god by the indigenous people. An expedition from the modern world finds the island and wants to exploit it in some way, sometimes for resources, sometimes as a filming location. At some point, Kong bonds with a human woman, and sometimes he is removed from the island and taken to New York City. Kong rarely survives to the film's end. The best-known versions of the story came out in 1933, 1976, and 2005.

The most recent retelling, *Kong: Skull Island* (2017), is set in the early 1970s, with the idea that Skull Island was discovered by a new global satellite imaging system. The island had not been previously discovered because it is surrounded by a permanent hurricane-like storm system. A U.S. government representative, Bill Randa (played by John Goodman), justifies an expedition to the island for mapping and oil exploration, though he really believes that the Earth has underground spaces where monsters live.

The expedition is primarily military, led by Lieutenant Colonel Preston Packard (Samuel L. Jackson) and supported by expert tracker James Conrad (Tom Hiddleston). Photojournalist Mason Weaver (Brie Larson) joins them. The operation includes many military helicopters that penetrate the storm and drop "seismic charges" to map underground features—ostensibly looking for oil, but really searching for hollow places Randa believes hold monsters. The explosives upset Kong, who vents his ire on the helicopters.

We learn quickly that Randa's theory is correct: Many terrible giant lizard-like creatures exist under Skull Island, and Kong protects the human residents from these "Skullcrawlers." While the plot has more events, here are some ways teachers could use *Kong* to support lessons in life science.

Scaling Limits

A favorite science fiction trope enlarges everyday creatures to heighten the fear factor. As I have mentioned in other columns, the biomechanics of bone and muscle cause significant problems when an animal is scaled to giant proportions. (See *Monsters vs. Aliens,* for example: *https://goo.gl/NuWtfV.*) I've made a chart of King Kong's sizes in the four most popular films.

To calculate the scaled mass in this chart, I started with a two-meter-tall and150 kilogram gorilla. If you double the height (and length and width) of anything, its mass increases by a factor of 8 (2x2x2.) So for example, the 2005 Kong is about four times larger than

Film	Kong height	Scaled mass	Elephant Equivalent
King Kong 1933	6–20 meters	4–15 tons	1–2
King Kong 1976	13–17 meters	40–90 tons	6–15
King Kong 2005	8 meters	10 tons	1–2
Kong: Skull Island 2017	31 meters	550 tons	90

a gorilla, so his mass should be about 64 times larger. I also converted the scaled mass into elephant equivalents as a frame of reference.

It would be a neat class activity to have students estimate Kong's height from visual cues in a still image, then replicate the calculation I did to create the chart. Note that in the 1933 and 1976 versions, the filmmakers were inconsistent with King Kong's size from one shot to another. In both films, he was smaller in the jungle and much larger in New York.

A creature the size of 2017 Kong would have some difficulty getting around. At 550 tons, he is more than 2.5 times more massive than a blue whale (the largest animal known to have ever lived on Earth). Without the support of water around him, Kong's feet would have to hold up that entire weight just to stand still. Jumping would multiply the forces on his limbs even more.

Feeding the Beast

If Kong is like the gorillas he appears to be based on, his diet should be mostly plants, though insects and other animals could comprise about a third of his diet. How much food would he need each day? That also greatly depends on which Kong we're considering, as size is a major factor. The World Builders website (*https://goo.gl/ltGnSy*) has a neat tool to help calculate the approximate nutritional needs of an animal based on its size. It is based on Kleiber's Law, which is an approximation and may not apply perfectly to very large animals, but it is at least a reasonable tool for this task. My calculation is that our 2017 Kong would need about 13 million Kcal (1 Kcal=1 food Calorie=1,000 calories) every day. If he was able to find a really calorie-dense food, such as dates, he'd need to eat about 4,500 kg of them every day just to survive. The smaller Kongs from past films would of course need much less food, and students could make their own calculations.

King Kong and Race

Teachers cannot and should not ignore the complex history of racial politics in the *King Kong* movies. In every iteration, King Kong is a giant black-skinned figure who captures and menaces a white woman. When that woman cares for Kong, he often dies at the hands of a group of white men, who could easily be seen as a lynch mob. In addition, the Skull Island native people are almost always represented in broad negative stereotypes. Finally, collecting Kong from his home and bringing him to North America in chains is a near-enough analogy to the transatlantic slave trade that it really should be discussed. I am not the first to note Kong's place in a long history of racist portrayals of people of African ancestry. This 2005 article is one example: *https://goo.gl/EjtEHC*.

Kong: Skull Island and the other Kong films will give biology teachers an opportunity to discuss energy needs and scaling, and potentially discuss racism in monster movies.

For more on the biology of the 2005 King Kong, see *https://goo.gl/xzRMDO*. For more on scaling up or down, see *https://goo.gl/dI3q2J*. ●

Jacob Clark Blickenstaff is Director of K–12 Engagement at the Pacific Science Center in Seattle. Read more Blick at http://goo.gl/6CeBzq, *or e-mail him at* jclarkblickenstaff@pacsci.org.

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National Science Teachers Association

MS. MENTOR, **Advice Column**

The Art of Science Teaching

I used to assign projects for students to complete at home. Now I'm at a middle school where many students do not have access to materials and resources outside of class. I need in-class projects!

—A., Colorado

In-class projects would level the playing field if students receive materials and class time with opportunities to work collaboratively and creatively.

You can find ideas for challenging, low-cost projects that aren't time-consuming in NSTA's K–12 journals. The activities and investigations correlate with the *Next Generation Science Standards* (*NGSS*), so they are focused and authentic. Articles in the middle level journal *Science Scope* feature sidebars documenting big ideas, essential pre-knowledge, time, and cost.

Another option might be to adapt the Exploratorium's Iron Science Teacher competition (*https://goo.gl/D1u08F*). Each team receives a box of common materials (e.g., a cork, rubber bands, craft sticks, plastic bottles, balloons, paper clips, wooden blocks, tape, and more) and a "theme ingredient." General supplies are available (glue sticks, rulers, a stapler, and so on). Teams have one day to develop a model using the theme ingredient and any or all of the other materials, with a written description. No two projects are alike, and all show a high level of creativity.

For students, you could require inventions or models that demonstrate learning of topics recently addressed in class. Provide a project rubric and time for students to demonstrate their work and create illustrated descriptions.

This will take several class periods, but it's time well spent, as you observe and assess what students have learned conceptually as well as their creativity, ability to work together, and use of problem-solving strategies.

I'm preparing to be a chemistry teacher. In addition to chemistry and teacher prep classes, what else should I study to become an effective teacher?

—T., Colorado

While math and physics are important, you also could become familiar with another language and the special education requirements in your state. You could pursue a personal interest in history and geography, literature, or the arts to better connect science with other subjects.

Teachers are "on stage" every day. Many teacher prep classes don't address how to communicate with students and share your enthusiasm and passion for chemistry. That's where acting experience or a class may help. This doesn't mean putting on a contrived show, but rather using your voice and body language effectively.

After several teachers in my school joined a community theater group, our confidence and communications in the classroom improved in several areas:

- enunciating clearly and reaching every corner of the room without shouting and straining one's voice;
- incorporating humor and timing;
- improvising based on student interests and questions;
- dealing with distractions;
- showing interest in a student's question or idea, even if we'd heard it several times before;
- being mindful of one's position in the classroom and moving around;
- using strategies such as props and wait-time; and
- using a well-aimed glare or a quiet whisper to stop some misbehaviors.

I'm a science teacher in a small district, and I'm curious about lessons that incorporate the three *NGSS* dimensions and what they "look like." Where can I find examples to share?

—B., New Hampshire

You can find examples of lessons aligned with the *NGSS* in NSTA's K–12 journals (*Science and Children*, *Science Scope*, and *The Science Teacher*). Featured articles describe classroom lessons and have a graphic connecting the lessons to performance expectations and the three dimensions (Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts). After reading an article, I try to determine the connections to *NGSS* as a way to check my understanding.

THINKSTOCK

Here are some recent examples:

- "The Physics of Sound" (preK), *https://goo.gl/bp9xcr*
- "Making Sense of Sound" (elementary), *https://goo.gl/LVLWEK*
- "Food and Energy for All" (middle school; this article also illustrates turning a demonstration into an inquiry activity), *https://goo.gl/n2JYqF*
- "Powered by the Sun" (high school), *https://goo.gl/rDD7n1*

To continue your study and find more examples, see the resources at NGSS@NSTA (*http://ngss.nsta.org*), including Curriculum Planning and Classroom Resources.

NSTA's You Tube channel has other examples. Check out *Introduction to Three-Dimensional Learning* (*https://goo.gl/CVKgGo*) and *The Vision for Science Education and the New Role of Teachers* (*https://goo.gl/7MqTCW*).

If you have specific questions or requests, *NGSS* and STEM are topics in the NSTA discussion forums and e-mail lists. Our colleagues are always willing to help, and we can all learn together!

I have several very disruptive students in my biology classes. I know I should contact their parents, but as a new teacher, how I should handle this?

—C., California

At the secondary level, I found it was more effective to work with students first, then contact parents or guardians about misbehavior. Even if you typically e-mail or text parents, having a real-time voice conversation may be the most effective way to express your concern.

Determine an appropriate time to speak (it may not be possible for all parents to talk while at work) through a text or e-mail. Or ask them to call you and suggest times, such as early morning or late afternoon.

Prepare notes to help you stay focused on the problem and what you want to discuss.

Start with some positive comments about the student and emphasize you want what's best for their child to be a successful learner. Provide examples of the behavior in question and how you tried to correct the situation. Ask for other ideas on how you can work together to resolve the issues. If the disruptive behavior occurs during a lab activity, remind the parents of the safety acknowledgement form they signed.

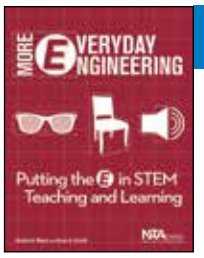
Give parents time to respond, and listen to them without interruption, using wait-time before you respond.

You can ask your mentor or administrator to be present (be sure to mention that he/she is there).

At the end, summarize what you and the parents will do and expectations for the student. Thank them for their time and input. Follow up with any results.

Annotate your notes and keep a log of your communications.●

Check out more of Ms. Mentor's advice on diverse topics or ask a question at www.nsta.org/msmentor.



NSTA PRESS: *More Everyday Engineering: Putting the E in STEM Teaching and Learning*

Producing Plastic...From Milk?

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 More Everyday Engineering: Putting the E in STEM Teaching and Learning, *by Richard H. Moyer and Susan A. Everett, edited for publication here. To download the full text of this chapter, go to* https://goo.gl/DzgJ6L. *NSTA Press publications are available online through the NSTA Science Store at* www.nsta.org/store.

Investigating Plastics (Teacher Background Information)

Materials

Students should wear indirectly vented chemical splash goggles, gloves, and thermal aprons during the laboratory portions of this lesson. In the Explore phase, each group of four students will need four beakers, each with 150 ml of milk heated to 49°C. For the Extend portion, each pair of students will need an additional 150 ml of hot milk. Finally, for the Evaluate phase, each group of four students will require four more samples of 150 ml of milk at varying temperatures. You can expect to obtain about 25 samples of 150 ml from a gallon of milk. The fat content of the milk matters little in this investigation, and the activity will also work with reconstituted powdered milk. To reduce the amount of milk used in the Explore and the Evaluate phases, each group could test only two samples and then combine class data.

For one group of students to complete all of the activities in each phase, 82 ml of plain white vinegar will be needed. The easiest way to filter the casein precipitate is to use a small square of cheesecloth. Each group will also need a stirring rod and some means to measure the vinegar. A slightly larger beaker is needed for each group to collect the decanted liquid. Newspaper or paper toweling is needed to absorb excess moisture. Cafeteria-type trays lined with wax paper can be used to dry samples overnight. Finally, each group of students will need a balance to find the mass of the dried samples of casein.

Engage

Begin this lesson by having students brainstorm plastic items they use daily. Since there are many different types of plastic, it may be hard for them to develop a broad statement defining a plastic. In general, plastics are materials that can be shaped or molded. Often people think of plastics as flexible, though many are rigid. Another important property is that most plastics are chemically inert to many reactants. A major focus of this phase is for students to relate their prior knowledge to the chemical engineering challenge of economically producing one type of plastic. Students will likely be surprised that plastic can be produced from milk proteins.

FIGURE 5.1 15 ml of vinegar in 150 ml of hot (49°C) milk

Explore

To begin the Explore phase, students need to observe the chemical reaction that precipitates the casein plastic from the hot milk. It is a striking reaction, and with 49°C milk and 15 ml of vinegar, the casein will develop (with gentle stirring) in 15 or 20 seconds. Students may be able to pick up the white plastic mass and should note that the remaining liquid is no longer white like milk, but a watery, grayish color. If students have difficulty separating the casein mass from the liquid, have them filter it using cheesecloth. Instruct students to squeeze excess moisture out of the plastic and knead the plastic into a pancake shape that they will put aside for massing another day when it has dried. Ask students why they think they should wait for the casein to dry before finding the mass (to only measure the mass of the casein and not the excess moisture). Students should have little difficulty observing the plastic-like characteristics of the casein.

Students will now design a test to determine how to increase the yield of casein using the least amount of vinegar. It is recommended that students test three additional amounts of vinegar, with 15 ml being the largest (more vinegar will yield little additional casein). When approving student plans, make sure they keep the volume and temperature of the milk constant and change only the amount of vinegar. Again, students need to remove excess moisture and form the casein into pancake shapes that they set aside to dry.

Explain

Students will find the mass of each casein sample the next day and construct a graph of their results. If all of the students did not use the same amounts of vinegar, consider combining all data before constructing graphs. Students should discover that the yield of casein increases with increased vinegar up to a certain point where essentially all of the casein has been precipitated. Thus, adding more vinegar does not result in any more casein.

Student graphs should show that the yield of casein increases to a point and then flattens to nearly horizontal, indicating no additional production with increased vinegar. Engineers use such a graph when they design the process for manufacturing casein so that excess vinegar is not used and essentially wasted. The graph shows a macroscopic pattern of how the yield of casein changes with varying amounts of vinegar. To address the crosscutting concept of patterns, students need to understand what is happening at the microscopic level that corresponds to the graph: There is a finite number of protein molecules in the milk, and when they have been converted to casein, no more can be produced regardless of the amount of additional vinegar. Therefore, the graph flattens to become horizontal.

Extend

As noted earlier, one characteristic of plastic materials is their ability to be formed or molded into many different shapes. Students can form a variety of shapes using casein plastic. Since the casein they made previously has dried, they will need to make more for the Extend phase of the lesson. Students should again squeeze excess moisture out of the mass and then form it into a desired shape. Many may wish to make beads. After forming a bead shape, they can pierce it with a small wire or paper clip so the bead ultimately can be strung. This needs to be done while the casein is moist. For more complex designs, candy molds work well for the amount of casein students will use. Casein can be colored by putting food dye into the milk before adding the vinegar.

Evaluate

To this point, students have investigated only one variable: the amount of vinegar. We purposely held the temperature constant at 49°C. The temperature of the milk is also an important factor in determining the yield of casein. Up to a point, the yield generally increases with temperature. As a performance assessment, students will plan and conduct an experiment to determine casein yield as a function of temperature. A critical issue is for students to recognize that the amount of vinegar must be kept constant.●

(All dates are deadlines unless otherwise specified.)

May 12—Register today for the **Sixth Annual STEM Forum & Expo**, hosted by NSTA, to be held July 12–14 at the Gaylord Palms Resort & Convention Center in Kissimmee, Florida. The forum will feature strands targeting early childhood and lower-elementary educators; upper-elementary, middle level, and high school educators; and administrators. The event will also feature a strand devoted to exploring successful partnerships among educators and community and business/industry members that enhanced STEM education for preK–16 learners. Earlybird registration for NSTA members costs just $180. For more information or to register, go to *https://goo.gl/dTLN6j*.

May 13—Join **NSTA's virtual conference, The Dynamic Ocean: Changes and Impacts,** to learn basic oceanic and atmospheric circulation patterns and how energy/heat and nutrients move around the planet; understand how the transfer of heat energy through ocean circulation patterns and atmospheric interaction affects weather and climate; and more. The virtual conference includes an opening general session and two self-selected breakout sessions, followed by another general session and a question-and-answer period. The conference will be held at 10 a.m.–2 p.m. Eastern Time (ET); 7 a.m.–11 a.m. Pacific Time. Registration costs $63 for NSTA members. Optional participation certificates are available for $9.95. Registered attendees will also receive access to the conference archives to watch it on-demand and the Ocean's Effect on Weather and Climate SciPack. For more information or to register, go to *https://goo.gl/UqBFVb*.

June 1—Share how you are **"Meeting the Needs of *All* Students With Physical Disabilities"** with your fellow elementary educators by submitting a manuscript today for the January 2018 issue of *Science and Children* (*S&C*). General-interest manuscripts may be submitted at any time. Read the call for papers at *https://goo.gl/UXBmlh*.

June 1—Good **"Assessment Strategies"** are essential to effective instruction. ***Science Scope***'s January 2018 issue will feature educators' best assessment strategies—if you submit a manuscript! General-interest manuscripts, commentaries, and column submissions may be submitted at any time. Read the call for papers and access submission guidelines at *https://goo.gl/l6bNbz*.

June 1—How are you **"Using New Tools to Support Science Learning in a Connected World"?** *The Science Teacher* (*TST*) is accepting manuscripts for the December issue that explore the use of social media, online simulations, virtual learning communities, and cloud computing, as well as ways to improve critical thinking, digital and media literacy, and more. In addition, the journal accepts articles unrelated to a theme at any time. For more information on writing for *TST,* issue themes, and more, go to *https://goo.gl/u6JTM6*. For help preparing a manuscript, see an annotated sample manuscript at *https://goo.gl/EwzlLG*.

July 12—Does each lesson build upon the prior one when you teach a unit? Explore how a coherent storyline can improve students' learning and learn how to create your own during **How Do I Develop a Storyline for a Unit?** This **free NSTA Web Seminar**, part of a series on implementing three-dimensional science standards, will be held at 6:30–8p.m. ET. New users should log in 15 minutes before the scheduled start time for an introduction to NSTA Web Seminars. All participants will receive a certificate of participation and 100 Learning Center activity points for attending and completing the post-program evaluation. An archive and presentation slides will be available at the end of the program. For more information or to register, go to *https://goo.gl/bKCJ9l*. ●

What Are Your Financial Concerns?

This fall, *NSTA Reports* will launch a new column on the financial concerns and interests of educators. To ensure that this new feature will serve our members' interests, NSTA created a survey at *https://goo.gl/YS8bv8*. By taking part in the survey, you will help determine which topics we address.

Please take the survey at *https://goo.gl/YS8bv8* starting May 5.

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NSTA Marches for Science

April showers didn't keep NSTA members, leadership, and staff from joining the March for Science in Washington, D.C., on April 22. The nonpartisan event to show the world that science matters opened with speakers and a "teach-in" before marchers headed down Constitution Avenue. NSTA joined more than 300 organizations as a March for Science partner. Satellite marches were held in more than 500 other cities. ●

CHRISTINE ROYCE