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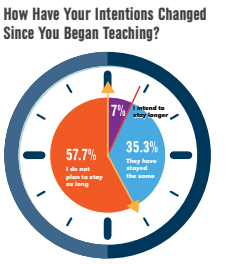
Will New Tax Law Change Your 2018 Filing? 6

NSTA Reports

National Science Teachers Association



NSTA Member Poll: Evolving Career Plans 4

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Learning Wins in STEM Games

KILLER SNAILS

At the New York Botanical Gardens, students and parents play Biome Builder, a game from New York City–based learning games company Killer Snails.

Jamie Easley, eighth-grade science teacher at Eleanor Roosevelt Middle School in Dubuque, Iowa, says she created Science Ball—a baseball-like game—"to make test review interesting [for students]…It's important to find every way possible to increase engagement and interest in the material we're teaching, especially if it's an unusual way to do it," she contends.

Easley labels "bases" in her classroom, and divides students into two teams. One student from each team "answers [short-answer or multiple-choice] questions simultaneously on small whiteboards, then they reveal [their answers at the same time]." Correct answers allow players to advance to a base; incorrect ones result in an out. Easley selects questions for each pair, and pairs students of similar levels so she can choose appropriate questions—a must for special-needs students.

To inform students about science, technology, engineering, and math (STEM) careers, Donna Muller, former K–8 technology teacher at Atonement Lutheran School in Metairie, Louisiana, says she turned The Game of Life® into a STEM careers game by creating her own "career cards, basing them on Career and Technical Education (secondary certificate) careers versus [the] college-bound careers. It makes it meaningful and shows career pathways."

Muller has used other popular games in her classroom, many of which have free digital versions online: Kahoot!® for vocabulary; Heads Up to teach about scientific processes like the water cycle; Pictionary and Win, Lose, or Draw because "they allow students to draw [things like] the parts of a cell. [Games] are a way to reach [students with] different learning styles."

When students excel at the games but don't perform well on tests, "the games can show me why the tests aren't working...If you set the game up right, it should test content knowledge," Muller explains. However, "games should not be the 'end-all,' they should help students get comfortable with the material, but students also need to do projects, hands-on [learning].

"You are getting cross-curricular with games, which helps you meet the *Next Generation Science Standards* (*NGSS*)," asserts Muller. In addition, "you are actually teaching those [21st-century soft skills], such as learning to work together and it's okay to not have the right answer; just keep trying…Students need to [be able to] make mistakes without it counting [against their grade]."

"Games [equalize] my class, even when some students have prior knowledge, and give everyone an activity to talk about," says Cynthia Hopkins, seventh- and eighth-grade science teacher at Kaffie Middle School in Corpus Christi, Texas. She has students play games related to concepts before teaching the concepts. "I use a game called Suspend to teach [about] unbalanced and balanced forces," she notes. Suspend involves hanging notched wire pieces on a tabletop stand. Adding pieces shifts the balance, and players try to add all their game pieces without making the structure fall.

"[Suspend] is the first thing I do in my Forces and Motion unit. I give

See STEM Games, pg 8

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National Science Teachers Association

COMMENTARY: **ChaMarra Saner**

Using Service to Catalyze Learning

By ChaMarra Saner

ChaMarra Saner

Have you ever reflected on a course during which your students struggled and thought, "Where did I go wrong?" In the sciences, we are often pressed to convey content, making the classroom seem dull. But as educators, we strive to create a climate in the classroom that is conducive to learning and a culture in which students feel inspired by the information they are learning. Bolstering students' creativity and allowing them to explore extends the educational potential beyond any standards.

When I recall what first inspired me to pursue science, the core of it all was creativity. So my question becomes this: How can I creatively convey information to the students? My answer: Through experiential learning and service.

My natural foundation for pedagogical development derives from the basic idea that education is not merely formative, it is *transformative*. Students evolve in numerous ways during the learning process. Ideally, students will progress from singular reliance on the professor for transmission of knowledge to becoming full participants in their education. I embrace experiential education, intentionally integrating academic learning and relevant community service to enhance scholarship, while not compromising academic rigor.

For my undergraduate students, combined learning and service opportunities promote meaningful connections between the course material and the community while challenging and broadening traditional notions of teaching and learning. Service learning pedagogy is important in chemistry for several reasons, including increased participation of underrepresented populations in science, technology, engineering, and mathematics (STEM) fields; creating a lifelong appreciation and interest in STEM fields through increased exposure; and improving the public's understanding of STEM, thereby growing science literacy in our society. It is important to me, as a scientist, to ensure all my students have the opportunity to integrate academic learning and relevant community service as a means to enhance scholarship. Realistic education is important to me!

What appeals to me about this pedagogical strategy? My ultimate goal as an educator is to mold and develop well-rounded students who are informed in the content in a fully immersed manner. By tapping into students' different capabilities, I am able to teach and apply active learning strategies while assessing the theoretical ideas in a non-traditional manner and maintaining the course's rigor. This approach can be applied to all course levels and with both majors and non-majors alike.

Additionally, this pedagogy creates opportunities for students to use their individual strengths in the context of the curriculum. As an example, after Catawba College's 2017 "Mysteries in Science" open house event for local middle school students, one of my students expressed her appreciation for being assigned to demonstrate an experiment related to a concept that we were covering in the course. Her additional research for the experiment not only helped her clarify her own understanding, but more importantly, she gained the confidence necessary to communicate about the subject matter and perform well on the test.

Service learning in the general chemistry classroom is still a fairly new idea. My conversations with students and among peers have led me to conclude that chemistry education is lacking not in content, but in ways to increase student interest and enhance performance beyond traditional learning. Too many people think chemistry is boring!

But service learning experiences help students master the material they present and exhibit their mastery as they conduct demonstrations for children. In addition, they must think and act like a scientist during this timeframe: following and enforcing safety rules and practicing lab protocols. These experiences encourage my undergraduate students to become active learners with minimal teaching direction. By holding events for children from underrepresented groups through collaborations with local community outreach groups and Title I high schools, we encourage those students to consider STEM careers for themselves.

Through teaching/mentoring opportunities, I strive to develop my students' creativity, as well as their practical skills. Both are key to academic success. Disseminating scientific and technical knowledge to others enhances my students' learning and supports their development of an advanced scientific skill set. Service learning should not impede scholarship, but should be an opportunity to enhance the classroom learning experience through new and innovative activities that involve the community and promote meaningful connections among the course material and the community. I believe that an environment steeped in science education provides students with the stimulation and curiosity necessary to explore their passions while developing the knowledge and technical skills to persevere. And as an educator, it is my responsibility to mold the skill set and cultivate the experiences necessary to do so. ●

ChaMarra Saner, PhD, is an assistant professor of chemistry in the School of Arts and Sciences at Catawba College in Salisbury, North Carolina. Saner uses several academic methods to create fun and educational experiences for her students and participants in the surrounding community that they may not otherwise have.

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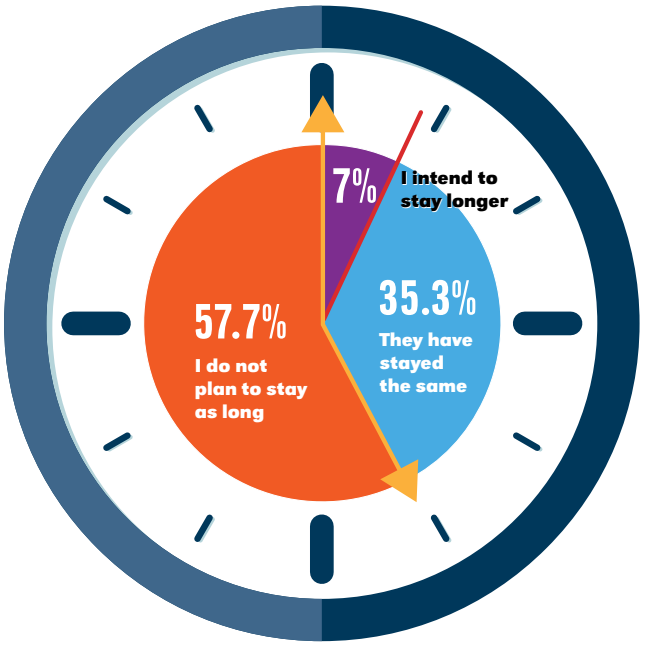
Evolving Career Plans

For a significant number of educators, career plans change after they enter the classroom, according to a recent informal *NSTA Reports* poll. When they started teaching, 88% of respondents reported planning to remain a classroom teacher for their entire career, with 7% planning to stay up to 10 years and 5% planning to do so for five years or less. More than half (57.7%) of respondents say they do not plan to stay in the classroom as long as they had originally thought. Only 7% say they want to stay longer than they had intended.

Of those who say they're considering leaving the classroom, 34.2% say they hope to move into an education-related role or field; 23.7%, a science-related role or field; 21%, retire; and 14.5%, to move into an unrelated role or field. Only 6.6% say they hope to transition into administration. About half (51%) of participants say teaching was not their first career, and 64.7% had been teaching for more than 10 years.

Here's what science educators are saying about their career plans:

How Have Your Intentions Changed Since You Began Teaching?



Won't Stay as Long

Too much time is spent working on schoolwork outside of school. —*Educator, Middle School, Colorado*

My Social Security (SS) earnings will be penalized by the amount I get in my school pension unless I have 30 years in with SS, so I will quit early and work to make the 30 years to avoid the penalty.—*Educator, High School, Maine*

Dealing with logistics, high stress, lack of respect, lack of control, lack of resources.—*Educator, High School, California*

Lack of respect for teachers by our state. Lack of respect and support by parents.—*Educator, Middle School, North Carolina*

I have been unsupported, overworked, and underpaid. The stress of having classrooms of 40 children and mountains of paperwork is taking its toll, and I no longer love being in the classroom. This job is slowly sucking the life out of me.—*Educator, High School, Texas*

I intend to cash in my sick leave and retire a year earlier. It will probably depend on what schedule they give me in the final years. The job is just getting too hard, and there is less and less support.—*Educator, High School, North Carolina*

Everything has changed: More to do with less resources, more testing, more paperwork. Mainstreaming too many kids. Constantly diffusing situations instead of teaching. No one values teachers anymore. Our pay has gone down, and now we pay more for insurance, retirement, and retirement healthcare.—*Educator, Elementary, Middle School, Michigan*

As I get older, I am feeling like it is a lot of work to run a class well. Also, my labs are not in my class, and I am thinking of looking into online teaching or go[ing] into more administrative positions.—*Educator, High School, France*

I love my students and I love teaching, but it is exhausting keeping up with all of the expectations. The expectations I have of myself and my responsibility toward my students and the district['s] expectations [don't match]. It is also a bit of a financial struggle.—*Educator, Middle School, New Jersey*

I intended to teach until age 65. I can't keep up this level of stress for many more years.—*Educator, Middle School, Illinois*

Physical and mental exhaustion. —*Educator, Middle School, Michigan*

Honestly, the ratio of stress to monetary compensation [is the reason]. I could be stressed and work more in other careers, but I would make more money. I could then support my parents and myself in their old age. —*Educator, High School, Illinois*

Scripted teaching that is required by the district [is problematic]. I have been begging for professional development in science for elementary teachers, and it has not happened.—*Educator, Elementary, Louisiana*

It's harder to truly teach my students. I spend so much time outside of the classroom preparing lessons and catching up on paperwork that my family rarely spends time with me.—*Educator, Middle School, West Virginia*

I decided to leave the classroom because of the current administrator. He told me he "doesn't believe in [science, technology, engineering, and mathematics (STEM)]."—*Educator, Middle School, California*

I took a four-year hiatus. Last year was my first year back in the classroom. I feel lost and overwhelmed with Tennessee's new state standards. I work very hard to do well, but I don't know if I'm doing the right thing the right way. I follow the standards, but have no idea whatsoever how they will be assessed.—*Educator, Middle School, Tennessee*

The challenges are becoming greater, and teachers' hands are tied more than ever by continually having to "prove" our worth as teachers. We spend more time talking about teaching and justifying what we do in our classrooms than actually teaching. In my district, language differences and deficits have become an enormous barrier to education.—*Educator, Middle School, Wisconsin*

I was recruited for a Ph.D. in education; I am finding that going back to the classroom isn't as plausible as I thought.—*Educator, Institution of Higher Learning, Colorado*

Intend to Stay Longer

I have been retired for several years. I went back into the classroom and teaching again because I really missed the interactions with the students. —*Educator, High School, Missouri*

It has gone by so fast, and now I have 12 years remaining. I am not sure, though, if all of my remaining years will be in the classroom.—*Educator, Middle School, High School, Georgia*

I do work at a community college and have a 100% teaching appointment. I have been doing this so long I would not be able to get a job doing research/teaching at a big-time university, but I don't want that kind of job. I love teaching more than I thought I would.—*Educator, Institution of Higher Learning, Missouri*

Plans Haven't Changed

I feel supported in my school by colleagues and administration.—*Educator, Middle School, Iowa*

I enjoy teaching, and any other field I would choose to go into would require me to have started at a younger age for it to be worth the time and money for training/certification.—*Educator,*

Middle School, High School, Institution of Higher Learning, Missouri

As soon as I started teaching, it felt right. Even through all of the difficulties of teaching in a very, very difficult school, I knew I needed to stay. I've since moved into better conditions, and [a] more respectful environment. Being treated as a professional and finally having resources to teach has made it so much easier to consider this career the one I will retire from.—*Educator, Middle School, High School, California*

I've achieved my goal of getting an Einstein Fellowship, and I want to continue to grow professionally. —*Educator, High School, Oregon*

If I get tired of one thing like elementary, I can move to middle school. —*Educator, Middle School, Texas*

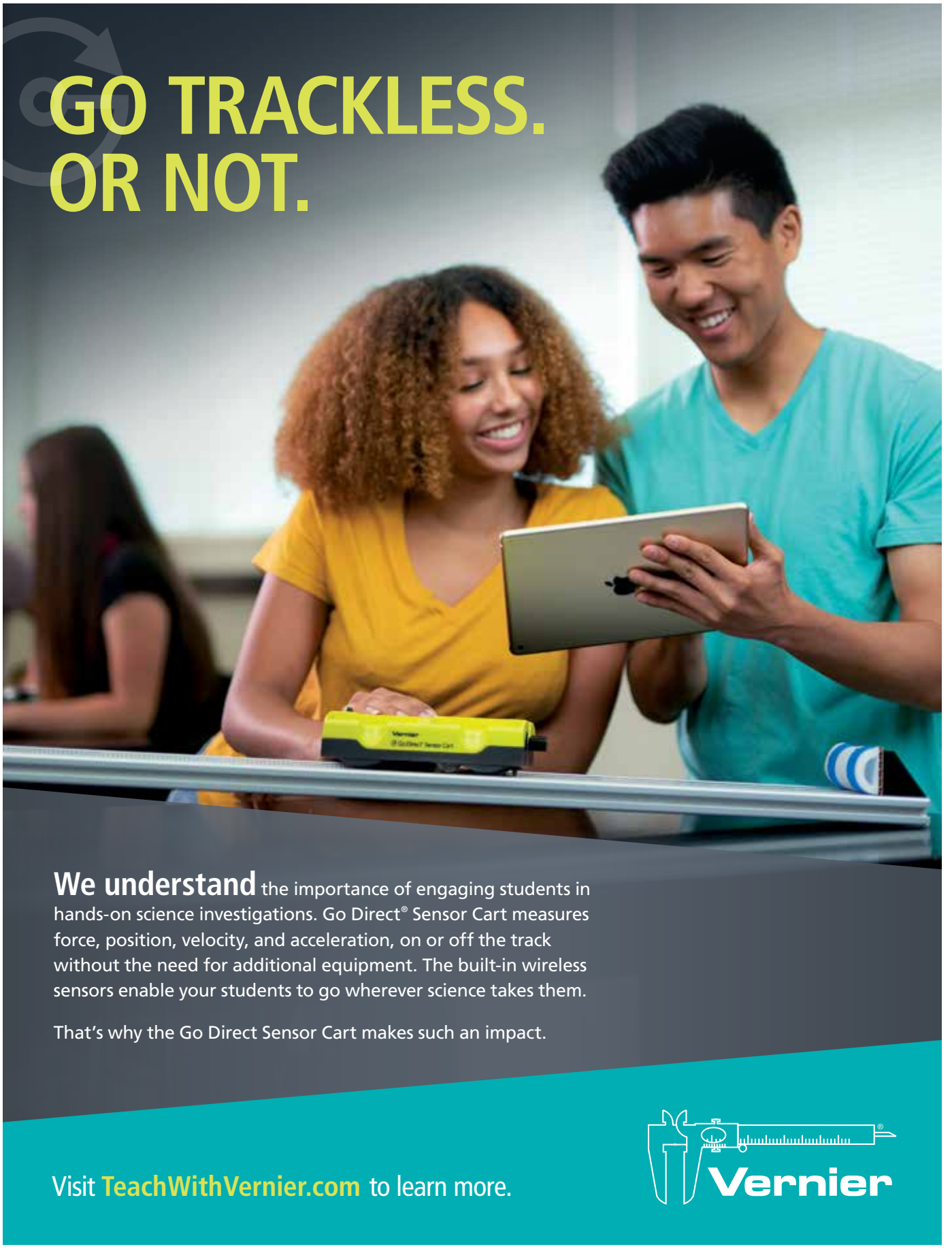
I'm good at it and I love it.—*Educator, High School, Utah*

I am happy [to be] teaching and do not feel that I can contribute in any other way (I was a research scientist before I became a teacher, but I did not feel the passion for that career that I feel for teaching). I also have entertained the thought of going into curriculum design or educating future teachers and have not found the drive to pursue those avenues strong enough.—*Educator, Middle School, High School, Hawaii*

I have a 30-year plan to become Secretary of Education of the United States after 20 years of teaching, during which time I'll get a [juris doctorate or masters of arts] in education law and a [doctorate of education] in science education after 10 years of teaching, and I've seen no reason to change that plan (quite the opposite). At the end of the day, people making decisions at the top should be people who've been in the trenches, have experience with what works, and aren't just [talking], so I want to work my hardest to get there.—*Educator, High School, Institution of Higher Learning, New York*

I transitioned at an older age into teaching. I am quite resilient, have raised my own children, and knew going into teaching that it would be challenging. My only plans are to go to a school corporation that pays better and has better benefits than where I am.—*Educator, Middle School, Indiana*

I need my retirement benefit. —*Educator, High School, California* ●



Quotable

Every individual matters. Every individual has a role to play. Every individual makes a difference.

—Jane Goodall, British primatologist and anthropologist

MONEY 101

Will New Tax Law Change Your 2018 Filing?

By Kelly Kenneally

Remember the Tax Cuts and Jobs Act enacted in the closing days of 2017? That legislation marked the most significant reform of the U.S. tax code in more than 30 years. What will the new law mean for your tax filing? For starters, experts predict fewer 2018 tax returns will be itemized because the new law eliminates the personal exemptions and almost doubles the standard deduction from $6,350 to $12,000 for individuals and from $12,700 to $24,000 for married couples filing jointly.

With a substantially higher standard deduction, it may no longer make sense for many households to itemize deductions. According to the Internal Revenue Service (IRS), about 30% of tax filers previously itemized returns, and the nonpartisan Tax Policy Center predicts that number could fall to about 10% this year.

Two itemized deductions remain, however, that educators would be wise to explore: deductions for supplies and student loans.

Teachers can claim the Educator Expense Deduction regardless of whether they take the standard deduction or itemize their taxes. A teacher can deduct a maximum of $250, while two married teachers filing a joint return can take a deduction of up to $250 apiece, for a maximum of $500. TurboTax® offers tips on deducting the cost of classroom supplies in compliance with the law at *http://intuit.me/2EY4iS7*.

Also relevant to many teachers, student loan deductions were preserved under the new tax law. Educators often carry large student loans for years. According to Student Loan Hero, about 44 million Americans owe more than $1.48 trillion in student loan debt. This deduction allows those repaying student loans to reduce their tax burden by as much as $2,500, and is available to anyone paying interest on education debt, even if you are not itemizing deductions. However, only single people earning less than $80,000 and married couples earning less than $160,000 can take advantage of the deduction.

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As you determine the best approach for preparing your taxes, here's an overview of four key itemized deductions that now are capped or eliminated.

State and Local Taxes

Significant changes to the state and local tax deduction, or SALT, make it less likely some taxpayers will itemize their taxes. The SALT deduction historically was a sizable deduction for taxpayers, but now is capped at $10,000.

This change could be consequential for residents of high-tax states like California, New Jersey, and New York. For example, if your combined property and state income tax is $20,000, only half ($10,000) is deductible now.

Home Mortgage Interest

Formerly, taxpayers could write off the interest paid on home loans that are up to $1 million. The interest payments on home equity loans or lines of credit (HELOC) of up to $100,000 were deductible regardless of how the money was spent.

Under the new law, homeowners can claim a deduction for interest on loans of up to $750,000 for the combined amount of loans for buying, building, or substantially improving their primary and any secondary homes. This deduction applies only to loans to build or improve a home, not for HELOCs used for other expenses.

Medical and Dental

Allowing taxpayers with high medical costs to reduce their taxable income by deducting some out-of-pocket medical expenses was a contentious issue as the tax bill was under consideration. Under the new law, Americans can claim itemized deductions for out-of-pocket health-care costs exceeding 7.5% of their adjusted gross income during the 2018 tax years. Note that next year, that threshold will climb to 10%.

Experts predict that even at the lower threshold, not many Americans will be able to take advantage of this deduction because their out-of-pocket medical expenses are too low. For many educators, their largest medical expense is their health insurance premiums. The premiums typically are paid with pretax dollars, so this cannot be deducted.

Casualty and Theft Losses

Previously, taxpayers could claim itemized deductions for unexpected property losses exceeding 10% of their adjusted gross income and not reimbursed by insurance. This would include damage from fire, accidents, theft, and vandalism, as well as natural disasters.

Now, claims for personal casualty losses apply only if the damage results from a disaster declared by the president. This has been in effect from the start of 2018 and will be through the end of 2025, and it maintains the 10% threshold. Given that the United States has experienced damaging hurricanes and wildfires in recent years, this provision could apply to an increasing number of Americans.

These are just a few of the highlights from the new law, which includes many more changes to deductions. For example, moving expenses, tax preparation, and alimony payments no longer are tax deductible.

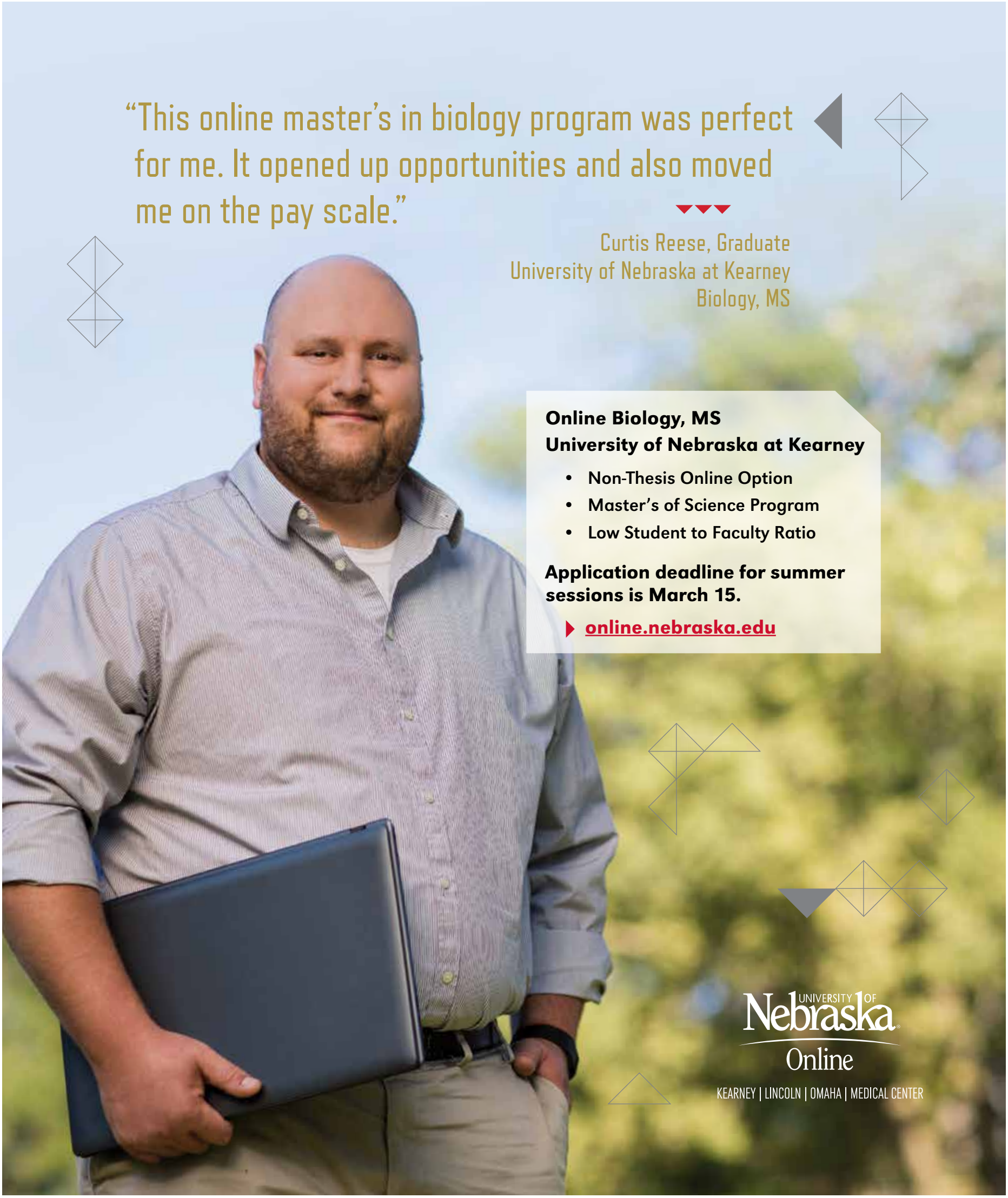
This column isn't providing tax or financial advice; it offers an overview of some of the significant tax law changes that will help educators consider their tax strategy in the coming weeks.

Given all the changes, it may be prudent to consult a tax professional or accountant now to develop a strategy for your 2018 filing. Since they charge fees for their services, be sure to get an estimate of costs beforehand. According to the National Society of Accountants, the average fee to prepare an itemized Form 1040 with Schedule A and a state tax return is $273, and the cost for a Form 1040 without itemized deductions and a state return is $176.

Another option to consider is free tax services. For example, AARP Foundation offers a Tax-Aide program. While the service is targeted to older filers, there are no income or age restrictions for seeking help from one of AARP's trained volunteers. AARP published more information on free resources last year at *http://bit.ly/2PY9EGr*.

The IRS offers a Free File program by the Free File Alliance, a nonprofit comprised of tax preparation companies. The program, geared toward low- and moderate-income taxpayers with an adjusted gross income of $66,000 or less, provides step-by-step tax filing guidance. More information is available at *http://bit.ly/2BE2Bd1*. ●

Kelly Kenneally has 25 years of public policy experience including serving in the White House. She has worked for more than 10 years with nonprofit organizations to help improve Americans' financial security.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STEM Games, from pg 1

no initial explanation. The debrief is the important part: Why is [your structure] balanced or unbalanced?," Hopkins relates.

To create her own game cards based on state test questions, Hopkins uses the free resources on Problem-Attic (*www.problem-attic.com*), one of many resources that she and a colleague presented during their Game On: Gaming With a Purpose session at the Science Teachers Association of Texas's 2018 Conference for the Advancement of Science Teaching.

Playing games with her students helps Hopkins "get to know them and allows me to check in with them during the year…I'm willing to look foolish," she admits, "because sometimes it takes that to reach some of my students."

In her games, Allyson Macdonald, a professor of educational sciences at the University of Iceland in Reykjavík, Iceland, requires student preparation. For Sustainability Scrabble, each student "had to make five tiles…The tiles all had to be related to recent class work in sustainability and could be a word/concept, a quote, or a picture (photograph or diagram)…The learning was in the questioning and defense of what [was] on the tile," she explains.

Her Three More game familiarizes students "with the 2030 Sustainable Development Goals. The year is 2025, and there are concerns that some of the goals will not be reached. Each person picks three of the 17 goals [that] they wish to alter in some way and [names] three additional goals," Macdonald relates.

In each group, she explains, "two participants [decide] the steps they would take to introduce a project linked to the goals selected from the survey. The other two…[ask] searching questions about planning and implementation. The learning was in the questioning and defense of what was being proposed and audited." Scores were determined by "clarity of proposal and feasibility, and additional points were given for incorporating an education project."

Designing STEM Games

Whether teachers use commercially available games or create their own, they should always be sure to follow lab safety practices during gameplay. Other considerations include making sure all students can participate.

Valarie Broadhead, science teacher at Aliso Viejo Middle School in Aliso Viejo, California, says she has incorporated games "as part of my *NGSS* instructional strategies," designing them "around special education students, then add[ing] on features and increas[ing] complexity for general education students." She incorporates "visual aspects…especially [in] the instructions and content. Pictures, models, and the use of colors also help English language learners," she notes.

Broadhead uses very large text so materials are easier to read, especially for students with visual impairments. She also places "pre-printed items (games, learning objectives, instructions, etc.) on their desks so they don't have to look up at the board, reducing possible errors." By using microphone enhancement, headsets with volume control, and print materials, students with hearing disabilities "don't have to 'hear' the instructions to know how to play the game," she explains.

"The great thing about science is that it's really an active, engaging discipline, so games can be created [in which] student players are doing the work of the field," contends Kathleen Mercury, who teaches gifted middle school students at Ladue Middle School in St. Louis, Missouri. "Students can [play] the role of engineers, learning how to create circuits by playing the right cards, or players can learn about the cycle of photosynthesis by moving the different elements around. "

Because she is "passionate about helping other teachers incorporate games and game design in their classes," Mercury shares her game design teaching resources for free at *www.kathleenmercury.com*. "Playtesting prototypes is such an important part of the process for students to see," she says, because "games, like any other open-ended work or research that starts with a question, are created through a process of inquiry, testing, and refinement. By modeling my willingness to engage in this process and to take feedback, they see the value of it, and that makes it easier for them to create and show their own unfinished work."

Lindsay Portnoy, co-founder and chief learning officer of Killer Snails, a learning games company, says, "We wanted to make science accessible, but also impactful, so all of our games are based on both dynamic STEM content and extant standards." In the BioDive game, for example, "student scientists collect data to iterate on their models as they work out their hypothesis, identifying how abiotic factors impact biotic factors across three marine ecosystems," she notes.

"We're also all parents and want to make games that are equally fun to play in class or at [home]," Portnoy asserts. ●

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This strand will focus on ways that science and other subject areas can be integrated, including the best way to bundle disciplinary core ideas.

Confluence of Equity and Education
This strand will focus on our imperative to maintain high expectations and broaden access and opportunities in STEM education to increase the likelihood of student success and to prepare them to compete globally.

The sessions offered in each strand will target by levels: Novice, Intermediate, Advanced

Learn more at *www.nsta.org/stlouis*

#NSTA19

NSTA National Science Teachers Association

PULL-OUT SECTION

SCIENCE TEACHERS' GRAB BAG

Inside this Convenient Pull-Out Section you will find:


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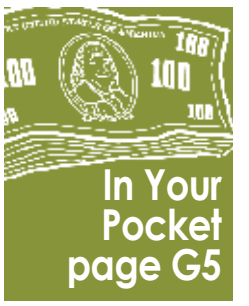
News Bits page G3


In Your Pocket page G5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Freebies for Science Teachers

The Underrepresentation Curriculum. H This curriculum was designed to help science, technology, engineering, and math (STEM) teachers bring conversations about equity and injustice into their classrooms in ways that fit their context and flexibility. In this unit, students compare census data to a dataset that demographically describes scientists, and uses the evident underrepresentation to explore questions of race and society and justice in America. Though the unit is geared toward high school students, teachers are encouraged to adapt the resources for their own grade levels and students. See *http://underrep.com*.

Madden Science. H High school educator David Madden has created a collection of lively and informative educational videos at the website *https://bit.ly/2R8saYZ*. Designed for high school students, but adaptable for other levels, the videos cover topics in general science, biology, physics, and biomimicry and highlight interesting concepts in the natural world. Notable titles include *Owl Biomimicry: The Evolution and Emulation of Silence* and *Sports Science: Power* (an exploration of power through a sports and training lens). In addition, a playlist of recorded Skype interviews with scientists offers students expert insight on topics like ecology and evolution, rainforest ecology, and biomimicry with pitcher plants. The videos can be used during class as a lesson supplement, preview, or review, or as homework assignments for lesson support or enrichment. Teachers can also use the videos when planning flipped classroom lessons.

Citizen Science Soil Collection Program. K12 Developed by the University of Oklahoma's Natural Products Discovery Group, this program provides teachers nationwide with resources (including a how-to-participate tutorial and a curriculum guide) to involve elementary, middle level, and high school students in authentic soil and microbiology research. The project brings together students and biomedical researchers to find new drug-like molecules from fungi found in the collected soil samples. The curriculum guide presents a collection of activities that teach students about fungi (grade four), the role of decomposers in the food web cycle (grades five and six), and the potential of natural products to become highly useful synthetic products and the connection between form and function (grades 7–12). To access the guide and to participate, visit the website *https://whatsinyourbackyard.org*.

USDA NRCS TEXAS

Nanomaterials: To Use or Not to Use. H Designed for high school biology and AP Environmental Science courses, this learning module from the Rochester Institute of Technology's Golisano Institute for Sustainability presents four lessons exploring nanomaterials, their life cycle, their possible impacts on the ecosystem, and research methods. The module's lessons and hands-on activities support the *Next Generation Science Standards* (*NGSS*) and enable students to contribute their learning to the public's understanding of nanomaterials through posters, blogs, videos, or other presentations they create themselves. The module also offers extension ideas for adapting the lessons for older or younger audiences. Refer to *https://bit.ly/2QnXVAp*.

Unleash Your Citizen Scientist. E Show students in grades 2–5 they don't need to wait until they grow up to be a scientist! In this 25-minute virtual field trip produced by the Girl Scouts of the USA and Discovery Education, students learn what it takes to be a citizen scientist and how they can contribute to the world of science from their classroom and their own backyard. An accompanying educator's guide presents activities that develop science process skills, such as learning to classify quantitative and qualitative observations (grades 2–3) and collaborating with peers to create an observation template (grades 4–5). Access these and other resources to engage students in STEM at the following website: *www.girlsleadstem.com*.

The Frankenstein Bicentennial Project. M Developed by Arizona State University researchers and partners to commemorate the 200th anniversary of the 1818 publication of Mary Shelley's novel *Frankenstein,* this project uses the novel to explore the social and ethical dimensions of emerging technologies such as artificial intelligence, synthetic biology, robotics, and human enhancement. Targeted for the middle level (ages 10–14), but adaptable for older and younger audiences, the project features an immersive online game that reimagines Mary Shelley's Frankenstein for a new generation (Frankenstein200); hands-on activities

See Freebies, pg G2

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

Freebies, from pg G1

and supporting materials for classroom and outreach settings (Frankenstein's Footlocker); and at-home activities for students and families (Frankenstein's Workbench). The activities are designed to prompt conversation and reflection about responsible innovation and include Spark of Life, in which students create a battery from two kinds of metal and their own body; and Frankentoy, in which students make a "creature" by mixing and matching different parts of toys. See the website *http://bit.ly/2r7Zynj*.

BiteScis Lessons. H These two-part lessons offer "bites" of current science research (i.e., student-friendly summaries of active research) and accompanying classroom activities for high school learners. The lessons—which support the *NGSS* and *Common Core* and cover topics in biology, chemistry, and physics—were developed by a team of teachers and early-career science graduate students to help educators connect classroom learning to relevant science research. The lessons are intentionally flexible: Teachers can use the bites alone to generate science discussion or help develop students' nonfiction text-reading skills, or incorporate both components as part of more in-depth studies and labs.

Lesson titles include HIV: Sequencing and Common Ancestry; Kinematics, Impulse, and Human Running; Convergent Evolution in Animal Locomotion; Acceleration Isn't Only Speeding Up; and Mechanical Waves: Applications in Medicine. In addition, the site invites educators to field-test new lessons in their classrooms; participating teachers will receive swag and an Amazon gift card! Visit *https://bitescis.org*.

Generation Beyond Aviation. H This digital curriculum from Lockheed Martin and Discovery Education gives high school students an inside look at how engineers and scientists are solving real-world technology challenges, from fighting wildfires to making flight suits for military pilots safer. Each unit includes a video describing innovative research and a STEM career at Lockheed Martin and a related

STUART PHILLIPS/U.S. NAVY

classroom challenge in which students model the processes engineers use. In Nature-Inspired Aviation, for example, students design a drone that can fly in the air and land in water, using the anatomy of animals as their guide. In Suit Up for Takeoff, students evaluate material for a proposed flight suit, while in Under the Radar, students must design an aircraft to evade radar. In Wildfire Response, students learn about different types of wildfires and how modern technology can be used to help firefighters determine the best response. Each unit includes Educator's Guides containing key learning objectives, essential questions, background information, *NGSS* connections, procedures, and student handouts. Refer to the following website: *http://bit.ly/2KCLR8Y*.

Verizon Innovative Learning Activities. K12 Looking for interactive STEM activities that excite students about emerging technologies like wearables, virtual reality, augmented reality, coding and game design, digital photography, and emoji design? Check out the Verizon Innovative Learning Educator's Portal at the following website: *http://bit.ly/2SeOPTO*. Here teachers can access projects for elementary, middle, and high school levels (complete with student guides, teacher guides, and introductory videos) to involve students in the engineering design process. (Free registration is required to access the resources.)

Bow Seat Ocean Awareness Resources. E M H Bow Seat—a nonprofit group dedicated to harnessing the power of creative arts to educate and motivate students ages 11–18 to become ocean stewards—offers lesson plans, readings, and contest opportunities to introduce marine science issues and promote ocean literacy. The lessons address topics in climate change, marine debris, and the right whale. Access the resources at the website *https://bit.ly/2QlMnNO*.

Analog Educators. K12 An analog astronaut is a person who conducts activities in simulated space conditions. Analog astronauts participate in a wide range of research from human physiology, psychology, crew cohesion, exercise, and nutritional studies to testing new science, technology, and engineering applications. With the resources at *http://bit.ly/2AVA1mY*, you can involve K–12 students in this important part of space exploration and generate interest in aerospace and aviation careers. For example, download NASA curriculum (e.g., Train Like an Astronaut, grades 3–8; Exploring Space Through Math, grades 7–12; Math and Science @ Work, grades 10–12) or watch Career Spotlight videos from USA.gov to learn what it takes to be an Aerospace Engineer (grades 3–8). Other resources include links to websites such as the Federal Aviation Administration's, which offers aviation and space career information appropriate for grades 5–12, and the Civil Air Patrol's, which offers aviation-related education resources and activities for all ages.

Cornell Institute for Biology Teachers (CIBT). K12 CIBT has developed more than 100 labs and activities to enhance science instruction in K–12 classrooms at the following website: *https://bit.ly/2FHoLPL*. Read abstracts of each activity, or search the collection by grade level or topic (e.g. Animals, Ecology, Evolution, Forensics, Human Health, Insects, Microbiology, Molecular Biology, Physical Sciences, Physiology, and Plants). Highlights from the elementary resources include a Teeth Unit and the activity Edible Earth Parfaits. Middle level students can participate in an Oil Spill Lab or learn about forensic science techniques (e.g., fingerprinting, chromatography, and chemistry) in the Case of the Missing Diamond Maker. In Battle-Jar Galactica, high school students examine bacteria that grow during the formation of sauerkraut and how the organisms work to break down the cabbage to get energy.

FINN ÅRUP NIELSEN

K–12 Makerspace Resources. K12 MIT's Edgerton Center has resources for setting up and operating K–12 Makerspaces. Available at the website *http://k12maker.mit.edu*, the resources include a printable list of tools and materials; illustrated charts describing tool types and their functions; supervision and safety guidelines; training guides for common tools (including student checklists and refresher guides); and links to articles, books, and websites highlighting the benefits of K–12 Makerspaces. In addition, a photo gallery of K–12 Makerspaces features teacher-tested ideas for layouts, storage systems, and signage, and the Maker Methodology outlines a teacher-friendly design process for creating, planning, and facilitating meaningful Maker projects.

Activities for Data Literacy. E M H Interested in improving data literacy among upper-elementary to high school students? Use the tools and data activities at Tuvalabs.com. The website's free version provides datasets and suggested activities for students to work with the data. Themes include Dinosaurs, Land Animals, Weather Balloon Data, and Passengers on the *Titanic*. Teachers can also upload up to 15 datasets of their own and create activities for students. Refer to *https://tuvalabs.com/k12*. ●

News Bits

- **The U.S. Navy's Office of Naval Research has awarded $1 million to global research and development organization Battelle to pilot a program that offers teachers from two states externships at local manufacturing or engineering businesses, to encourage problem-based learning experiences in their classrooms.** K12

In fall 2019, teachers from Tennessee—and during the following year, from Ohio—will begin the Manufacturing & Engineering Externship Program, which will ultimately reach 160 educators. Aimee Kennedy, Battelle's senior vice president for education and philanthropy, says this award will fund teachers' stipends, and "teachers will find and share new connections between academic content and real-world solutions." Battelle will support participating teachers with year-long training on problem-based learning to address the gap in science, technology, engineering and math (STEM) industries, particularly in manufacturing. See *https://bit.ly/2PIQfrW.*

- **The new Netflix science series *Brainchild* features relatable, family-friendly science topics such as the senses, neurology, marine biology, and gravity, as well as women and minorities in STEM fields.** M H

Executive-produced by rapper Pharrell Williams and targeted to preteens and teens, *Brainchild* explores major scientific topics using interactive games, illusions, hidden-camera experiments, and magic. Episodes highlighted in the series' trailer investigate questions such as What exactly are memories? How big is the universe? Do you control your emotions, or do your emotions control you? What are germs? Do fish urinate?

For each episode, *Brainchild* offers science, technology, engineering, arts, and mathematics–targeted, classroom-ready lesson plans and student handouts. The educational materials at *www.brainchildshow.com* are designed for students in grades 3–8. The lessons support the *Next Generation Science Standards, Common Core Learning Standards in Literacy and Math,* and National Health Standards. Watch the trailer at *https://bit.ly/2PHTMaS.*

- **Mobile preschool classrooms have become more prevalent throughout Colorado.** P

In some rural communities in Colorado, preschool students are accustomed to attending school on buses that come twice or three times a week, but more recently, mobile preschool classes have been established in Denver suburbs. The mobile model is a response to "child-care deserts," and the buses are reaching children—many of whom are English-language learners—who can't attend traditional brick-and-mortar preschools because of their cost and/or distance, or because the community has more children than preschools.

The state has licensed four mobile programs, which means they meet basic health and safety standards. But so far, none of the mobile programs have received a quality rating garnered by building-based preschools, despite their efforts to meet the criteria. Mobile programs generally run for shorter time periods, but program managers and parents have observed that children do make gains.

Read more at the following website: *https://bit.ly/2OI1PyP.* ●

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Cincinnati, OH ..... November 14–16
Seattle, WA ..... December 12–14
Proposal Deadline: 1/15/2019

2020 National Conference
Boston, MA ..... April 2–5
Proposal Deadline: 4/15/2019

To submit a proposal, visit
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NSTA National Science Teachers Association

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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.

January 20–25

Bostitch Creativity in the Classroom Grant K12

These $250 grants go to K–12 teachers with creative lesson plans. Lessons should be original, impactful, and exemplify creativity in the classroom. Submit a Google Doc with your lesson plan and an application to *http://bit.ly/2DWZ2jw* by **January 20.**

Lawrence Scadden Teacher of the Year Award in Science Education for Students With Disabilities K12

This award recognizes excellence in science teaching for students with disabilities. The honoree will attend the NSTA National Conference, be recognized at the Science-Abled Breakfast, and receive $1,000 for travel expenses. K–12 science, general education, or special education teachers in public or private schools with at least five years of teaching experience may apply by **January 20** at *www.sesd.info/scadden.htm.*

Terri Lynne Lokoff National Child Care Teacher Awards P

This award goes to outstanding child-care teachers from all 50 states, the District of Columbia, and U.S. military bases and installations worldwide. Awardees receive $500 for personal use and up to $500 for a classroom enhancement project of their own design, submitted with their application. They also receive a paid trip to Philadelphia to attend the award ceremony and exchange ideas with peers. One awardee will receive the Helene Marks Award and be named the National Child Care Teacher of the Year, which comes with a $1,000 stipend.

Interested teachers should complete a pre-application form online at *www.tllccf.org/about-awards;* full applications must be postmarked by **January 21.**

National Chemistry Olympiad High School Mentors Needed H HE

The American Chemical Society (ACS) seeks high school teachers and college faculty to serve as U.S. National Chemistry Olympiad (USNCO) mentors. During their three-year term (2020–2022), mentors help prepare the top USNCO students to compete in the International Chemistry Olympiad.

During their first summer, mentors prepare for and work with students in a two-week study camp; in their second and third summers, mentors accompany students to the International Chemistry Olympiad and serve on the International Jury. Mentors receive an honorarium, and the ACS covers most travel expenses. Apply by **January 25;** see *http://bit.ly/2QreJWX.*

Alan Shepard Technology in Education Award K12

This award—presented by the Astronauts Memorial Foundation, in partnership with NASA and the Space Foundation—recognizes the outstanding contributions of one K–12 educator to technology education. Priority is given to innovative aerospace or aeronautics programs. The winning teacher will receive $1,000, a commemorative trophy, and a trip to the Space Symposium in Colorado Springs to receive the award.

Candidates can be formal or informal educators. Postmark applications by **January 25;** visit *http://bit.ly/2BHYSLA.*

January 31

American Physiological Society Six-Star Science Online Professional Development Program M H

The society offers this program for middle and high school science teachers. Over the course of 10 months, online teacher fellows explore Six-Star Science, a research-based framework for excellence in science instruction, and develop methods for implementing it in their classrooms. Fellows design experiments, engage in online discussions, and develop strategies to enhance student-centered learning. They receive a $1,400 stipend for participation, and graduate credit is available.

Science teachers in any discipline with at least one year of teaching experience and a current appointment are eligible. Those who work in rural areas, school systems with limited resources, or primarily minority schools are encouraged to apply. Applications are due by **January 31.** Consult *http://bit.ly/2Q3JZfx.*

Five Star and Urban Waters Restoration Grants A

These grants go to projects that promote community stewardship of natural resources and enhance local water quality, watersheds, and the species and habitats they support. Projects should have measurable ecological, educational, and community benefits and include diverse community partnerships and an education or outreach component. Grants range from $20,000–$50,000 with an average grant of $30,000. Apply by **January 31;** refer to *http://bit.ly/2U0taAh.*

Fund for Teachers Grants P K12

Teachers can use these grants to support professional development experiences of their own design, anywhere in the world. Individuals receive up to $5,000, and teams receive up to $10,000 to conduct their own summer projects. PreK–12 teachers, curriculum specialists or heads, special education coordinators, media specialists, and librarians who have at least three years of teaching experience and spend 50% of their time directly teaching students are eligible.

Application instructions vary by state; check eligibility and apply online by **January 31** at *www.fundforteachers.org.*

SPIE Education Outreach Grants K12 HE

SPIE, the international society for optics and photonics—the science and application of light—provides these grants for optics- and photonics-related education outreach projects. Schools, youth clubs, universities, science centers, optics centers, industry associations, and optical societies are eligible for grants of up to $5,000. Projects are judged by their potential to impact students and increase optics and photonics awareness. Apply by **January 31;** consult *http://bit.ly/2RoiKsr.*

February 1

AAPG Foundation's Teacher of the Year Award K12

The American Association of Petroleum Geologists (AAPG) presents this award to an outstanding K–12 geoscience teacher. One finalist will be selected from each of six regions: Pacific, Rocky Mountain, Southwest, Mid-Continent, Gulf Coast, and Eastern. Applicants must have three years of full-time teaching experience and be currently teaching at a K–12 school.

The honoree will receive $6,000: $3,000 for his or her school, to be used at the teacher's direction, and $3,000 for personal use. In addition, the honoree receives an all-expenses-paid trip for two to the AAPG Annual Convention and Exhibition to receive the award. The runners-up in each area will receive an honorable mention and $500.

Teachers must apply directly through their local geological society by **February 1.** Learn more at the website *http://bit.ly/2diFUzA.* ●

What's New

FROM U.S. GOVERNMENT SOURCES

National Institutes of Health (NIH)

Infectious Diseases Lessons H

This series of five online activities for high school learners explores the wide-ranging impact of infectious diseases and related problems. Through the activities, students examine the impacts of infectious diseases (Deadly Diseases Among Us), determine the cause of a mysterious disease (Disease Detectives), analyze data to explain a case of antibiotic-resistant tuberculosis (Superbugs: An Evolving Concern), investigate the phenomenon of herd immunity (Protecting the Herd), and use online resources to evaluate proposals to combat AIDS, VRSA, and measles and recommend one proposal to support (Making Hard Decisions). The activities can be taught in sequence as a unit to supplement standard biology curriculum, or they can be used individually to enhance instruction of a particular concept or concepts in biology. Learn more and access the activities at the website *https://bit.ly/2QdDKoJ.*

U.S. Environmental Protection Agency (EPA)

America's Wetlands H

This resource will give high school students and teachers a better understanding of the variety of wetlands, their importance, how they are threatened, and what can be done to conserve them for future generations. A Wetlands Fact Sheet Series provides an introduction to wetlands and offers information on how to teach about them, their economic benefits, types of wetlands, and wetland restoration, among other topics.

The site's Wetlands Education for Students and Teachers section also offers resources for the elementary and middle levels. It has a comprehensive collection of K–12 wetland resources from EPA and from top universities and conservation organizations. Categories include Activities, Teaching Guides and Materials, Education Programs, Videos, and links to additional resources. See *http://bit.ly/2KKqdPW.*

National Oceanic and Atmospheric Administration (NOAA)

Raising the Bar: The Oyster Bar! K12

Learn how to foster environmental literacy and provide a Meaningful Watershed Educational Experience in the webinar Raising the Bar...the Oyster Bar! Engaging Students With NOAA's Three-Dimensional Learning Sequence. Hosted by Molly Harrison, NOAA Planet Stewards Coordinator, and Bart Merrick, Education Coordinator for the NOAA Chesapeake Bay Environmental Training Center, the 90-minute presentation shares guidance for how to effectively connect K–12 standards-based classroom learning with issue-driven outdoor field experiences, action projects, and meaningful synthesis and conclusions. The webinar primarily focuses on a Maryland-based program conducted with elementary students; however, it includes ideas and resources for adapting the experiences for other locations and for middle and high school levels. Watch it at the following website: *https://youtu.be/lQnqS_4V4ec.*

Severe Weather Preparedness Game E M

Owlie Skywarn's Severe Weather Preparedness Adventure, an online game from NOAA and the National Weather Service, teaches students in grades 3–8 what to do to stay safe in severe weather, such as winter storms, hurricanes, floods, tornados, and lightning events. To play, students join Owlie and friends on his quest to become a Young Meteorologist, solving game challenges and learning weather facts and tips along the way. After completing all five challenges, Owlie—and students—earn a printable Young Meteorologist certificate. Visit *https://bit.ly/2S2WDYJ* to access the game and additional resources, including a glossary of weather terms and links to background information and classroom activities that support game content.

U.S. Department of Agriculture (USDA)

Team Nutrition Resources E M

USDA's Team Nutrition program has educational resources to inform K–8 students and their families about the importance of healthy eating and healthy lifestyle choices. Visit the website *https://bit.ly/2sjf3Id* for games, activities, posters, handouts, recipes, and more on the topic. For example, students can play MyPlate Grocery Store Bingo to learn about new foods and healthy eating habits or become Kid Food Critics when they visit the grocery store and choose a new food to try, taste, and rate like a professional reviewer. The site also has informational handouts for parents and teachers.

National Aeronautics and Space Administration (NASA)

The Invisible Network M H

This NASA podcast series engages middle and high school students, educators, and other space enthusiasts in the excitement of space exploration, science, and history. The six-part miniseries focuses on developments and innovations in space communications networks—past and present—that are crucial to spaceflight, yet are often overlooked. Told in a narrative format, the series highlights a side of NASA that students don't often see: the human side. Each podcast is about 15–20 minutes long and includes a transcript. See *https://go.nasa.gov/2ykTtb1.*

Beyond Earth: A Chronicle of Deep Space Exploration, 1958–2016 M H

This 393-page e-publication chronicles humans' attempts to send robotic spacecraft beyond Earth's orbit, to the Moon, to other planets and their moons, to the Sun, to comets, to minor planets, to dwarf planets, and ultimately beyond the solar system. Available as a PDF document as well as for Kindle and other e-Book readers, and suitable for middle and high school Earth and space science educators and space science enthusiasts of all ages, the book presents a chronological listing of all robotic deep space missions attempted by humans since the Space Age began in 1957. Each listing contains details about each attempt, including nation of origin, objectives, spacecraft, launch dates and times, scientific instruments, and summaries of mission results. Find this book at *https://go.nasa.gov/2y9QxgK.*

Learning Launchers K12

Bring the excitement of the International Space Station (ISS) and space science research into K–12 classrooms with NASA's Learning Launchers teacher toolkits. Each toolkit focuses on a single research theme or topic related to the ISS and contains lessons, videos, and other related resources. Found at *https://go.nasa.gov/2S1VWia,* the toolkits address themes such as Microbes, Lightning, Dark Matter and Particle Acceleration, Plant Biology, Education, Circadian Rhythm and Cognition on the International Space Station, Earth Observations, Cardiovascular Health, Nutrition, and Robotics. Use the activities in the classroom to help students recognize the impact of space science research and exploration in their daily lives.

U.S. Department of Energy (DOE)

Fossil Energy Teacher Toolkit K12

DOE's Fossil Energy Office created a fossil energy teacher toolkit to bring energy education into K–12 classrooms. The materials include printable study guides and classroom activities emphasizing the roles played by coal, natural gas, and petroleum in everyday life and familiarizing students with the science and technologies that can help make using fossil fuels cleaner. The toolkit also contains a classroom activity, Conserving Electric Energy, for elementary school students; online

interactive energy lessons for middle school students; and career information for high school students. Visit *http://bit.ly/2zwqZfo.*

Centers for Disease Control and Prevention (CDC)

Disease Trading Cards M H

Use these trading card sets to teach middle and high school students about some of the diseases the CDC studies. Available at *https://bit.ly/2QAxKmo,* the downloadable trading cards feature images and fast facts and are organized into three series. The first series, Infectious Diseases, includes a quiz card to test student knowledge and covers more than 20 diseases of public health importance, including Anthrax, Avian influenza, Ebola, HIV, Lyme Disease, Rabies, Strep Infection, Tuberculosis, Ulcers, and West Nile Virus. The second series, Vaccines, features cards about diseases that can be prevented by vaccines, such as Chicken Pox, Polio, and Tetanus. Disease Detectives, the third series, has cards highlighting the ways scientists are working to treat and prevent foodborne illnesses.

U.S. Census Bureau

Statistics in Schools K12

Help K–12 students understand the importance of learning statistics for their future success with the video P*reparing Students for a Data-Driven World*. The video highlights the Bureau's efforts to promote statistical literacy through its Statistics in Schools Program, which has produced interdisciplinary math, geography, and history and social studies lessons for K–12 audiences that incorporate the use of real data. The video emphasizes the value of statistics in everyday life, and the lessons provide opportunities for students to develop skills in areas like data analysis, graph interpretation, and drawing conclusions.

On the same page as the video (*https://bit.ly/2RBENwu*) are links to geography activities for grades K–12. Science-related activities include Examining Changes to the Environment Through Pictures and Data (grades 4–8) and Beyond Population—Using Different Types of Density to Understand Land Use (grade 12).

Analyzing Visual Data Activity E

In this interdisciplinary science and history activity, students in grades 2–3 practice analyzing visual data as they examine historical images of three types of Native American dwellings (teepee, pueblo adobe structure, and hogan) and record observations about each one. Students then discuss their observations as a class, comparing the basic features of each dwelling type and reflecting on their understanding of what "home" means based on their observations. Developed as part of the Census Bureau's Statistics in Schools program, the activity gives students an opportunity to work with primary sources while also learning how to analyze visual data. Both teacher and student versions are included. Refer to *https://bit.ly/2DrH1JY.*

U.S. Department of Education (ED)

Ask A REL Reference Desk Service K12

Developed by ED's Institute of Education Services, the Ask A REL reference desk service is a collaborative effort provided by 10 Regional Educational Laboratories (RELs) that functions like a research librarian. The service enables K–12 teachers, administrators, and other stakeholders to submit research-related questions about education policies, programs, and practices online. Each question is routed to a REL to begin preparing a response, and REL staff consult with experts and search databases, including the National Library of Education and the Educational Resources Information Center, to answer the question. REL responses—which include annotated references; links to free, relevant research articles; and referrals—are provided in as little as three weeks. Learn more and view an archive of answered questions at *https://bit.ly/2Sl7UUr.* ●

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NSTA National Science Teachers Association

MULTIVIEW

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.

Smithsonian's Teacher Innovator Institute E M

This free program at the National Air and Space Museum in Washington, D.C., helps teachers of grades 5–8 promote authentic learning in science, technology, engineering, and math (STEM). Working with museum educators and content experts, participants develop projects for their classrooms that incorporate aerospace science, museum learning, history, and technology. The institute takes place July 15–26. Teachers must commit to attending for two weeks each summer for three years.

Thirty teacher-innovators will receive lodging, food, and travel to the institute, along with program materials. Individuals or teams of middle school STEM teachers with project ideas and an interest in informal education techniques are encouraged to apply. Visit *https://s.si.edu/2QAj9et;* apply by **February 1.**

National STEM Scholar Program M

This National Stem Cell Foundation–funded program seeks middle school science teachers who are passionate about teaching STEM. Ten teachers will connect with national thought leaders in STEM education; work on hands-on, minds-on activities; and develop a Challenge Project for their classrooms. Each will also receive a Chromebook and a $2,500 credit for their project's supplies and materials, along with an all-expenses-paid trip to the NSTA National Conference in Boston, Massachusetts, in 2020, at which they'll share about their projects.

The program takes place June 2–8 at Western Kentucky University (WKU) in Bowling Green. Expenses such as meals, travel, and lodging, are covered. WKU faculty will also provide mentoring for participants throughout the year.

Applicants should have at least two years of teaching experience and spend most of the day teaching science classes for grades 6, 7, or 8. Apply online by **February 1** at *http://bit.ly/2BJCmC0.*

National WWII Museum's Teacher Seminar M H

Middle and high school teachers with at least three years of experience can attend this 16-month seminar sponsored by the National WWII Museum in New Orleans. This year's institute focuses on liberation and the legacy of the war, connecting events such as the Holocaust, the Nuremberg trials, the Marshall Plan, and the founding of the United Nations to today's world. During July 28–August 3, participants attend seminars at the museum, where they gain content, curriculum, and strategies for introducing students to WWII's legacy.

In Phase II, taking place during the 2019–2020 school year, participants design and lead workshops for other teachers using the curriculum resources from Phase 1. The museum will help teachers plan and advertise these workshops and provide free copies of the curriculum for participants.

In Phase III (July 2020), teachers go to Munich, Germany, and spend a week exploring Dachau and other historic sites that relate to key themes in Phase I.

Participants get free room and board, a travel stipend, most meals, and seminar materials. Six hours of graduate credits are available.

Teachers of subjects other than social studies who can explain how the program will benefit their teaching may apply, as well as media specialists, librarians, curriculum coordinators, and academic coaches who spend at least half their time directly instructing students. Apply by **February 1** at *http://bit.ly/2rcV7Yz.*

Fermilab Teacher Research Associates Program M H

This eight-week program enables science, math, technology, and computer science teachers to do professional research at Fermi National Accelerator Laboratory in Batavia, Illinois. Teachers are paired with jobs and mentors that best match their particular skills and interests; they might, for example, help assemble a piece of equipment, build part of a detector, or work independently on a software task. The goal for teachers is to experience cutting-edge science and technology research that can be transferred to their classrooms.

Teachers of grades 7–12 at public, private, or parochial schools may attend. Applicants must have full-time appointments the years before and after the research experience. Those selected receive a $1,040/week salary.

Apply by **February 17.** Program dates vary by mentor; for details, see *http://1.usa.gov/1JdZOXy.*

Landmarks of American History and Culture Workshop M H

This National Endowment for the Humanities workshop at the Henry Ford in Dearborn, Michigan, explores America's Industrial Revolution. Participants who teach science, engineering, or technology and this period of American history will discover concrete examples of the concepts they teach.

One-week workshops will be held during June 23–28 and July 14–19. Participants receive a $1,200 stipend to cover travel, meals, hotel, and other expenses. Apply by **March 1** at *http://bit.ly/2rdJZKQ.*

National WWII Museum New Orleans Real-World Science M

This seminar explores key STEM concepts using real-world WWII examples. During July 14–20, science teachers of grades 5–8 will experience firsthand the ways that necessity, knowledge, perseverance, and skill led to innovation, inventions, and careers in STEM during the war. Seminar materials, lodging, and a stipend are provided. Visit *http://bit.ly/2AzyPEy* to apply by **March 15.** ●

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

2019 Outstanding Science Trade and STEM Books

NSTA recently released the 2019 Outstanding Science Trade Books for Students (OSTB) and the 2019 Best STEM Books lists. These annual lists of books published in the preceding year are selected by a review panel appointed by NSTA. The panel of educators, assembled in cooperation with the Children's Book Council (CBC), select engaging, accurate books that should not only educate, but also hopefully inspire young readers. For more details on the books on the 2019 OSTB list, as well as lists from prior years, visit the website *www.nsta.org/ostb.* The 2019 Best STEM Books list is available at *https://bit.ly/2QnCfUQ.*

OSTB

25 Women Who Thought of It First, by Jill Sherman

A Is for Australian Animals, by Frané Lessac

About Woodpeckers: A Guide for Children, by Cathryn Sill; illustrated by John Sill

Alexander Graham Bell for Kids: His Life and Inventions, with 21 Activities, by Mary Kay Carson

Animal Discoveries, by Tamra B. Orr

Bats in Trouble, by Pamela McDowell; illustrated by Kasia Charko

The Bee Book, by Charlotte Milner

Belle's Journey: An Osprey Takes Flight, by Rob Bierregaard; illustrated by Kate Garchinsky

Bonkers About Beetles, by Owen Davey

The Brilliant Deep: Rebuilding the World's Coral Reefs, by Kate Messner; illustrated by Matthew Forsythe

Champion: The Comeback Tale of the American Chestnut Tree, by Sally M. Walker

Charles Darwin's On the Origin of Species, adapted by Rebecca Stefoff

Clang: Ernst Chladni's Sound Experiments, by Darcy Pattison; illustrated by Peter Willis

The Coral Kingdom, by Laura Knowles; illustrated by Jennie Webber

Countdown: 2,979 Days to the Moon, by Suzanne Slade; illustrated by Thomas Gonzalez

Counting Birds: The Idea That Helped Save Our Feathered Friends, by Heidi E.Y. Stemple; illustrated by Clover Robin

Counting on Katherine: How Katherine Johnson Saved Apollo 13, by Helaine Becker; illustrated by Dow Phumiruk

Dinosaurium: Welcome to the Museum, by Lily Murray; illustrated by Chris Wormell

Eavesdropping on Elephants: How Listening Helps Conservation, by Patricia Newman

Endurance, Young Readers Edition: My Year in Space and How I Got There, by Scott Kelly

Everest, by Sangma Francis, illustrated by Lisk Feng

Exoplanets, by Seymour Simon

Flow, Spin, Grow: Looking for Patterns in Nature, by Patchen Barss; illustrated by Todd Stewart

Flying Deep: Climb Inside Deep-Sea Submersible Alvin, by Michelle Cusolito; illustrated by Nicole Wong

Fur, Feather, Fin—All of Us Are Kin, by Diane Lang; illustrated by Stephanie Laberis

The Girl With a Mind for Math: The Story of Raye Montague, by Julia Finley Mosca; illustrated by Daniel Rieley

Hidden Figures: The True Story of Four Black Women and the Space Race, by Margot Lee Shetterly; illustrated by Laura Freeman

A House in the Sky, by Steve Jenkins; illustrated by Robbin Gourley

How We Got to Now: Six Innovations That Made the Modern World, by Steven Johnson

Illumanatomy, by Kate Davies; illustrated by Carnovsky

Lovely Beasts: The Surprising Truth, by Kate Gardner; illustrated by Heidi Smith

Mae Among the Stars, by Roda Ahmed; illustrated by Stasia Burrington

Maggie: Alaska's Last Elephant, by Jennifer Keats Curtis; illustrated by Phyllis Saroff

Mama Dug a Little Den, by Jennifer Ward; illustrated by Steve Jenkins

Marie Curie, by Demi

National Parks of the USA, by Kate Siber; illustrated by Chris Turnham

Nothing Stopped Sophie: The Story of Unshakable Mathematician Sophie Germain, by Cheryl Bardoe; illustrated by Barbara McClintock

Otis and Will Discover the Deep: The Record-Setting Dive of the Bathysphere, by Barb Rosenstock; illustrated by Katherine Roy

Paddle Perch Climb: Bird Feet Are Neat, by Laurie Ellen Angus

Perfectly Peculiar Plants, by Chris Thorogood; illustrated by Catell Ronca

A Place to Start a Family: Poems About Creatures That Build, by David L. Harrison; illustrated by Giles Laroche

Snowy Owl Invasion! Tracking an Unusual Migration, by Sandra Markle

Sounds of Nature: World of Birds, by Robert Frank Hunter

Spring After Spring: How Rachel Carson Inspired the Environmental Movement, by Stephanie Roth Sisson

Starstruck: The Cosmic Journey of Neil deGrasse Tyson, by Kathleen Krull and Paul Brewer; illustrated by Frank Morrison

To Pluto and Beyond, by Elaine Scott

To the Moon! The True Story of the American Heroes on the Apollo 8 Spaceship, by Jeffrey Kluger with Ruby Shamir

Up & Down: The Adventures of John Jeffries, First American to Fly, by Don Brown

Very, Very, Very Dreadful: The Influenza Pandemic of 1918, by Albert Marrin

Water Land: Land and Water Forms Around the World, by Christy Hale

When Sparks Fly: The True Story of Robert Goddard, the Father of U.S. Rocketry, by Kristen Fulton; illustrated by Diego Funck

When the Whales Walked and Other Incredible Evolutionary Journeys, by Dougal Dixon; illustrated by Hannah Bailey

Wild Orca: The Oldest, Wisest Whale in the World, by Brenda Peterson; illustrated by Wendell Minor

Woodpeckers: Drilling Holes and Bagging Bugs, by Sneed B. Collard III

Best STEM Books

Astronaut-Aquanaut: How Space Science and Sea Science Interact, by Jennifer Swanson

The Brilliant Deep: Rebuilding the World's Coral Reefs, by Kate Messner; illustrated by Matthew Forsythe

Champion: The Comeback Tale of the American Chestnut Tree, by Sally M Walker

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Curiosity: The Story of a Mars Rover, by Markus Motum

Cyrus Field's Big Dream: The Daring Effort to Lay the First Transatlantic Telegraph Cable, by Mary Morton Cowan

The Disappearing Spoon and Other True Tales of Rivalry, Adventure, and the History of the World from the Periodic Table of the Elements (Young Readers Edition), by Sam Kean

Doll-E 1.0, by Shanda McCloskey

The Girl With a Mind for Math: The Story of Raye Montague, by Julia Finley Mosca; illustrated by Daniel Rieley

Google It: A History of Google, by Anna Crowley Redding

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How We Got to Now: Six Innovations That Made the Modern World, by Steven Johnson

Inga's Amazing Ideas, by Ann Rubino

Izzy Gizmo, by Pip Jones; illustrated by Sara Ogilvie

Joan Procter, Dragon Doctor: The Woman Who Loved Reptiles, by Patricia Valdez; illustrated by Felicita Sala

Nothing Stopped Sophie: The Story of Unshakable Mathematician Sophie Germain, by Cheryl Bardoe; illustrated by Barbara McClintock

Otis and Will Discover the Deep: The Record-Setting Dive of the Bathysphere, by Barb Rosenstock; illustrated by Katherine Roy

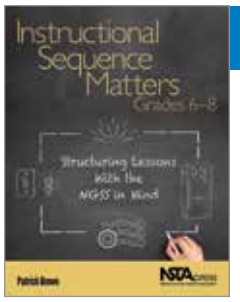
Salamander Rescue, by Pamela McDowell; illustrated by Kasia Charko

Spin the Golden Light Bulb, by Jackie Yeager; illustrated by Gabrielle Esposito

Spring After Spring: How Rachel Carson Inspired the Environmental Movement, by Stephanie Roth Sisson

When Sparks Fly: The True Story of Robert Goddard, the Father of U.S. Rocketry, by Kristen Fulton; illustrated by Diego Funck

The Wright Brothers: Nose-Diving Into History (Epic Fails #1), by Eric Slader and Ben Thomson ●



NSTA PRESS: *Instructional Sequence Matters, Grades 6–8*

Rethinking Development and Learning

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 Instructional Sequence Matters, Grades 6–8: Structuring Lessons With the *NGSS* in Mind, *by Patrick Brown, edited for publication here. To download the full text of this chapter, go to* https://bit.ly/2D9FGaG. *NSTA Press publications are available online through the NSTA Science Store at* www.nsta.org/store.

The Importance of Sequencing Hands-On With Minds-On

Although investigatory experiences can inherently be engaging for students due to their hands-on nature, for the experience to be minds-on, these experiences must integrate with the flow of instruction. Unfortunately, the research on laboratory experiences has revealed that too often when the hands-on part of science is disconnected from content, students leave with a false understanding of the nature of science and view content as separate from practice (Singer, Hilton, and Schweingruber 2006). This same line of research has even shown that labs, when not integrated into the flow of classroom instruction, are no more effective than other instructional approaches used in a similar isolated fashion (e.g., lectures, discussions, and readings on their own; Singer, Hilton, and Schweingruber 2006). For example, simply doing a hands-on lab for activity's sake may interest students but not allow them to form an evidence-based claim.

Similarly, students may be intellectually engaged in a stimulating teacher lecture, but may also not have firsthand experiences that allow them to construct knowledge. Debating the use of an isolated approach is not the point here. Whatever the mode of instruction, the research suggests that students need multiple different exposures, and these exposures must be tied to students' prior knowledge and framed in a relevant context (Banilower et al. 2010; Bransford, Brown, and Cocking 2000). Thus, how we sequence science instruction plays an important role in helping novices learn science.

Activity Box: Maximizing the Impact of Hands-On Teaching

1. After reading the "Common Hands-On Science Instructional Sequences" section in Chapter 1, make a bulleted list of the pros and cons of using a learning cycle compared to a traditional hands-on approach.
2. Add any additional pros or cons to your list based on your firsthand experiences with children.
3. Post your list in your planner, on your desk, or on your computer so you can reflect on it frequently when designing lessons.

The key aspect of the learning cycle is that students have the chance to collect data and investigate science before being introduced to new terminologies and concepts. In the learning cycle, students use the data gathered in the Explore phase to formulate scientific ideas in the concept introduction phase. The learning cycle allows students to generalize concepts and theories from data collected during laboratory experiences or other direct observation of phenomena and have those ideas backed up with authoritative explanations. The learning cycle also allows teachers to introduce facts, terms, and concepts in a very meaningful way and helps students invent accurate scientific understanding rather than trying to discover science ideas all on their own (Atkin and Karplus 1962; Brown and Abell 2007).

Discrete facts and science vocabulary are directly linked to the scientific ideas students have built through their explorations. Here is why authoritative explanations (e.g., teacher lectures, readings, and discussions) can be particularly potent learning experiences for students. A teacher's explanation provides new ideas, terms, and concepts directly tied to students' immediate experiences and knowledge they have created firsthand. As a result, students develop the ability to use scientific vocabulary correctly, appropriately, and situated in context.

Just think about the powerful effects of the learning cycle from a cognitive standpoint: The beginnings of students' accurate science understanding are based on knowledge they have constructed and the practices they used to formulate new ideas. Additional supporting knowledge and deeper conceptual understanding are contextualized by their firsthand experiences. Thus, in students' brains, neural connections are created, fine-tuned, and strengthened based on their immediate experiences.

In a traditional hands-on sequence, students learn concepts, theories, and facts in the first phase of instruction. Then, students generalize these new ideas to their data. This approach is counterproductive for a number of reasons. First, if teachers start lessons by telling or giving students information, through lecture or textbook readings, those students are denied the opportunity to show what they already know and to intellectually challenge themselves to make sense of scientific phenomena.

Second, teaching content first and providing experiences afterward fails to link specific content with important science processes, giving students a false image of science. Reliable data-producing experiences generate valid and accurate science knowledge.

Third, from a cognitive angle, students construct the link between provided ideas and experiences with data aimed to verify knowledge. Although students still construct understanding, the learning processes are associated with students attaching meaning to what they carry out through experiments.

Finally, learning by listening is valid only if one considers something very simple such as "red light means stop" and "green light means go." Developing a deep conceptual understanding, including scientific thinking, requires a multitude of well-orchestrated activities that must come before telling students new ideas. The evidence is quite clear that students learn less when they passively listen (Bransford, Brown, and Cocking 2000).

Forming a Theoretical Framework for Science Teaching

Science instruction is best carried out with intentionality. A theoretical framework for how you design your lessons—that is, your mind-set—should be informed by current research and allow for rigorous investigation through empirical testing in real-life daily classroom settings. Being clear up front about what the most optimal learning looks like is the first step in becoming explore-before-explain teachers. Always keep in mind the importance of exploratory experiences providing the foundation for all future learning. Using an explore-before-explain instructional sequence as the backbone for daily lessons, long-term curriculum planning, and goal setting within professional learning communities can be a powerful way to transform learning and cultivate in students the skills necessary to be successful in school and science. ●

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>
> *- Past NGSS Workshop Participant, Minneapolis, MN*

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National Science Teachers Association

ASK A MENTOR, **Advice Column**

Establish Policies to Manage Cell Phones, Chronic Absences, and Other Classroom Challenges

I am struggling with the students being on their cell phones. I was hoping that I could get some advice or tips to handle the situation.

—E., Ohio

In my 27-year career, the worst incident I ever had with a student involved a phone.

I didn't confiscate or park phones like some teachers do, due to concerns about damage and theft. (If you do have such a system, make sure that the parents and administration are aware.)

Instead, I employed a three-strike rule:

On the first occurrence, quietly tell the student to put away the phone.

For the second transgression, tell the student firmly and clearly to put away the phone and that the student was now on strike two. Strikes remained for the rest of the term, not just that class period.

If there was a third occurrence, ask the student to wait outside the door until you can have a conversation about using phones. Sending the student to the principal's office is an alternative. In general, the third strike should fix things. After that, they receive no further warnings: Send them out of class and call home. This is also when you should involve the principal's office if you had not done so earlier.

Be firm about this and never back down: Like an umpire.

One student has only been present one day out of four weeks. How should I keep this student up to date with the work that he is missing? Any tips and advice are greatly appreciated!

— O., Ohio

Ask your cooperating teacher what strategies have been used in the past and how assessments and grading have been handled. Also, find out if any communications with the family have occurred and if the child has support at home to catch up. As a student teacher, you should leave these communications to the cooperating teacher, and I strongly advise against giving the family your e-mail address or direct contact information.

Since this student is chronically absent, you should keep notes about the lessons and activities he or she has missed and collect any handouts in a folder. If the student frequently loses or forgets the work he or she does receive, then don't send work home: Keep a binder in class for him/her.

You can also be a little proactive and differentiate your teaching for this student as having a special need. Assemble booklets or binders of material that the student can work through at his or her own pace. These binders will be very useful on the days when the student is present and you are in the middle of a project or an intensive class activity. Similarly, prepare some take-home activities that can replace in-class labs and hands-on work.

I understand that confidence comes with experience, but I was wondering if you have any tricks or tips that helped you become more confident as a teacher?

– J., Ohio

To calm my own nerves, I would remind myself about the following:

- No one expects perfection. Just be reflective about your lessons and interactions with students.
- I was older and more educated than all the students I taught.
- This was my job, and nothing was going to stop me or mess with that.
- Most of the time, only I would know that a lesson didn't go as planned.
- Safety concerns are always the first priority. I never questioned my decisions to maintain safety.
- Unless the building burns down or students are hurt, any mistake is relatively minor and nearly always fixable.

Making snap decisions can be difficult, particularly early in your career, and hesitancy can be interpreted as a lack of confidence. To help prepare student teachers to make decisions, I would ask them to consider some scenarios and describe their vision of a perfect classroom. What were they doing as the teacher? What were the students doing? What were the outcomes? What were the interactions like? Every decision you make should be based on your vision of what your perfect classroom would be like.

If you are naturally quiet, you can consciously work on projecting your voice. I have seen teachers who become different people in their classrooms!

I consistently see various forms of plagiarism occurring in the classroom. How can I combat this?

—O., Ohio

In real life, group projects do not require individual final products from each team member. So you could deter cheating on group projects by accepting one work product from each group. Employ a jigsaw approach and require different members complete different sections of the project or lab report.

Try to determine if the students are being bullied into giving up the answers. This situation requires involvement of the teacher and perhaps administration. Students can easily copy fill-in-the-blank, matching, and multiple-choice assignments. Use them for review, or have students complete reflection slips to promote individual thinking. If you have only one or two students who cheat on an assignment, you could give them a second chance with different, perhaps more difficult, worksheets.

No matter what strategies you use, make sure to inform your students what the consequences for plagiarizing and other forms of cheating will be. When you receive plagiarized work, you could do the following:

- Return the copied assignments to be redone and designate different questions on returned assignments for each student to elaborate on.
- Call the students' parents or guardians.
- Record a zero grade for the assignment.
- Select one member out of a group who cheated to receive a grade on the work and mark the others as incomplete. If you select the one who didn't do the work, the author will likely howl in protest.
- Grade one submission, deduct a 20% "cheating penalty," and then divide the result evenly among the group.

Keep sharing the message that plagiarism is serious and not tolerated.

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/2RpuVFy, *or e-mail* mentor@nsta.org.

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National Science Teachers Association

BLICK ON FLICKS

Incredibles 2

By Jacob Clark Blickenstaff

With 14 years between the first and second *Incredibles* movies, a large fraction of the *Incredibles 2* audience had not even been born when the first film came out in 2004. Pixar has brought back most of the lead voice actors: Craig T. Nelson as Mr. Incredible, Holly Hunter as Elastigirl, Samuel L. Jackson as Frozone, and Sarah Vowell as Violet Parr. Though we have had to wait for this sequel, the action picks up just days after the final scene of the first *Incredibles* movie in which The Underminer appeared to threaten Municiberg.

The family battles The Underminer, but he escapes with the contents of at least one bank, and his boring machine causes a great deal of damage to the city. The police arrest the Incredibles and threaten them with prosecution for using their powers in violation of the anti-superhero laws. The family also learns that the agency that had created new identities for superheroes and helped them find normal jobs is shutting down. They have just two weeks in a hotel before they will be on their own.

Fortunately for the Parrs, Winston Deavor (voiced by Bob Odenkirk) saw their fight against The Underminer, and is a fan of superheroes. He and his sister Evelyn run Devtek, a large, very profitable communications company. Seeking to change the anti-superhero laws, Deavor recruits Elastigirl to be the center of a pro-supers campaign. Mr. Incredible is hurt to be passed over for the public role, but commits to caring for the family while Elastigirl is out fighting crime. This role reversal is perhaps the main indication of how much time has passed between the two *Incredibles* movies: Representation of female characters has dramatically shifted. For much of the movie, we see Elastigirl out fighting the bad guy(s) while Mr. Incredible parents three children on his own.

The film features quite a bit of cool physics that teachers could attach to this superhero story.

Spring Energy

Of course, Elastigirl's superpower is her flexibility. She is able to alter her shape almost without limits, stretching her arms and legs dozens of meters, or ballooning her body into a parachute. When she stretches, her body seems to act like a spring, which means that the farther she stretches, the greater the force it takes to stretch her. (This also means that the farther she stretches, the more energy she stores and can use later.) The relationship between force and distance in a stretched spring looks like this:

$$F = -kx$$

The "x" is the distance from the "unstretched" state of the spring (or superhero). The negative sign shows that the force of the spring is always pushing or pulling the spring back to its unstretched shape, so the force is in

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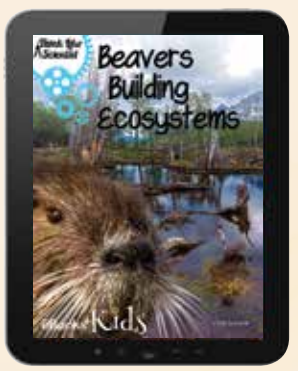

Lexile Level: 790L

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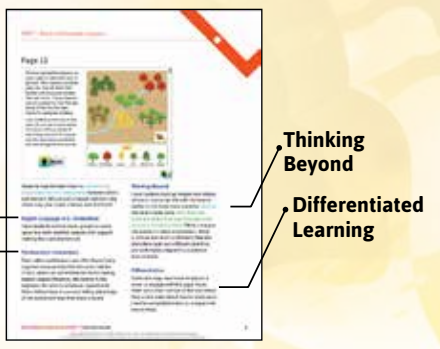

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the opposite direction of the motion. The "k" is the spring constant, and is generally a property of the particular spring you are using.

The energy stored in a spring is equal to the work needed to stretch it, and work is force times distance:

$$Energy = Work = F^{\star}x = kx^2$$

With this relationship, we can calculate how much Elastigirl would have to stretch her arms to launch herself into the air, if we know her spring constant. I am going to estimate a reasonable number (based on bungee cords) of 500 Newtons per meter ($\frac{N}{m}$) for Elastigirl's spring constant. It would also be possible to try to estimate k using data from the film, but that would be a more challenging exercise.

Let's suppose Elastigirl needs to get to the top of a 10-meter-tall building. How much does she need to increase her gravitational potential energy (PE)? Keep in mind the formula to calculate PE is mass multiplied by the gravitational constant on Earth multiplied by change in height ($PE=mgh$). Assuming Elastigirl weighs about 60 kg, we get this:

$$PE = (60kg)\ (9.81m/s^2)\ (10m) = 5{,}900\ Joules$$

Now we can use that value to solve for x:

$$x = \sqrt{\frac{E}{k}} = \sqrt{\frac{5900\ J}{500\ \frac{N}{m}}} = 3.4\ m$$

So if Elastigirl stretches her arms about a third of the way up the building, she has stored enough energy in her arms to launch herself up to the top. The trampoline technique she used to send Mr. Incredible after the Underminer also is based on a spring storing energy, so the physics is very similar.

Drag

When you move an object through a fluid (a liquid or a gas), friction opposes that motion. Physicists generally call fluid friction "drag." *Incredibles 2* features two notable drag examples: one in which Elastigirl increases drag, and another in which a ship is designed to decrease it.

Slowing or stopping things by making herself into a parachute is a trick Elastigirl uses more than once in the film, and she used it in the original. Parachutes in general work by making a large surface area that does not move easily through air. As long as Elastigirl can hold on to the object and her body doesn't tear, she has a very effective way to safely slow and even stop a variety of objects, including vehicles.

The climactic battle of *Incredibles 2* occurs on a Devtek boat, which is a hydrofoil. Hydrofoil vessels can go much faster than traditional watercraft because the majority of the hull lifts out of the water when underway, thereby greatly reducing the drag force on the ship. When a hydrofoil is moving fast enough, wing-shaped foils in the water create lift, which holds the hull up. At low speeds, the foils do not create enough lift to support the boat, so it looks like a normal boat. As it speeds up, the foils generate more and more lift, eventually raising the hull out of the water.

I've long been a fan of *The Incredibles*, and this sequel is as good or better than the first film. It's great to see Elastigirl taking the lead, and Jack Jack's battle with a raccoon in the middle of the movie is an amazing bit of physical comedy. I've focused on the physics of Elastigirl's springy super power and on two examples of drag, but teachers could also discuss hypnosis in a psychology class, and the changing properties of materials with temperature in a basic physical science class. ●

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.

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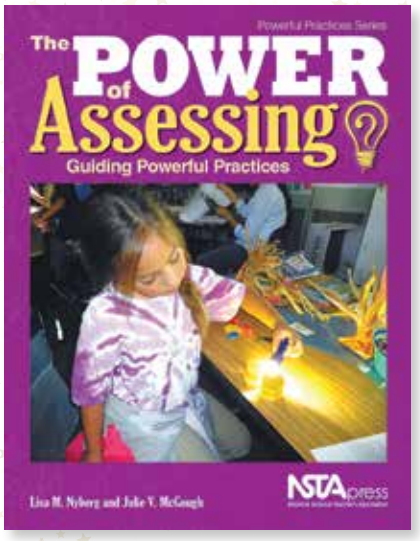
New Year NEW BOOKS!

As the new STEM Coordinator for our district, NSTA publications have been extremely helpful in shaping our STEAM vision

–Susan K.



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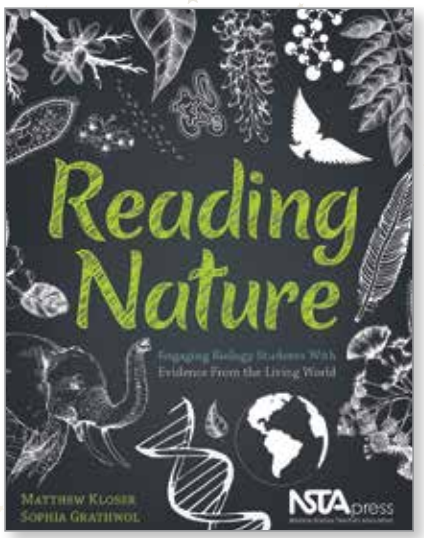

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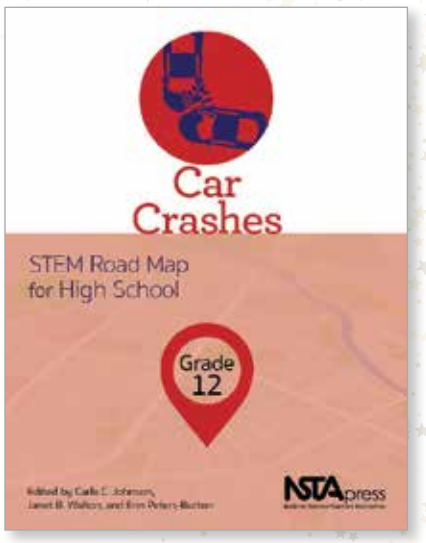

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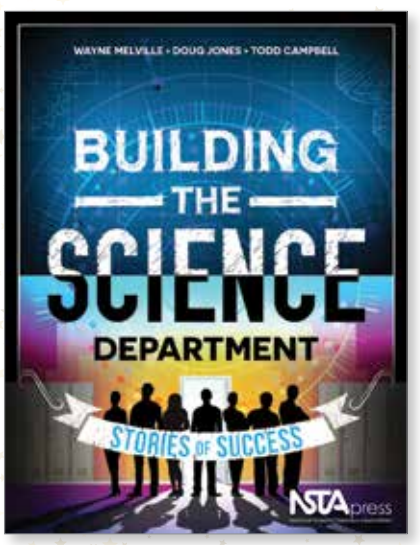

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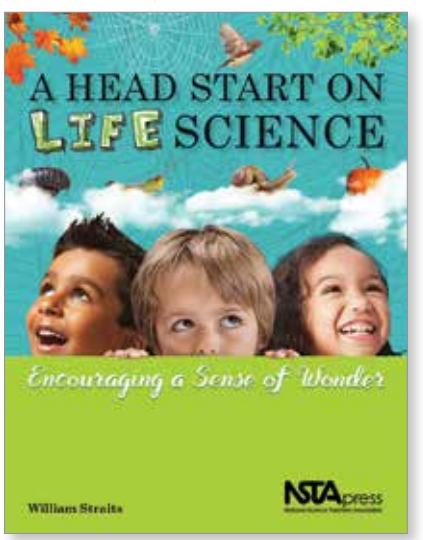

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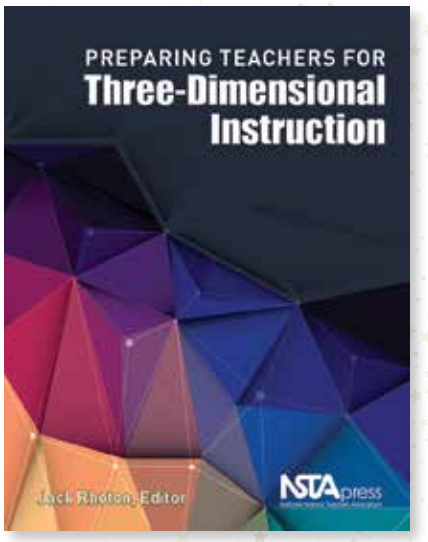

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NSTA National Science Teachers Association

(All dates are deadlines unless otherwise specified.)

January 23—Do you dream about the effect a new science lab could have on your students' learning? Find out how you can win a $20,000 lab makeover for your school during **Developing a Competitive Application for the Shell Science Lab Challenge**, a free NSTA Web Seminar. The challenge recognizes middle and high school science teachers who share how they get the maximum educational benefits for their students using only limited supplies and budgets. 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*.

January 24—Join K–12 teachers, administrators, and curriculum developers as they explore the history of science, technology, engineering, and mathematics (STEM) and how to increase STEM content in lessons during **How to STEM Up Your Classroom**, a free NSTA Web Seminar. The session will run from 6:30 to 8 p.m. ET. For more information on NSTA Web Seminars or to register, visit *http://bit.ly/2RGhr8N*.

January 30—Don't miss the first session of the **Picture-Perfect STEM Online Course** with the award-winning authors Karen Ansberry and Emily Morgan. The online course features 10 hours of live training, participants' choice of either the *Picture-Perfect STEM Lessons K–2* or *Picture-Perfect STEM Lessons 3–5* e-Book, and a digital learning packet. Graduate credit is available. Registration costs $175. For more information, visit *https://bit.ly/2zOlVTx*.

February 1—Submit your manuscript on "Differentiating for the Gifted and Advanced Learner" for the September 2019 issue of *Science Scope*, NSTA's middle level journal. Manuscripts should discuss how educators have created tiered activities, supported the emotional needs of gifted students, and balanced the needs of both advanced and underperforming students, among other topics. Manuscripts focused on making, technology, practical research, and more, as well as general-interest manuscripts, are accepted anytime. Read the call for papers at *http://bit.ly/2zOZUUA*.

March 1—How do you encourage scientific discussion in your elementary classroom and make sure all students participate? **Share your strategies on the theme "Cultivating Classroom Conversations"** for the November/December 2019 issue of *Science and Children (S&C)*, NSTA's peer-reviewed journal for elementary science education. General-interest manuscripts may be submitted at any time. Read the call for papers at *http://bit.ly/2StzkHq*.

March 1—*Science Scope* is accepting manuscripts through today for the October 2019 issue, featuring the theme "**ESS3 Earth and Human Activity."** Middle level educators can share how they develop awareness and understanding of the human impact on the Earth and natural resources. Manuscripts focused on making, technology, practical research, and more, as well as general-interest manuscripts, are accepted anytime. Read the call for papers at *http://bit.ly/2zOZUUA*.

April 1—*S&C* is looking for creative, effective strategies for having students take science home and extend their learning. **Submit your manuscript on "Take-Home Science"** for consideration for the January 2020 issue by today. General-interest manuscripts may be submitted at any time. Read the call for papers at *http://bit.ly/2StzkHq*.

April 1—Share how you're **"Using Technology for Instruction and Assessment"** with your middle level colleagues by submitting an article on that theme to ***Science Scope*** by today. What are your favorite apps for students to use? What online programs have challenged your students to develop their critical-thinking skills? General-interest manuscripts, as well as manuscripts focused on making, technology, practical research, and more, are accepted anytime. Read the call for papers at *http://bit.ly/2zOZUUA*.

May 1—Do your students "tinker" in science? Is it different from hands-on engineering? *S&C* 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*. ●

Celebrating 75 Years at NSTA

Did you know that 2019 marks NSTA's 75th anniversary? Throughout this year, we'll be sharing milestones from our history!

1948 Robert H. Carleton became the association's first executive secretary, a position now known as executive director. NSTA established the Robert H. Carleton Award for National Leadership in the Field of Science Education in his honor in 1973.

Space Survival Story Update

In the "Teaching About Space Survival" story in the November 2018 issue of *Reports* (page 14), the photo caption should not have included the words "from kits." We apologize for the error.

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Cast Your Vote!

Have you received your e-ballot for the NSTA Board and Council Election? Don't miss your chance to help shape the association's future; voting ends on **February 8!**

The candidates for NSTA President are Eric J. Pyle, professor in the Department of Geology and Environmental Science at James Madison University in Harrisonburg, Virginia, and Elizabeth Allan, professor in the Department of Biology at University of Central Oklahoma in Edmond, Oklahoma.

NSTA members also will vote for three division directors on the Board of Directors. The candidates are Sharla Dowding and Zoe Evans (Coordination and Supervision Division Director); Brenda Walsh and DeEtta Andersen (High School Level Division Director); and Lisa Kenyon and Brian Shmaefsky (College Level Division Director).

Six district directors also will be elected this year. The candidates are

- **District III** (Delaware, District of Columbia, Maryland): Florentia Spires and Ekaterina (Katya) Denisova
- **District V** (Alabama, Florida, Georgia, Puerto Rico, Virgin Islands): Brian Gardiner and Brian Butler
- **District IX** (Minnesota, North Dakota, South Dakota): Lorraine O'Shea and Scott Johnson
- **District XI** (Kansas, Missouri, Nebraska): Jodi Bahr and Trudy Giasi
- **District XV** (Idaho, Montana, Wyoming): Lesley Urasky and Chris Taylor
- **District XVII** (Alaska, Oregon, Washington): Bradford Hill and Jeanne Chowning

Visit *www.nsta.org/nominations* to read the candidates' biographies and position statements. If you haven't received your ballot or have a question about the NSTA Board and Council, contact Amanda Upton, senior manager for nominations, at *aupton@nsta.org*. ●