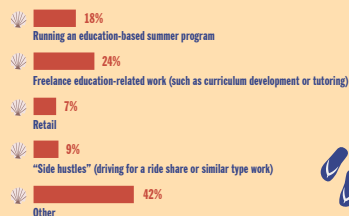


If You Are Working During the Summer,  
What Type of Work Are You Doing?NSTA Member Poll:  
Reflecting on Summer Break 6

NSTA

## Reports

National Science Teaching Association



JACOB SLATON

## Fall Conferences

Highlight 3-D Learning 18

## CONTENTS

- 3 When to Guide Instruction Before Inquiry
- 6 NSTA Member Poll: Reflecting on Summer Break
- 8 Money 101: Protect Finances Amid Data Hacks
- 10 Let's Make Science Learning Lifelong, Lifewide, and Lifedeeep

## GRAB BAG

## Pull-Out Section!

- G1 Freebies
- G3 News Bits
- G4 Summer Programs
- G7 What's New
- G8 In Your Pocket

- 14 NSTA Press Free Chapter Excerpt: *Supporting Emergent Multilingual Learners in Science, Grades 7–12*
- 16 Blick on Flicks: *The Lion King, Version 2.0*
- 18 Fall Conferences Highlight 3-D Learning
- 20 Ask a Mentor: Teaching About Gases, Chemistry, and Space
- 21 Celebrating 75 Years at NSTA
- 23 Mark Your Calendar; #ICYMI; NSTA Has a New Meaning
- 24 NSTA Opens Search for New Treasurer



## Educating Students About Aerospace Careers

Cindy Hasselbring reads from the *Boeing Pilot and Technician Outlook* report: “804,000 new civil aviation pilots, 769,000 new maintenance technicians, and 914,000 new cabin crew will be needed to fly and maintain the world fleet over the next 20 years.” She adds, “212,000 pilots are needed for North America alone. 193,000 maintenance technicians are needed for North America alone... There’s a good opportunity for students to pursue aviation jobs. A student can start at a regional airline at \$60,000 a year.”

Hasselbring, senior director of the Aircraft Owners and Pilots Association (AOPA) High School Aviation Initiative, says AOPA offers a high school aviation STEM (science, technology, engineering, math) curriculum that “is free to high schools..., and provides two career pathways: pilot and drones [Unmanned Aircraft Systems or UAS].”

At age 16, “students can take the [Federal Aviation Association (FAA)] Private Pilot Knowledge Test or Unmanned Aircraft Systems Part 107 Remote Pilot Knowledge Test. Those who pass the UAS test can start a business piloting [drones]. They can work for many employers because they can legally fly a drone,” says Hasselbring.

Some students take the courses “just to learn something new and different. Then they realize they want to be pilots. That’s why the curriculum is used as in-school courses only, to hook in students who may not have considered those careers before. They’re not as likely to choose the courses as an after-school club,” she asserts.



Students in William Ervin's aerospace class at Dubiski Career High School in Grand Prairie, Texas, gather around the flight simulator used in the class.

“The curriculum supports the *Next Generation Science Standards* (NGSS) and *Common Core*, and a lot of engineering practices are embedded. [It challenges] students with projects like testing foam board airfoils in a cardboard wind tunnel and modifying their designs,” as the Wright Brothers did in the wind tunnel they built, she observes.

“Students also learn about the NTSB [National Transportation Safety Board], and how they investigate accidents. [In one activity,] students are members of a Go Team investigating what caused an accident and what the recommendations of the NTSB should be,” Hasselbring notes.

“The ninth- and 10th-grade curriculum will be available this fall. The 11th-grade curriculum will be available next year. By 2021, all four years [of the curriculum] will be available,” Hasselbring notes.

bring notes. “Schools must go through the application process in the fall” to receive the curriculum, she adds.

To use the curriculum, teachers must attend a three-day professional development workshop. “In-person attendance costs \$200 and includes the opportunity to participate in hands-on activities and take a free flight in a small aircraft,” Hasselbring explains. Teachers can attend online at no charge.

“Last year, AOPA offered, for the first time, a Teacher Scholarship program that pays for flight training so teachers can become pilots. We gave 20 teachers \$10,000 each. We hope to offer that again,” she reports.

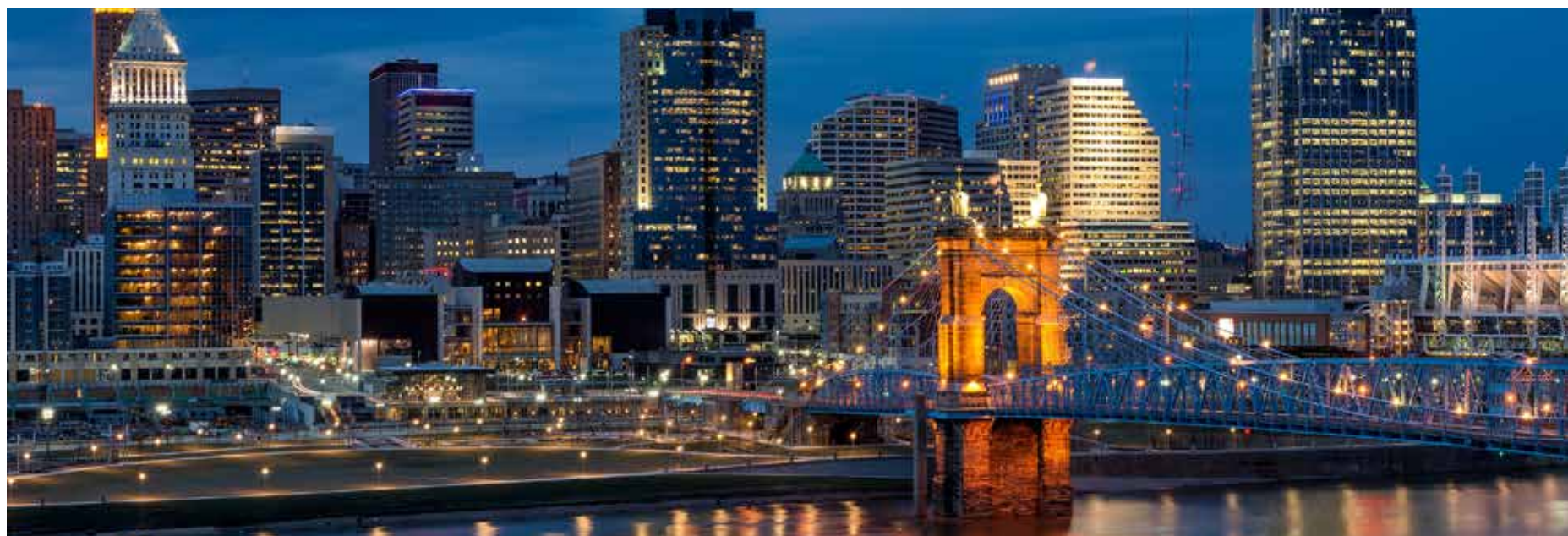
William Ervin, aerospace teacher at Dubiski Career High School in Grand Prairie, Texas, has used a variety of

See Aerospace, pg 4

# SAVE THE DATE

## NOVEMBER 14-16, 2019

### NSTA AREA CONFERENCE ON SCIENCE EDUCATION



## CINCINNATI, OH

### Science: The Bridge to Endless Possibilities

Bridging the Three Dimensions of Science  
Teaching and Learning: Practices,  
Core Ideas, and Crosscutting Concepts

Constructing Bridges:  
Building Lifelong Appreciation  
and Passion for Science

Building Strong Bridges:  
Reinforcing the Connection  
Between Science and Literacy

Save on your registration fees by taking  
advantage of special earlybird and advance rates.

**Earlybird deadline: Oct. 4, 2019**

**Advance deadline: Oct. 25, 2019**

For more information and updates, visit  
[www.nsta.org/cincinnati](http://www.nsta.org/cincinnati)

#NSTA19





## COMMENTARY: John F. Wiginton

# When to Guide Instruction Before Inquiry

By John F. Wiginton



John F. Wiginton

Discussions among educators of the appropriateness of instructional guidance have increasingly intensified over the last 30 or 40 years. Participants usually fall into one of two camps.

Group 1 advocates for minimal instruction, seeming to advance the idea that students learn best in an unguided or minimally guided environment. This environment is defined, in general, as one where students, rather than being presented with essential information, must discover or construct this essential information for themselves. This strategy has been known by different names over the years: inquiry, problem-based, discovery-based, experiential, and constructivist learning, for example.

Group 2 supports providing students who are learning new information with direct and complete guidance, at least in terms of the procedures and concepts required for particular disciplines. By extension, students should not be left to discover this information by themselves, as that learning strategy is inefficient and prone to misconceptions without proper guidance.

Nowhere is this discussion more energetic and impassioned than in science, and especially in science laboratories.

Over the past couple of decades, educational psychology has made huge advances in our knowledge of how learning actually occurs. Short-term (processing) memory, long-term memory, and the relationship between them are critical components for answering this question: Which strategy is best for which students at which time?

I think we would all agree that learning can be defined as changing (as in expanding or growing) the knowledge in our long-term memory. Cramming for exams and then doing a “data dump” isn’t learning, as students

often forget that information within as little as a few weeks.

As teachers, we are considered expert problem solvers because of the extensive knowledge in our long-term memory, which helps us identify, sometimes even unconsciously, the possible routes to a solution. Without this information in our memory, we would be as incapable as our students are. Most students know how to construct knowledge, given adequate information, and absolutely no empirical evidence suggests giving them partial information improves the efficiency or the effectiveness of the process.

This leads me to conclude extensive guidance can be relaxed, yielding to more minimally guided methodologies, but only at the point that the students’ own knowledge and experiences stored in long-term memory begin to provide the internal guidance that initially came from the teacher.

My advice is this: Don’t hurry to turn all of your cookbook labs into inquiry labs. While I would never propose that scientific inquiry is a bad thing, some concepts and procedures actually need to be taught, not discovered.

Conduct a lab showing the students how to set up and use a balance. Level it. Tell them why they must use the same one for all their measurements even if there is a line of classmates waiting to use theirs and the other one is free.

Show them the differences in vacuum and gravity filtration and why one is chosen for a procedure over the other. Let them design a lab procedure illustrating the point, but only give them a couple of possibilities, and make sure there is a correct answer.

Show them how to make solutions and why you do that in volumetric glassware versus beakers.

Don’t make them discover the solubility rules; tell them the rules and then prove it in a cookbook lab. Five different internet searches or five different textbooks will yield differing sets of rules anyway—and they need to be able to understand the subjectivity in these differences. If you want, have them bring in different search results and design a lab that shows they are all true, just different.

Teach them never to put anything back in a reagent bottle. Don’t put them through the frustration of the lab not working because the chemicals are contaminated, or heaven forbid, let them discover that the experiment will work anyway, so it must not be a very important rule in the first place.

Practice accuracy and precision and significant figures, every time, every day. Don’t let them discover that their teacher really doesn’t think these are that important. Real science, publishable science, science that is worthy of being shared with the rest of the world, depends on it.

And once you have managed to get them to store lots of information and experience in their memory banks, then break out some inquiry labs and let them have some fun doing science! After all, cookbook labs and inquiry labs both have their uses. ●

*John F. Wiginton is an instructional associate professor and the director of Undergraduate Laboratories at the University of Mississippi. A 16-year chemical educator, he has served on NSTA’s Committee on College Science Teaching. He is a member of the Safety Committee of the American Chemical Society’s Division of Chemical Education (ACS-DivCHED), and serves on the board of directors of the Mississippi Science Teachers Association (MSTA).*

## NSTA Reports

National Science Teaching Association  
1840 Wilson Boulevard  
Arlington, Virginia 22201-3092  
703-243-7100  
nstareports@nsta.org

Lynn Petrinjak.....Managing Editor  
Debra Shapiro.....Associate Editor  
Will Thomas, Jr.....Art Director  
Production Staff.....Jack Parker  
Catherine Lorrain  
David L. Evans.....Executive Director  
Jason Sheldrake.....Advertising Director  
jsheldrake@nsta.org  
703-312-9273

© 2019 National Science Teaching Association

K–16 teachers only may reproduce NSTA Reports’ contents for classroom or noncommercial, professional-development use only. This does not include display or promotional use. For all other permission to photocopy or use material electronically, please contact the Copyright Clearance Center (CCC) (www.copyright.com; 978-750-8400). For further information about NSTA’s rights and permissions policies, please access [www.nsta.org/permissions](http://www.nsta.org/permissions). Although advertisers work hard to follow strict safety procedures, guidelines are constantly evolving. It is important to note that all ad images are simulations, not actual experiments—any safety lapses are extremely unlikely to endanger the participants, who are models rather than actual teachers and students. Therefore, NSTA assumes no responsibility for nor guarantees the accuracy of safety information presented in ads.

Are you interested in submitting a Commentary for consideration for *NSTA Reports*? E-mail Lynn Petrinjak at [lpetrinjak@nsta.org](mailto:lpetrinjak@nsta.org) for more information.

## Aerospace, from pg 1

aerospace and aviation resources, including AOPA's. "We use the AOPA curriculum [as a] pilot school. We teach and evaluate the curriculum," he explains. He also has adapted the AOPA curriculum for his 11th and 12th graders and will be evaluating the 11th-grade AOPA curriculum this school year.

Last year, Ervin wrote Introduction to Aerospace and Aviation, a Career and Technical Education (CTE) innovative course for grades 9–11 that was approved by the Texas Education Agency (TEA). "Innovative courses allow districts to offer state-approved innovative courses to enable students to master knowledge, skills, and competencies not included in the essential knowledge and skills of the required curriculum," according to the TEA website. Ervin's course provides "the foundation for advanced exploration in the areas of professional pilot, aerospace engineering, and [UAS]," he explains.

Ervin notes TEA has "a bank of innovative courses" teachers can access. (See

<http://bit.ly/33nkiL>.) He is currently developing a 10th-grade innovative course based on AOPA's curriculum.

### Manufacturing Aircraft

In the Utah Aerospace Pathways (UAP; <http://uapathways.com>) program, high school students take aerospace manufacturing training courses at their schools and at local technical or community colleges. Students then have an externship with one of UAP's participating companies during senior year and graduate with a certificate in aerospace manufacturing. "Industry partner companies (Boeing, Janicki, Hexcel, Albany Engineered Composites, Orbital ATK, Kihomac) joined with Hill Air Force Base [located near Ogden, Utah] because they felt the need to build their workforce and training," says Sandra Hemmert, CTE Specialist for Granite School District in Salt Lake City, Utah. UAP was created "to help students gain skills for industry and college," Hemmert maintains.

UAP was the start of Talent Ready Utah, an initiative of the Governor's

Office of Economic Development and the Utah Department of Workforce Services. "It is an amazing partnership of government agencies, industry, and education," Hemmert observes. Usually it takes two years to develop new high school courses, but "within six months, [UAP] had four new courses. Everything moved faster to address the needs of the industry partners," she contends.

"The industry partners developed a skills list that was used as the basis of the state standards," says Hemmert. "To create the curriculum, we had 12 teachers who did a two-week internship in all of the companies. We brought them in with company partners to develop the curriculum. Our teachers didn't know anything about [composite materials], but the industry partners had an idea about how to get kids excited [about learning]: doing hands-on activities with them."

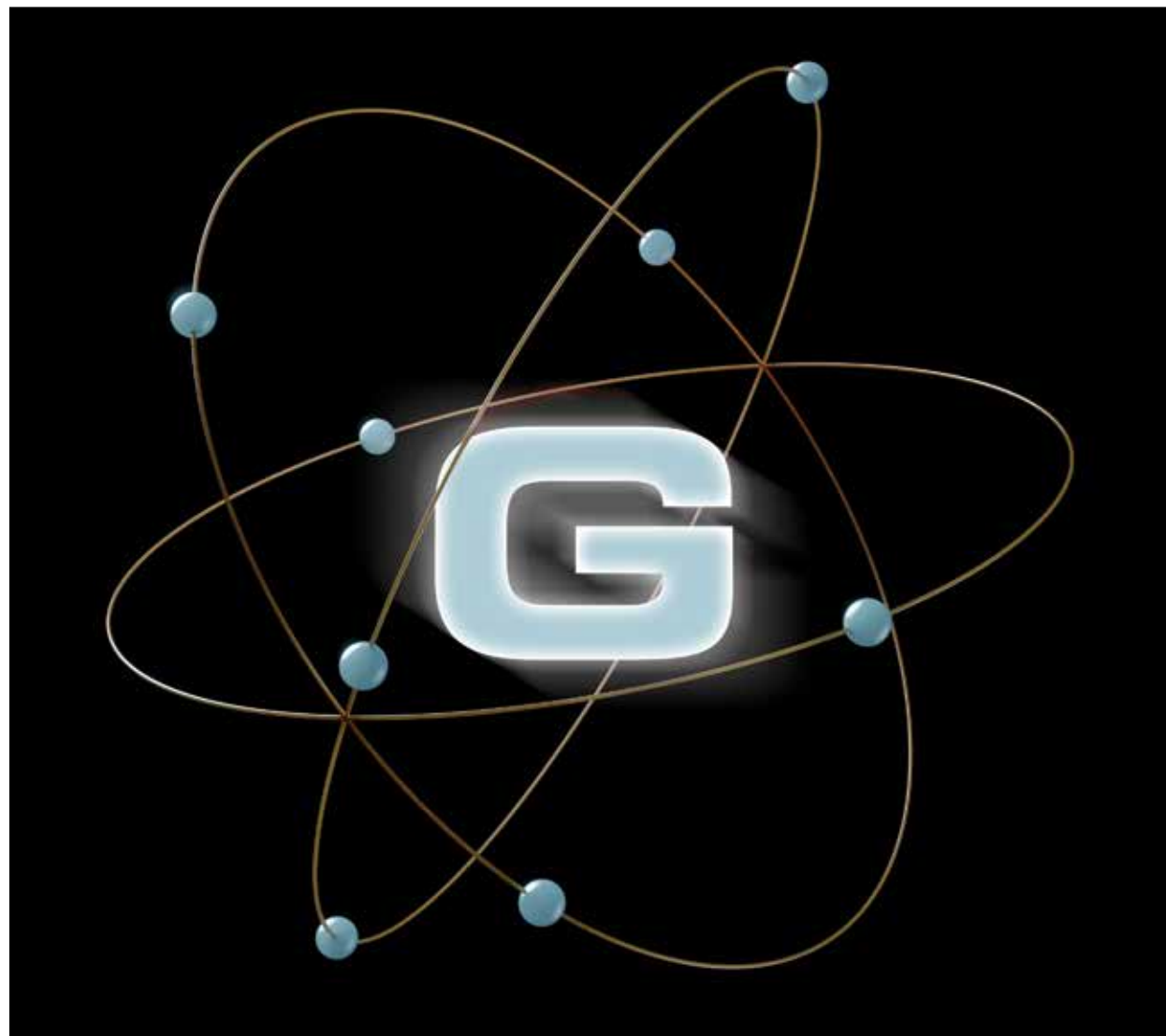
UAP was piloted in two school districts—Granite and Davis, in Farmington—and has since expanded to four more Utah school districts. Salt Lake Community College and Davis

Technical College in Kaysville are the original UAP partner colleges.

"Students are guaranteed an interview with any of the participating companies after earning the certificate," says Hemmert. "Students can apply to any of the companies...If one company can't hire a student, it will support [the student in obtaining a job] with the other companies," she contends. Students can earn as much as \$19 per hour right after high school.

"We have kids who do something else for two years, but they can still have the interview if they have earned the certificate. Some kids go to college and say, 'It isn't for me,' but the certificate gives them a job opportunity. If they decide to attend college, the companies [reimburse] tuition...for employees...A lot of kids are going to college to become engineers and also working for a company to get their tuition reimbursed," Hemmert relates.

"In addition, the program [educates students about] jobs they didn't know about. There are so many jobs in aerospace manufacturing," she asserts. ●



## YOUR SAVINGS COMPOUND

Special discount for  
National Science  
Teacher Association  
Members.

**GEICO®**  
**MemberDiscount**

Some discounts, coverages, payment plans and features are not available in all states, in all GEICO companies, or in all situations. GEICO contracts with various membership entities and other organizations, but these entities do not underwrite the offered insurance products. Discount amount varies in some states. One group discount applicable per policy. Coverage is individual. In New York a premium reduction may be available. GEICO may not be involved in a formal relationship with each organization; however, you still may qualify for a special discount based on your membership, employment or affiliation with those organizations. GEICO is a registered service mark of Government Employees Insurance Company, Washington, DC 20076; a Berkshire Hathaway Inc. subsidiary. © 2019 GEICO

# GET STARTED

# PASCO

## Special Promotion

Start building your NEXT GEN Science lab with one of our easy to use wireless sensors or take advantage of this limited offer on special starter lab sets designed for Biology, Chemistry, Environmental, Physics, and Middle School Science.

**FREE!** With purchase of promotional starter sets, you will receive data collection software, labs, and sensor storage systems, at no additional charge

## BEST PLACE TO START Super Easy and Low Cost

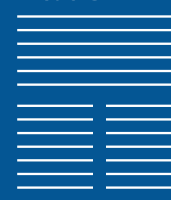
Go NEXT GEN in your **science** lab with PASCO's amazing **Wireless Sensors**, award-winning SPARKvue software, and some starter lab activities.



**FREE**



Labs



Select software, labs, storage and charging systems come free with purchase of special promotional packages. Promotional code required. See web for details.

# PASCO

[pasco.com/getstarted](https://www.pasco.com/getstarted)



# Reflecting on Summer Break

In July, *NSTA Reports* asked science educators how they were spending their summer. Relaxing/vacationing was the most important summer activity for 45% of respondents, while 21.5% put catching up on personal matters at the top of their list. Most respondents (72%) indicated professional development (PD) to be of middle importance or lower. Working for supplemental income was the top priority for 10.5%. Nearly 80% indicated job hunting was their lowest priority for the summer.

Of educators working during the summer, 24% reported they were doing freelance education-related work such as curriculum development or tutoring, 18% were running an education-based summer program, 9% were working “side hustles” such as driving for a ride share, and 7% reported working in retail. Forty-two percent reported having other types of summer employment, including coaching sports, union leadership roles, computer programming, conducting scientific research, unpaid preparation for the coming school year, waiting tables, and teaching summer school.

Most did not expect to spend a large amount of time pursuing PD: 88% said they would spend a week or less in PD mandated by their school or district; 8% indicated they would spend two weeks. More educators planned to invest more time in self-selected PD, with nearly 30% expecting to spend more than two weeks in this type of PD and 23% planning to devote two weeks.

## Here's what science educators are saying about their expectations for the school year:

### Looking Forward to...

**Using all** the new ideas and curriculum that I worked so hard planning during the summer.—*Educator, High School, Oklahoma*

**Seeing the** students again!—*Educator, High School, Missouri*

**My coworkers** and the camaraderie.—*Educator, High School, Illinois*

**I am** looking forward to having new administrators at my site this coming year.—*Educator, Elementary, California*  
**Everything—the kids**, the classroom, the subjects!—*Educator, High School, Illinois*

**The students** and my teacher friends.—*Educator, Elementary, Wisconsin*

**Getting to** know my new students and being able to talk about what I love and share that love.—*Educator, High School, Colorado*

**Another chance** to try to get it right this year.—*Educator, High School, Alabama*

**New curriculum** plus new classroom in new building.—*Educator, Middle School, California*

**New class** of students, new classroom setup, new eyes on curriculum expectations, catching up with other teachers.—*Educator, Elementary, New Jersey*

**Challenge of** interested students, which is why I am still teaching, being in my 46th year.—*Educator, High School, Connecticut*

**Seeing my** coworkers, my new classroom, and new curriculum.—*Educator, Middle School, Georgia*

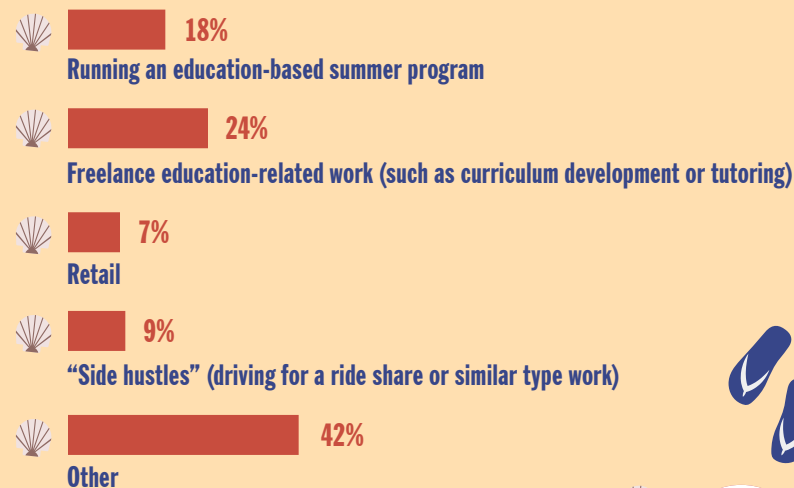
**Seeing my** work friends again—we don't all live close to [one another], so we don't get together much during the summer.—*Educator, High School, California*

**I enjoy** finding interesting connections to the content/skills I teach my students (current events, new ways to explore ideas and acquire understanding). I like learning more all the time myself.—*Educator, High School, Colorado*

**I teach** kindergarten, so I love, love, love the excitement my students have for learning, and look forward to those “Aha!” moments that keep me going during the school year.—*Educator, Elementary, Arizona*

**I love** my students. I cannot wait to challenge them and see what they are able to learn and do this year. It is never a dull moment or day in the life of a teacher.—*Educator, High School, Missouri*

## If You Are Working During the Summer, What Type of Work Are You Doing?



**A refreshed** me teaching a refreshed group of interesting students.—*Educator, High School, New Jersey*

**Refining my** curriculum and the implementation of new educational strategies.—*Educator, High School, California*

**Getting to** know my new students and do some of the things I learned about in the workshops I went to.—*Educator, Elementary, Oklahoma*

**New curriculum** due to new adoption pilots.—*Educator, High School, California*

**Meet the** new students, feel productive and busy with my day.—*Educator, Middle School, California*

**Coding!**—*Educator, Elementary, California*

**Not sure.** Last year I taught at a new school, and it was the worst experience ever since admin[s] were awful. I will be at a different new school. I am just hoping to make it through the year without feeling the anxiety I felt last year.—*Educator, High School, Idaho*

**I developed** a new class last semester and have been working to enhance, modify labs and projects. I can't wait to try out all of the fun new stuff.—*Educator, High School, Ohio*

### Not Eager for...

**Waking up** so early.—*Educator, High School, Oklahoma*

**Still not** feeling caught up on everything that needs to be done for the school year and my personal life!—*Educator, High School, Missouri*

**The redundant** paperwork.—*Educator, Middle School, New Jersey*

**Not teaching** the same subject each year. My high school re-assigns me each year, so I always have a new subject to plan and adapt to.—*Educator, High School, Illinois*

**Getting my** stamina back and getting into the rhythm of the teaching day, as well as setting expectations and teaching procedures to new classes for the first couple of months.—*Educator, Elementary, California*

**Getting up** early! Ugh!—*Educator, High School, Illinois*

**Getting the** district to give info about where you will be the next year (will I be in the same grade/room/school?) early enough to feel prepared to begin the year.—*Educator, Elementary, Oklahoma*

**Having to** start up again after not using my learned skills from the year

before in several months.—*Educator, High School, Colorado*

**Exhaustion going** back to work full time, and exhaustion when the students start classes.—*Educator, Middle School, High School, New York*

**Stress from** administration. One reason I’m looking forward to retiring.—*Educator, Middle School, Virginia*

**Not having** access to the restroom when I need it.—*Educator, Middle School, Ohio*

**Getting to** know a new group of students.—*Educator, High School, New Jersey*

**The physical** aspect—going from a more solitary and sedentary summer to being on my feet all day and “on” with students and colleagues.—*Educator, High School, California*

**Motivating myself** to plan and get ready for another year with students I do not know and often curriculum I have never taught.—*Educator, High School, Missouri*

**New curriculum** plus new classroom, in new building with five more students per class.—*Educator, Middle School, California*

**My personal** life ends.—*Educator, High School, Alabama*

**Professional development**, the one-size-fits-all kind.—*Educator, High School, Arkansas*

**Matching the** “new” requirements of continuously changing district/administration interpretation of standards/strategies with the needs of an ever-evolving student body.—*Educator, Middle School, Florida*

**Title switching** and constantly having to recreate the wheel for a different position each year.—*Educator, Elementary, Middle School, Illinois*

**The hectic** “go-go-go” schedule.—*Educator, High School, New Jersey*

**Lack of** work-life balance.—*Educator, High School, California*

**Getting back** into a schedule in terms of balancing responsibilities. In the summer, I can focus on family and self-care. It becomes a challenge during the school year, and self-care often goes by the wayside.—*Educator, Middle School, West Virginia*

**Lack of** discipline and disciplinary support. Old, out-of-date curriculum materials.—*Educator, Middle School, Washington* ●



Vernier

INSPIRE A LOVE OF SCIENCE

EASY

Simple for students and teachers to use

AFFORDABLE

Priced to fit school budgets

VERSATILE

Supports a variety of devices and experiments

Set your students up for success with cutting-edge technology that encourages curiosity, develops computational thinking skills, and enhances their understanding of the world around them.

DEVELOP YOUR STUDENTS CRITICAL 21<sup>ST</sup> CENTURY SKILLS

Visit [learn.vernier.com/middle-school](https://learn.vernier.com/middle-school)

Quotable

The objective is to teach the student to see the land, to understand what he sees, and to enjoy what he understands.

—Aldo Leopold, U.S. environmentalist (1887–1948)



## MONEY 101

# Protect Finances Amid Data Hacks

By Kelly Kenneally

On the heels of the credit scoring company Equifax agreeing to pay up to \$700 million to compensate victims of hackers, banking giant Capital One reported a hacker stole the personal information of more than 100 million people.

This latest high-profile data breach impacts consumers who obtained a credit card from Capital One as far back as 2005. While much of the information stolen from the bank was already public, the breach included 140,000 Social Security numbers. And other companies, universities, and government agencies may also have also been affected by this same hack.

Security experts warn that these data breaches are likely to continue, leaving consumers increasingly at risk for financial fraud and identity theft. According to Risk Based Security's report (<http://bit.ly/2LRMvCZ>), more than 2,000 breaches exposing about

1.9 billion records were reported in the first quarter of 2019. Compared to that same period in 2018, the number of breaches increased 56%, while the number of exposed records was up 29% from 1.4 billion.

Given this alarming trend and the absence of new data protection laws, it's increasingly important for consumers to take action. This means understanding if you're part of incidents and taking proactive measures to safeguard your accounts and personal information. Here are seven steps you can take now to assess your vulnerability and protect your financial information.

**1. Determine if you can submit a claim for an Equifax data hack, and register for free credit reports.** First, check online (see the website <http://bit.ly/2ZwIsPP>) to determine if your information was part of the Equifax incident. If so, collect the

*Given this alarming trend and the absence of new data protection laws, it's increasingly important for consumers to take action.*

information documenting your losses and expenses, then submit your compensation claim by **January 22, 2020** (<http://bit.ly/334Ej7w>). Even if you weren't part of the breach and don't qualify to file a claim, you can get free credit reports for seven years as part of the settlement (consult <http://bit.ly/2SUyLDq>). Everyone should sign up for these reports.

**2. Know if you're at risk.** Whether it's the recent Capital One hack or the inevitable next incident, be vigilant about watching for announcements of new breaches, and be aware of your exposure. For example, Capital One said it will reach out directly to customers affected by the hack to offer free credit monitoring and identity protection to affected customers. But if you don't hear from Capital One and think your information may have been exposed, proactively call the company's customer service line at 800-227-4825 rather than waiting. It's also prudent to sign up for fraud alerts to stay abreast of the newest risks. The Federal Trade Commission offers e-mail alerts (see the website <http://bit.ly/2GCoknW>), as does AARP (<http://bit.ly/2SUZJ2j>).

**3. Freeze your credit.** Only about 25% of U.S. adults have frozen their credit, even though security experts agree that a freeze is essential to protecting your data and stopping scammers from creating accounts in your name. Credit freezes prevent loans and other services from being opened in your

name without your consent, and they don't affect your credit score. Freezing credit at the three credit reporting bureaus (Equifax, Experian, and TransUnion) now costs nothing, and can be done online or over the phone. The credit bureaus will lift the freeze at your request if you decide to apply for a new mortgage, car loan, or credit card.

**4. Protect your accounts.** Don't wait for a hack. Carefully monitor your credit card and banking statements at least monthly (or more frequently if you can) for any fraudulent activity, and report any suspicious activity immediately. You can monitor your accounts frequently online rather than waiting for paper statements. Also, check with your bank and credit card issuers to find out the types of real-time alerts you can sign up for to verify account activity. It's also important to change your passwords frequently using a combination of letters, characters, and symbols to generate a complex passphrase. And don't ever access your accounts using public or unsecured WiFi.

**5. Enable layers of security.** Given hackers' increasing ingenuity, it's important to add an extra level of security when logging on to your financial accounts whenever possible. Check with your financial institutions to see if you can implement "out-of-band" authentication when accessing your accounts online. This type of two-factor

UC SANTA BARBARA

KAVLI INSTITUTE FOR THEORETICAL PHYSICS

High School Physics Teachers' Conference:



## Spacetime, holography, and entanglement

January 18, 2020

Free registration, deadline Dec. 15, 2019.

Financial aid is available for travel and lodging, awarded on a rolling basis after October 21, 2019.

[www.kitp.ucsb.edu/teachers-conference](http://www.kitp.ucsb.edu/teachers-conference)



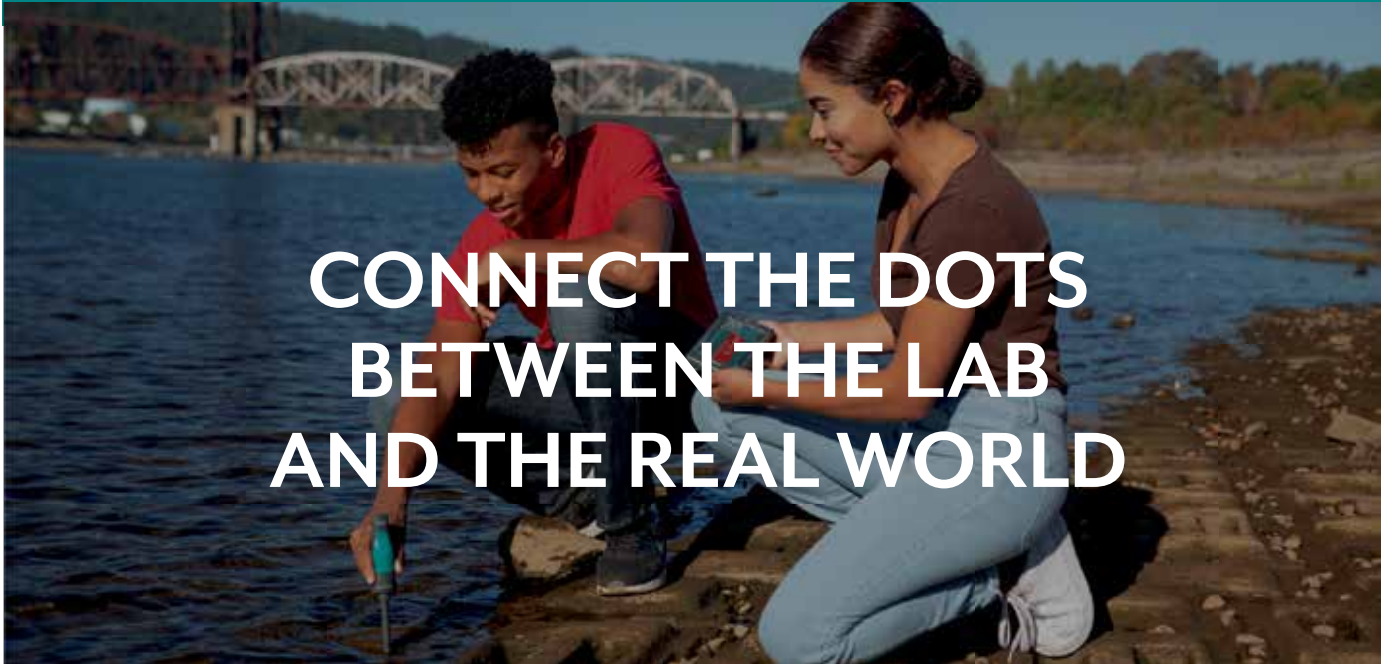
authentication requires a secondary verification method through a separate communication channel, along with the typical user ID and password. This type of security typically generates a text message sent to your mobile phone containing a unique code to enter before accessing your account, which adds an extra layer of security to your account. Unless the hacker has your phone, your account is safe.

6. **Don't take the bait on phishing.** Phishing scams continue to collect personal and financial data: Social Security numbers, credit card details, or passwords for online accounts. Usually associated with e-mail, phishing scams also can come in other forms, including social media, pop-up ads, phone calls, text messages, and lures to bogus websites. To protect yourself, never click on links or download attachments in suspicious e-mails. Phishers often use company logos to make their communications seem legitimate, so always go directly to your financial institution's website rather than clicking on e-mailed links. And never, ever, give anyone your passwords or account numbers.

7. **Create an online Social Security account.** Given that millions of Social Security numbers have been compromised, it's critical to set up online access to safeguard your benefits. Creating an online Social Security account prevents someone else from fraudulently setting up an account and filing for benefits in your name. Once you've set up your online account, no one else can. Go to [www.ssa.gov/myaccount](http://www.ssa.gov/myaccount) to set up your account. ●

*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.*

# Vernier



## CONNECT THE DOTS BETWEEN THE LAB AND THE REAL WORLD

### EASY

Simple for students and teachers to use

### AFFORDABLE

Priced to fit school budgets

### VERSATILE

Supports a variety of devices and experiments

Encourage students and build their confidence in pursuing a STEM career path with help from Vernier Software & Technology.

Whether or not your students are already STEM-inclined, the hands-on experience with data-collection technology from Vernier helps them prepare for standardized testing and college, as well as preparing them to meet the NGSS and state standards through experiments that support three-dimensional learning.

### INSPIRE STEM CURIOSITY IN YOUR STUDENTS.

Visit [learn.vernier.com/high-school](http://learn.vernier.com/high-school)

### Quotable

**Don't let others discourage you or tell you that you can't do it. In my day I was told women didn't go into chemistry. I saw no reason why we couldn't.**

—Gertrude B. Elion, U.S. pharmacologist (1918–1999)

# Let's Make Science Learning Lifelong, Lifewide, and Lifedeeep

By Dennis Schatz, NSTA President (2019–2020)

This year, NSTA marks 75 years of providing science educators with effective resources and professional development in the form of publications, conferences, and workshops. As we celebrate this anniversary, we look toward the next 75 years. NSTA will remain the go-to source for our current members, and will expand what it offers to the coming generation of science educators, who will increasingly rely on the internet and their smartphones. It is time to broaden our reach to better serve the educators of science found outside the classroom—in after-school programs, in science-based museums, and even at home.

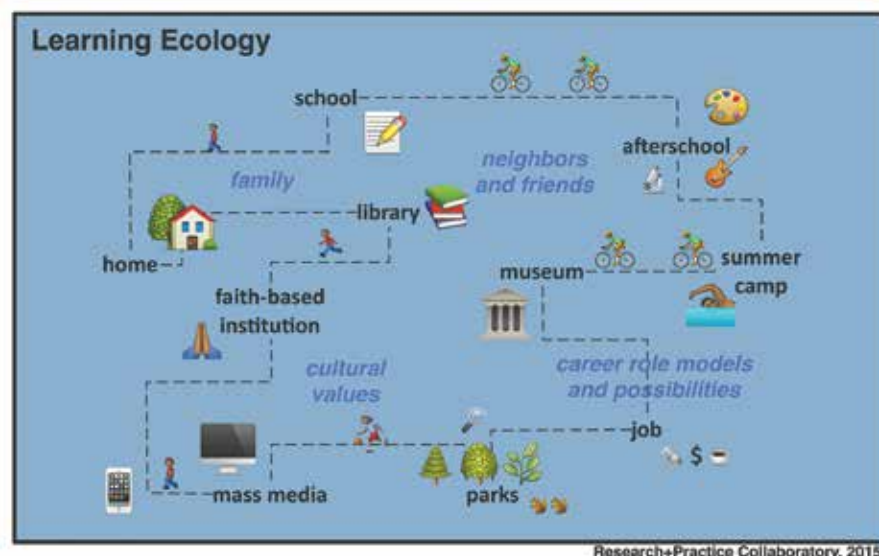
This new focus nicely complements my presidential theme for the coming year: “**Making Science Learning Lifelong, Lifewide, and Lifedeeep.**” By this, I mean

- **Lifelong:** Making science learning something people engage in throughout their lives;
- **Lifewide:** Making science learning something people experience in

a variety of situations every day throughout the year, whether in school, at home and work, and in after-school programs, museums, and summer camp;

- **Lifedeeep:** Encouraging people to engage in science learning at a level that is right for them, such as following science news in the media; participating in a citizen science project; becoming an amateur astronomer; or even having a science-based career.

For years, research (including *Eyeballs in the Fridge: Sources of Early Interest in STEM*; Adam Maltese and Robert Tai, *International Journal of Science Education*, 15 March 2010) has made it clear that individuals develop their interest in science before age 12, while they are in elementary school. However, we also know that only a limited amount of science is taught in these grades. The latest research from Horizon Research, Inc., finds only 90 minutes of science per week is taught on average in grades K–3, and 135 minutes per week in grades 4–6.



In addition, our youth spend less than 20% of their waking hours in a school classroom.

Finding more time in the formal classroom is a challenge, so the goal should be to use some of the 80% of time outside of school to engage students with science, technology, engineering, and mathematics (STEM) concepts through such opportunities as after-school programs or at other learning venues (e.g., science centers, science-based competitions, and the home). We need to develop a STEM learning ecology that takes advantage

of all of the places where youth spend their day.

*Connected Science Learning* (see <http://csl.nsta.org>), the newest NSTA journal (developed in collaboration with the Association of Science-Technology Centers), highlights effective programs that connect in-school and out-of-school STEM learning. It is an example of how NSTA is broadening its reach beyond the school classroom.

The future NSTA will still serve classroom teachers, but will increase its efforts to serve other educators in museums and other informal education venues, educators in after-school programs, and even parents to take advantage of the 80% of time youth are not in the classroom.

If NSTA is successful, we will not only “*Make Science Learning Lifelong, Lifewide, and Lifedeeep*,” but we will also fulfill my dream—some have called it a fantasy—of science being as pervasive as sports. Imagine not only in-school science courses and after-school science programs, but also intramural science leagues and even “pickup” science activities in local parks.

We will know we’ve succeeded when everyone rushes home for Monday Night Science—and perhaps there will be T-shirts, websites, and Facebook pages connected to the event.

I look forward to working with everyone on the NSTA staff, council, board, and committees to make NSTA successful for the next 75 years and to make Monday Night Science bigger than Monday Night Football. ●

## Share Your Ideas!

NSTA's Conferences on Science Education

Have an idea for an inspiring presentation or workshop on science or STEM education? Submit a session proposal today for...

9th Annual  
STEM Forum & Expo,  
hosted by NSTA  
Louisville, KY  
July 22–24, 2020

Proposal Deadline:  
12/03/2019

2020 Area Conferences  
Pittsburgh, PA  
October 29–31  
New Orleans, LA  
November 19–21  
Phoenix, AZ  
December 10–12

Proposal Deadline:  
1/15/2020

2021  
National Conference  
Chicago, IL  
April 8–11

Proposal Deadline:  
4/15/2020

To submit a proposal, visit [www.nsta.org/conferenceproposals](http://www.nsta.org/conferenceproposals)





# DO MORE HANDS-ON SCIENCE

**:360<sup>°</sup>  
Science™**

The flexibility to create  
the best possible  
lab experience for  
your students.



## Designed with you and your students in mind.

Flinn's **360Science™** provides personalized instruction while delivering the lab experiences students need. This **comprehensive blended learning** solution combines **differentiated digital content** and **hands-on experiences**.

**360Science** provides flexibility by including:

- Videos and simulations to give students familiarity with the experiment, increasing lab confidence
- Leveled instructions with short, guided and open- and advanced-inquiry options
- Editable digital instructions to further customize labs
- Background information, safety techniques and assessments
- NGSS alignment for every lab



**360Science™**—Differentiated, Leveled, Adaptable Labs  
[www.flinnsci.com/learning-solutions/360science](http://www.flinnsci.com/learning-solutions/360science)

**FLINN**  
SCIENTIFIC

# NATIONAL CONFERENCE ON SCIENCE EDUCATION

## SAVE THE DATE



# SCIENCE

EXPANDING THE VISION

# BOSTON

April 2-5  
2020

OVER 1,200 SESSIONS

NETWORK WITH  
MORE THAN 10,000  
EDUCATORS

350+ EXHIBITORS  
WITH CUTTING-EDGE  
RESOURCES

AND MUCH MORE!

NSTA is holding its 68<sup>th</sup> national conference next year

The theme is 20/20 Science: Expanding the Vision. Conference program strands include:

- The Long View: Building a Lifelong Passion for Science
- Learning Science in All Spaces and Places: Near and Far
- Thinking, Acting, and Communicating Like Scientists: A Focus on Disciplinary Literacy
- Aligning the Lenses: Authentic, Three-Dimensional Measurement of Student Learning

For more information, please visit  
[www.nsta.org/boston](http://www.nsta.org/boston)

#NSTA20





# PULL-OUT SECTION

## SCIENCE TEACHERS' GRAB BAG



Inside this Convenient Pull-Out Section you will find:

### Freebies for Science Teachers

**Global Systems Science (GSS).** **H** This interdisciplinary, integrated course for high school students focuses on science-related societal issues. Developed by the Lawrence Hall of Science at the University of California, Berkeley, GSS incorporates content from various science disciplines (biology, physics, Earth science, chemistry, and environmental science) and addresses issues at the intersection of science and society, including climate change, societal energy use, population growth, and loss of biodiversity. At [www.globalsystemscience.org](http://www.globalsystemscience.org), teachers can access curriculum materials, including 12 digital textbooks and teaching guides, or select Updates to register for Staying-Up-to-Date, a weekly e-mail featuring research updates and news articles keyed to course textbooks. Use the articles to stay current on course content, or browse the article archives to find source material on numerous topics to use for nonfiction reading and writing assignments.

**Life on Earth iBook Textbook.** **H** Inspired by author and biologist E.O. Wilson, and created with a team of world-renowned educators and artists, this comprehensive standards-based curriculum textbook for high school audiences tells the story of life on Earth, providing a deep understanding of introductory biology and encouraging students to take responsibility for conserving and protecting the planet. Presented as a seven-unit collection, the digital textbook uses multi-touch experiences to engage learners in topics from molecules to ecosystems. Biology: Life on Earth, an accompanying iTunes U course, builds on the textbook content and promotes learning in and out of the classroom through reading and writing assignments and hands-on extension activities like field observation and moviemaking. Access the resources at <http://bit.ly/2MIFPMO>.

**Space Station Explorers Kit.** **EM** This space-themed activity guide for grades 3–8 was developed by the International Space Station (ISS) U.S. National Laboratory's education team. Appropriate for both formal and informal education settings, the downloadable guide introduces students to life aboard the ISS through six hands-on activities and accompanying online resources. The science, technology, engineering, and math (STEM)-based activities support the *Next Generation Science Standards (NGSS)* and *Common Core* learning standards and address topics such as measuring distances to space destinations, mission patch design, engineering and launching rockets, training for a spacewalk, exploring science through fiction, and building



NASA

a space station. Highlights from the online extensions include a blog, ISS 360, and the *Science Time From Space* video series, which features astronauts on the ISS conducting experiments on basic science concepts. See <http://bit.ly/2ZELm4O>.

**Spotlight on PreK–12 Engineering Education.** **P K12** Community for Advancing Discovery Research in Education (CADRE)—a National Science Foundation (NSF)-funded resource network that supports education researchers in improving formal and informal STEM education—has curated a collection of resources highlighting promising developments in preK–12 engineering education. Resources include curriculum and learning products from NSF-funded projects as well as videos and information about the research itself. Watch classroom videos featuring engineering-focused STEM education research and development, read expert commentary on New Directions for Engineering Education Research, and preview materials produced from evidence-based engineering projects for preschool (e.g., The RISE project website), elementary (e.g., The Soda-Can Crusher Challenge student activity and Views of Nature of Engineering teacher questionnaire), middle level (e.g., Virtual Engineering Internships from Amplify Science), and high school (e.g., Virtual Solar Grid). See <http://bit.ly/2GAClCy>.

**National Geographic Society's Professional Learning Courses.** **K12** Designed for K–12 educators and offered several times during the year, these online courses provide teaching tools and content expertise from National Geographic

on topics such as Teaching Global Climate Change in Your Classroom (middle level), Connecting the Geo-Inquiry Process to Your Teaching Practice (all levels), and Integrating Service With Learning Goals (all levels). Teachers can receive graduate credit through a partnership with the University of San Diego (to learn more, visit <http://bit.ly/32Ydq1F>).

K–12 teachers can also take coursework to become a certified National Geographic Educator. Through this professional



Freebies  
page G1



News Bits  
page G3



Summer  
Programs  
page G4



What's New  
page G7



In Your  
Pocket  
page G8

See Freebies, pg G2

## Freebies, from pg G1

development program, teachers gain practice in generating classroom activities that are interdisciplinary and centered around real-world problems at local, regional, and global scales, as well as develop leadership skills and a nationwide network of committed colleagues dedicated to innovating across disciplines. See <http://bit.ly/30UI6m6>.

**SCALE Science.** **M** NGSS-designed/supported, project-based curricula with embedded performance assessments are available from the Stanford Center for Assessment, Learning, and Equity (SCALE) at the following website: <https://stanford.io/2ZFr1MX>. Teachers can access project-based, year-long science curricula and assessments for middle level learners: Learning Through Performance—Sixth-Grade Curriculum; SCALE/San Francisco Unified School District NGSS Middle School Curriculum (grades 6–8); and Stanford NGSS Integrated Curriculum: An Exploration of a Multidimensional World (grades 6–8). The curricula include language supports and opportunities for structured group work, two key components that have proven effective in facilitating students’ co-construction of ideas and fostering rigorous and equitable outcomes for diverse students. The website also has professional development webinars to help teachers implement SCALE Science materials in the classroom.

**Science Pickle.** **M H HE** This website offers readings, experiments, data analyses, challenges, software (web and desktop apps), simulations, tools, practice problems, learning games, and self-graded assessments to enable students to explore Earth systems science at their own pace following the direction of their own questions. While the website’s explanatory content is primarily targeted for high school level and above, many of the activities are adaptable for the middle level. For example, the Learning Tools section contains activities for students of any level, such as writing activities that develop effective notetaking skills in science and research activities like creating puzzles or mystery boxes to

learn about scientific modeling. Refer to <https://sciencepickle.com>.



NASA, ESA, AND THE HUBBLE SPACE TELESCOPE

**Star Walk.** **K12** This augmented reality-enabled astronomy app can inspire K–12 students and astronomers of all ages to stargaze outdoors. The app turns any iOS device (phone, tablet, watch) into an interactive guide to the night sky and enables users to learn about more than 200,000 celestial bodies. Point your device at the night sky to see the stars, planets, satellites, and constellations in their proper place from any location. The app’s Star Map updates in real time when the device moves. Users can access details about celestial objects onscreen or project the app on a big screen with no reduction in picture quality. Download the app at <https://apple.co/2YzQsxQ>.

**ACS Science Activities for the Classroom.** **E** This American Chemical Society (ACS) website features hands-on activities to enrich science instruction in elementary classrooms. Targeted for grades 3–5, the activities can generate student interest in science and address topics in physical science, Earth and space science, and life science. The activities focus on the processes of doing science, including the importance of establishing an experimental control; changing and controlling variables; observing, measuring, and recording data; and drawing reasonable conclusions. Lesson titles include Metals—They’re Electrifying! (Characteristics of Materials/Magnets and Metals), Sour Power (Chemical and Physical Change/Acids and Bases), A State Debate (Solids, Liquids, and Gases/States of Matter), Salt Shaker (Motion and

Energy/Sound and Light), Caves—The Hole Story (Planet Earth/Land), Put Proteins on Your Pro Team (Your Body/Nutrition), and Make Your Own Sculpture Dough (Art and Toys/Art). Visit <https://bit.ly/2HPY8HM>.

**Smokey Bear Live: A Distance Learning Adventure.** **K12** This resource provides K–12 teachers, students, and the public with informative and interactive ways to learn about wildfire and celebrate the 75th anniversary of the Smokey Bear public awareness campaign. Visit <http://bit.ly/2LVhCNP> for lesson plans and videos exploring fire ecology and how to prevent wildfires at home and outdoors. The lessons include materials developed by the USDA Forest Service (e.g., Smokey Bear and Friends Complete K–2 Educator’s Guide; Smokey’s Wildfire Prevention Detectives, grades 6–8; and Fire Ecology Curriculum, grades K–12), Scholastic (e.g., Wildfire Search, grades 4–8), and universities (e.g., Wildfire Lesson Plans, grades 4–8, from the Penn State Department of Ecosystem Science and Management).

Teachers can register to participate in a live webcast on fire science on November 7. The webcast will focus on fire science topics such as wildland fires and their role in the ecosystem, the difference between wildfire and prescribed fire, and the role of prescribed fire in wildlands management. Consult <http://bit.ly/2MKO3ye>.



Francoise Barré-Sinoussi

**Women Who Changed Science.** **M H HE** Microsoft and Nobel Media developed this multimedia web experience highlighting the contributions of female Nobel Prize winners. Featured scientists include Francis Arnold (chemistry and evolution), Françoise Barré-Sinoussi (AIDS scientist), Gerty

Cori (cellular energy), Marie Curie and Irene Joliot-Curie (radioactivity), May-Britt Moser (neuroscience), Donna Strickland (laser pulse technology), and Tu Youyou (malaria research). The online profiles combine photographs, primary documents, audio files, and text to provide multidimensional views of each scientist. In addition, the profiles have links to profiles of other scientists of interest, as well as an opportunity to Match With a Laureate. To find a match, users choose answers to three questions (i.e., an issue you care about, a topic that interests you, and a person who inspires you) and receive the profile of the scientist who most closely matches their answers. Most appropriate for middle to college level audiences, the website aims to inspire young women in STEM pursuits. Consult <http://bit.ly/2ywIpxax>.

**STEM Activity Clearinghouse.** **K12** The clearinghouse has vetted STEM activities appropriate for K–12 library and classroom settings. Search for activities by audience, content area, level of difficulty, and other parameters, or browse curated collections like Amazing Animals, Citizen Science, Computational Thinking, Engineering Design Challenges, Tech Time Fun, and Weather and Climate. While the lessons are intended for use in library settings, many can be adapted for classroom or center use. Visit the website <http://bit.ly/2M6NTSa>.

**NASA’s STEM on Station.** **E M H** Next year is the 20th anniversary of humans living aboard the ISS. To celebrate, NASA’s STEM on Station and Microsoft Education developed lesson plans to explore the challenges astronauts face living in space. From designing “Astro Socks” to protect feet in microgravity to analyzing photos of Earth to predict climate change and more, these eight standards-supported lessons for grades 5–12 can generate interest in space science and engage students in designing in 3-D, analyzing data, building sensors, using virtual reality, and working with machine learning and artificial intelligence. Each lesson at <http://bit.ly/2YmmgLo> includes a video overview and student and teacher resources. ●





# News Bits

- **The California Science Framework recommends all students take physics, despite a shortage of physics teachers.** **MH**

In 2016, California's Board of Education adopted the *Framework* to support the *Next Generation Science Standards*, which recommends that all high school students take biology, Earth/space science, chemistry, and physics. But fewer aspiring teachers are earning a credential in physics, according to data from the California Commission on Teacher Credentialing. The test can be a significant hurdle: The pass rate for the physics test was 52% in 2016–2017, according to the commission.

To address the teacher shortage, the San Francisco Unified School District has partnered with the San Francisco Teaching Residency, run by Stanford

University and the University of San Francisco, and the New York University Steinhardt Residency. It also works with Trellis, a Bay Area nonprofit that partners with San Francisco State University's science and math student teaching programs to offer a year of student teaching followed by five years of support. The program offers a pathway to becoming a credentialed teacher in a least one science, technology, engineering, and math (STEM) discipline. At the end of six years, teachers earn a master's degree and National Board certification. See <https://bit.ly/2YeAyJc>.

- **A study published in *BioScience* reports that expanding class size in STEM classrooms has a negative effect on female class participation.** **HE**

Researchers collected data from 44 courses at institutions including Cornell University, the University of Minnesota, and American University in Cairo, Egypt. They analyzed more than 5,300 instructor-student interactions in STEM courses over two years and found smaller classes led to more equitable participation.

A range of tactics can boost female participation in large classes, including group work or a slightly longer wait time after posing a question to the class, say the authors. Instructors could also have students first respond to questions in writing, share anonymous answers with the class, and invite the students to follow up aloud. See <https://on.mktw.net/2yF3v6L>.

- **The National Science Foundation (NSF) awarded Xavier University of Louisiana \$400,000 to improve undergraduate STEM education.** **HE**

Xavier's Biology Department received funding through NSF's Histor-

ically Black Colleges and Universities (HBCU) Undergraduate Programs to support redesigning two lab courses to be course-based research experiences (CUREs), as freshmen at HBCUs and smaller institutions typically don't have research opportunities. The grant will affect approximately 1,500 first-year students over the course of three years.

The first course will characterize unknown genes to determine their functions in yeast; the second focuses on discovering novel regulatory genes in *Aspergillus* (a filamentous fungus) species known to damage crops. All incoming biology majors will study genetics, molecular biology, biochemistry, statistics, and bioinformatics, along with research techniques to hone their analytical and problem-solving skills.

Shubha Ireland, a biology professor at Xavier, observes, "This initiative will be a positive factor in increasing and maintaining student interest and retention in the sciences." Xavier is possibly the first HBCU nationwide to revamp first-year courses this way. ●

## Engineering is iteration!

Discover how easy it is to engage your students in **science and engineering practices** with WhiteBox Learning.

Students do the work of real engineers:

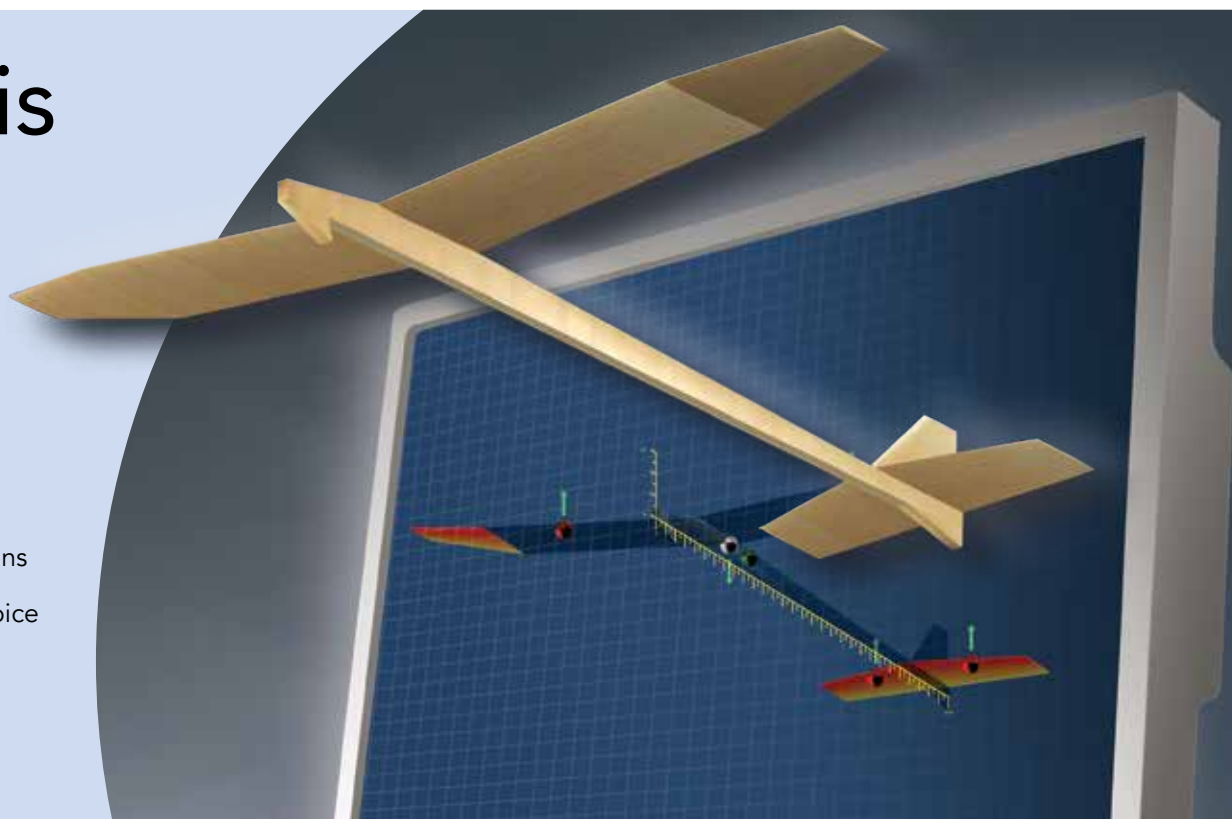
- Using CAD-inspired software
- Following the informed iteration process
- Building authentic models from virtual designs

See why **WhiteBox Learning** is the favorite choice of students and teachers!

Try it FREE at:  
**whiteboxlearning.com**



**WHITEBOX**  
LEARNING  
A Flinn Scientific Company



"... I have never had any other curriculum that was as complete a package as the WhiteBox System... It is by far the best thing I have ever put in my classroom. Plus, the kids absolutely love it!"

—Rocky Shepherd, Middle School STEM Teacher



# Summer Programs

## Editor's Note

Visit [www.nsta.org/publications/calendar](http://www.nsta.org/publications/calendar) to learn about other summer professional development opportunities.

### Costa Rica Leatherback Turtle Volunteer Trip **A**

Spend four nights working with leatherbacks at a research station along Costa Rica's northern Caribbean coast on this conservation trip held by the nonprofit SEE Turtles. Activities during this June 14–20 trip include walking the nesting beach at night; helping to measure turtles; collecting eggs and moving them to hatcheries; and working with hatchlings (later in the season). During the day, participants can help clean the beach; look for wildlife like monkeys,

sloths, butterflies, birds, and more; or simply rest and relax.

This trip is open to individuals and small groups. Profits from this trip will help save at least 500 hatchlings per participant at a turtle nesting beach. The fee includes in-country transport, meals, lodging, activities, guides, and a donation to turtle conservation. (Airfare to Costa Rica, personal items, and tips for the guides are not included.) Learn more at <http://bit.ly/2O19OMq>.

### Tell Educators About Your Summer PD **A**

Want to announce your summer professional development (PD) program in the Summer Programs section of [www.nsta.org/publications/calendar](http://www.nsta.org/publications/calendar), NSTA's online calendar, and possibly

in this column? E-mail the following information to [nstareports@nsta.org](mailto:nstareports@nsta.org):

- program dates and application deadline,
- location,
- who is eligible to attend (i.e., STEM teachers, elementary teachers, science supervisors, principals, informal educators, etc.),
- relevant websites, and
- fees (if applicable).

All summer PD announcements will be posted on the online calendar. To appear in *NSTA Reports*, a program must meet one of these conditions:

- be held by/through a nonprofit group, government entity, or university;
- provide a stipend for all participants;

- offer tuition-free credit to all; or
- reimburse all participants for some expenses (such as travel costs).

If your program qualifies for publication in *Reports*, we must receive the information at least two months before the issue in which you want the announcement to appear (remaining issues are October 2019, November 2019, and January 2020 through May 2020). Announcements in the Summer Programs column will be published one time only on a space-available basis and will be edited for style and length.

Get even more visibility for your program by advertising it in NSTA publications. Learn more at the website [www.nsta.org/exhibitsadv](http://www.nsta.org/exhibitsadv). ●

## THE NSTA Learning Center

Join over 220,000  
science teaching professionals.

Learn today, your way.

Connect with  
others through  
14 topical forums

Use the forums to share your questions, comments, challenges, or success stories. Many users even request and share resources to use in the classroom that very day!

Gauge your  
knowledge in 25  
content areas

Explore thousands  
of resources: lesson  
plans, articles, book  
chapters, and more

Attend events,  
online and  
in-person

Track your  
professional  
learning goals  
and activities

Connect with  
others through  
14 topical forums  
or via private  
messaging

<http://learningcenter.nsta.org>





“This online master’s in biology program has opened up opportunities for me as a teacher. It has helped me develop skills to talk with students and get them interested in science.”

Curtis Reese, Graduate  
University of Nebraska at Kearney  
Biology, MS

**Online Biology, MS**  
**University of Nebraska at Kearney**

- Non-Thesis Online Option
- Master’s of Science Program
- Low Student to Faculty Ratio

Develop the skills to make an even greater impact in your classroom.

**Application deadline for spring semester is October 15.**

**Learn more:**

► [online.nebraska.edu](https://online.nebraska.edu)

UNIVERSITY OF  
**Nebraska**  
Online

KEARNEY | LINCOLN | OMAHA | MEDICAL CENTER

# NSTA Partner School Package

Each Partner School receives these benefits:

- » **NSTA membership** for all teachers in the school building
- » **One free conference** registration for a teacher/administrator to a STEM Forum or an NSTA Conference
- » **Recognition** as an NSTA Partner School
- » **One** print journal for the school building and e-journals for every teacher/member in the school
- » **One** hard copy of NSTA Reports (newspaper) with e-Reports for every teacher/member in the school
- » **Learning Center Forum**, including collections of *NGSS* and STEM resources differentiated by grades
- » **An initial one-on-one conversation** with NSTA to determine which products and services can best support school-wide professional learning goals
- » **Participation** in three virtual conferences per year, exploring critical topics for STEM and *NGSS* integration
- » **Access** to a national *NGSS* and STEM listserv and 16 other listservs

Please visit

[www.nsta.org/schoolmembership](http://www.nsta.org/schoolmembership)

for more information

[schoolmembership@nsta.org](mailto:schoolmembership@nsta.org)



In addition, each teacher receives discounts on

- » **NSTA conferences and workshops**
- » **Print books**
- » **Interactive eBooks+**

Special Introductory Price:  
**\$1,950 per school**







FROM U.S. GOVERNMENT SOURCES

### Bureau of Land Management (BLM) Minerals Teaching Guide **M**

The teaching guide *Minerals: Essential Ingredients in Your Life* introduces middle level students to the minerals used in making many products, from personal care items and cell phones to kitchen tools and hybrid cars. Students then explore one mineral in particular, cobalt, and determine whether it should be mined in the United States. Students must consider factors such as national security, alternative uses for public lands, and the problematic labor conditions at many cobalt mines overseas. Through the process of evaluating the pros and cons of domestic cobalt mining, students discover how land managers balance domestic minerals development, recreation, respect for American Indian tribes and Alaska Natives, grazing, and habitat protection.

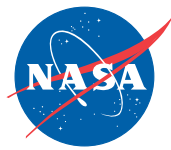
Each activity features time required, learning objectives, teacher preparation, procedures, assessments, and essential handouts. Consult the website <https://on.doi.gov/2ZiqZKs>.



### U.S. Fish and Wildlife Service (FWS)

#### Ocean Science Lessons **E M H**

An ocean study offers opportunities to measure, monitor, model, and learn. At <http://bit.ly/2X2MFZ7>, teachers can access news stories, videos, and other content to explore ocean science with elementary, middle level, and high school students. The content can be adapted to fit different grade levels and learning standards and addresses ocean understandings through themes such as human impacts, animal behavior, restoring ecosystem health, interdependence, protection, sustainability, and technological solutions to reduce human impacts.



### National Aeronautics and Space Administration (NASA)

#### Mars 2020 "Name the Rover" Contest Judges Needed **K12**

Calling all Mars enthusiasts and space educators: NASA's Mars 2020 "Name the Rover" contest needs your help! Designed to excite K–12 audiences and the public about the engineering and scientific work that make NASA's missions to the Moon and Mars possible, the upcoming student contest is currently recruiting volunteer judges to help score anticipated student entries. The contest opens this fall (date to be determined) and is expected to generate thousands of entries from K–12 students nationwide. Judges will be needed for three to five hours in November to review the entries. Learn more at <https://go.nasa.gov/2YjzVO>.

#### NASA Space STEM **K12**

Engage K–12 students in the history and future of space exploration with a website, Space STEM, and a publication, *NASA STEM Forward to the Moon Educators Guide*. The resources are designed to inspire the next generation of space exploration while commemorating the achievements of the Apollo space missions and the 50th anniversary of humans' first landing on the Moon. The website features a wide range of science, technology, engineering, and math (STEM) activities for K–5, 6–8, and 9–12 classrooms and informal programs, from classroom demonstrations studying the science of the Moon (e.g., Whip Up a Moon-Like Crater) to engineering design challenges investigating which wheel designs and materials are best on a simulated Martian surface (e.g., Racing Against Friction). Visit <https://go.nasa.gov/2Za9R9Q>.

In addition, students can watch *NASA STEM Forward to the Moon*, a 30-minute program about NASA's plans for continuing research on the Moon, along with video footage of

middle level students conducting activities such as Moon landing simulations and space-themed engineering design challenges using simple household materials. The accompanying publication, *NASA STEM Forward to the Moon Educators Guide* (see the website at <https://go.nasa.gov/2YNQMJJ>), presents instructions for space-related activities such as demonstrating sizes and distances of Earth, the International Space Station, the Moon and Mars; making balloon rockets with a payload; simulating gravity with magnets; making a water filtration system; designing a lunar habitat; and simulating finding oxygen on the Moon.



### U.S. Department of Agriculture (USDA)

#### Invasive Species Resources **K12**

The USDA has curated a collection of K–12 education resources on invasive plants and animal species at the website <http://bit.ly/2LYSBBm>. Developed by the USDA and other groups, the resources include curricula, fact sheets, learning kits, and videos. Addressing various grade levels, these materials are focused on helping students understand the role of invasive species in the environment. Highlights include Invasive Pest Management Curriculum (grades K–6), Aquatic Invaders Attack Pack (grades 4–10), Hungry Pests Invade Middle School Curriculum (grades 6–8), and Habitattitude: Animals and Plants in Classroom Education (grades K–12).

### U.S. Department of State Global Education 101 **K12 HE**

Global Education 101 is a self-paced online course for K–college U.S. educators. The approximately five-hour course provides a full picture of global competence: what it is, why it is important, and how to incorporate it into the classroom. Throughout the course, teachers participate in reading and videos, multimedia quizzes, video chats, webinars, discussion boards, and reflections. Educators are also encouraged to apply the practical strategies learned in the course's three modules in their classrooms and schools. Upon completion, educators receive a U.S.

Department of State Global Educator Certificate indicating five hours of professional learning, as well as access to the Global Education 101 badge, which can be used in e-mail signatures and professional profiles. To learn more and enroll, visit <http://bit.ly/2T5qEZE>.



### National Oceanic and Atmospheric Administration (NOAA)

#### Talking Trash, Taking Action **E**

Developed by the Ocean Conservancy and the NOAA Marine Debris Program, this curriculum for grades four and five teaches students about the impact of marine debris on our ocean and how to prevent it. Through activities exploring marine debris and its origins, students learn what happens to trash when it enters waterways, compare marine debris decomposition rates, and explore the effects of trash in the ocean on marine ecosystems, such as animal entanglement or organisms mistakenly ingesting trash as food. Students also participate in a hands-on habitat cleanup, identify ways to prevent trash from entering waterways, and create a piece of art from recycled trash. Pre- and post-surveys help teachers gauge student understandings about marine debris. Refer to <http://bit.ly/2EEFjVp>.

### What Causes a Thunderstorm? **E M**

Help elementary and middle level students understand why and how these storms form with this quick animation on NOAA's SciJinks weather website (<http://bit.ly/2W5sEWg>). The clip describes the three components required for thunderstorm formation (moisture, unstable air, and lift) and how the three parts interact before, during, and after a storm. It also discusses how forecasters use information from high-tech weather satellites, such as those in NOAA's Geostationary Operational Environmental Satellite-R Series, to monitor clouds and lightning as storms form and help protect us from severe weather on Earth. The website features the clip and transcript and a poster based on the animation. ●



# In Your Pocket

## Editor's Note

Visit <https://bit.ly/2ZIRlp5> to learn about more grants, awards, fellowships, and competitions.

## September 20–30

### FirstEnergy STEM Classroom Grants **P K12**

These grants support classroom projects and professional development initiatives focused on science, technology, engineering, and math (STEM). Those that include the study of electricity are of special interest. PreK–12 educators and youth group leaders in FirstEnergy service areas (in Maryland, New Jersey, Ohio, Pennsylvania, and West Virginia) can apply for grants of up to \$1,000. Projects must be completed during the 2019–2020 school year.

Apply by **September 20** at <http://bit.ly/2YYLNqz>.

### Space Foundation Discovery Center Field Trip Scholarships **A**

These scholarships help classes visit the foundation's Discovery Center in Colorado Springs, Colorado. The Discovery Center is an educational destination for preK–20 students that promotes science, technology, engineering, art, and math (STEAM) through space exploration. Field trips must be conducted between September 30 and December 13, 2019.

Apply by **September 20** at <http://bit.ly/2JCM3WG>.

### Space Foundation Teacher Liaison Program **A**

The foundation invites educators who teach about space to apply for this program. Teacher Liaisons receive training and cutting-edge resources to further integrate space in their classrooms and serve as links between the foundation and their respective schools and districts. Liaisons also work with other space organizations,

such as NASA, and get complimentary registration for and special recognition during the foundation's annual Space Symposium. Once selected, Teacher Liaisons remain active in the program as long as they meet its requirements.

Public, private, and homeschool teachers; school administrators; and informal educators in preK–20 settings are eligible. Apply by **September 30**; see <http://liaisons.spacefoundation.org>.

### Green Thumb Challenge Grant **K12**

The Green Education Foundation awards this \$500 grant to an exceptional youth garden program that has impacted the lives of K–12 students and their surrounding communities. A video chronicling the success of your garden, a digital portfolio, or scanned artwork with descriptions is required to apply. The deadline is **September 30**; consult <http://bit.ly/NMYblp>.

### Impossible Science Student Challenge **M H**

What cool STEM projects are you and your students working on? Share about them for a chance to win a live magic show for your school by Impossible Science founder Jason Latimer. Middle and high school students in the United States and Canada can enter with their teacher or other adult sponsor. The top three finalists will receive exclusive interviews and distribution of their project through Engineering.com.

Submit your project description through ProjectBoard by **September 30**. Access <http://bit.ly/2XZHlku>.

## October 1–8

### Donald Samull Classroom Herb Garden Grant **E M**

The Herb Society of America offers these grants to public and private school teachers of grades 3–6 with classes of at least 15 students. Ten schools will receive \$200 “seed money” grants to establish indoor or outdoor herb gardens. Funds may be used for soil, plant trays, containers, or tools.

Apply by **October 1** at the website <http://bit.ly/2Lref0X>.

### Toshiba America Foundation Science and Math Improvement Grants **E**

These grants of up to \$1,000 support elementary school teachers with innovative classroom project ideas for improving STEM learning. Successful projects often tap into students' natural curiosity, enable them to ask their own scientific questions, and incorporate the expertise of community partners. K–5 requests are due by **October 1**. Visit [www.toshiba.com/taf](http://www.toshiba.com/taf) for details.

### Frances R. Dewing Foundation Grants **P E**

The foundation gives grants only to programs that deal directly with early childhood education. As such, these grants support preschool, elementary, and other education; conservation and environmental protection; the fine and performing arts and other cultural programs; and social services. Programs must serve children younger than age 12.

Giving is limited to the United States. The average grant amount is \$5,000. Apply by **October 1**; learn more at <http://bit.ly/2OeOiUM>.

### The Sparkplug Foundation Grants **P K12**

The foundation makes grants anywhere in the United States, and in Israel/Palestine. Sparkplug funds startup organizations and new projects of established organizations in education, music, and community organizing. It aims to support projects that deal with “the whole student” and with learning as a community activity. This has included projects that use a neighborhood as a classroom, literacy projects that bring parents and kids together to learn, or projects that help teachers share ideas about creative, relevant curricula. The funding supports critical and investigative thinking, and projects that address class disparities in education.

Sparkplug gives preference to proj-

ects with small budgets, projects of “smallish” organizations, and projects less likely to receive corporate, institutional, or government funding. To apply, answer the preliminary application questions at <http://bit.ly/2LD0L2u> by **October 8**.

## October 10–15

### Air Force Junior ROTC Grant **M H**

The Air Force Association offers grants of up to \$250 to promote aerospace education in classrooms and Junior ROTC units. Grants can be used for aerospace-related items, such as books and materials, or field trips to an aerospace museum, Air Force base, or other aerospace facility. Classrooms and units can apply every other academic year.

Apply by **October 10**; refer to <http://bit.ly/2xTheX4>.

### NSHSS STEAM Educator Grant **H**

The National Society of High School Scholars (NSHSS) provides these \$1,000 grants to enhance STEAM-related activities, innovation, and classroom excellence for STEAM teachers. Funds can be used for supplies, materials, field trips, or other resources that enrich the delivery of their courses.

High school teachers at public or private schools in the United States or abroad are eligible. Applicants must register as an educator with NSHSS and submit applications by **October 15**; visit <http://bit.ly/2y2cVci> for details.

### Lorrie Otto Seeds for Education Grants **P K12**

Wild Ones, a not-for-profit environmental education and advocacy organization, gives grants ranging from \$150 to \$500 to schools, nature centers, or other nonprofit educational organizations serving preschool through high school to establish hands-on nature education areas. Funds will be provided only for the purchase of native plants and seed. The grant project coordinator will also receive a complimentary Wild Ones one-year membership and the electronic quarterly, the *Wild Ones Journal*.

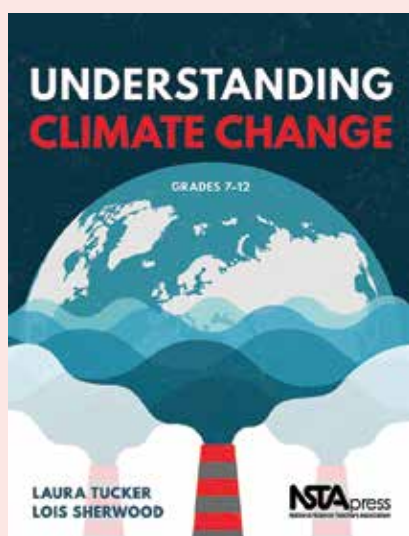
See <http://bit.ly/2OfWhAX> for more information. Apply by **October 15**. ●



Between **September 1** and **October 31, 2019**, get **free shipping** when you order \$75 or more of **NSTA Press** and **NSTA Kids** books.

Use promo code **SHIP19** when you checkout in the online Science Store.\*

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



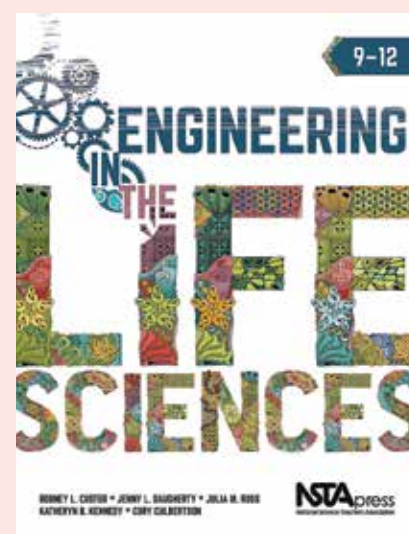
**Grades 7–12**

Book: Member Price: \$25.96 | Nonmember Price: \$31.95  
E-book: Member Price: \$19.17 | Nonmember Price: \$23.96  
Book/E-book Set: Member Price: \$30.67 | Nonmember Price: \$38.34



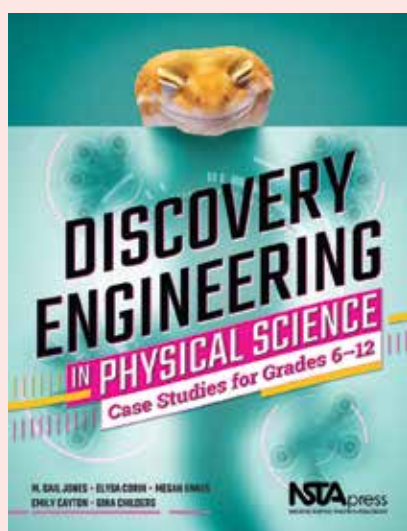
**Grades PreK–5**

Book: Member Price: \$10.36 | Nonmember Price: \$12.95  
E-book: Member Price: \$8.42 | Nonmember Price: \$9.71  
Book/E-book Set: Member Price: \$13.47 | Nonmember Price: \$16.84



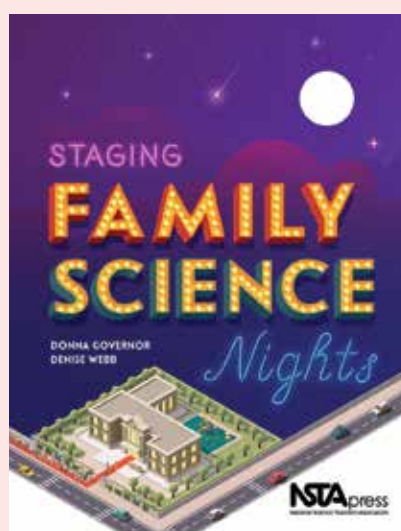
**Grades 9–12**

Book: Member Price: \$31.96 | Nonmember Price: \$39.95  
E-book: Member Price: \$23.97 | Nonmember Price: \$29.96  
Book/E-book Set: Member Price: \$38.35 | Nonmember Price: \$47.94



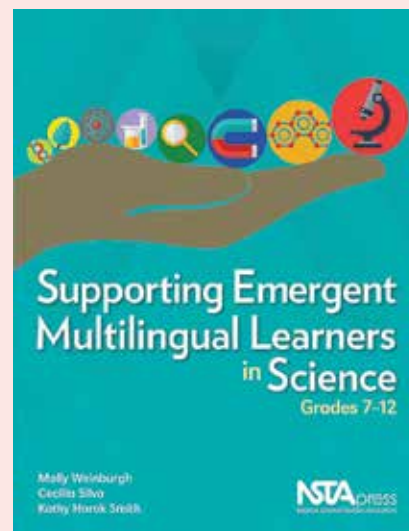
**Grades 6–12**

Book: Member Price: \$31.96 | Nonmember Price: \$39.95  
E-book: Member Price: \$23.97 | Nonmember Price: \$29.96  
Book/E-book Set: Member Price: \$38.35 | Nonmember Price: \$47.94



**Grades PreK–12**

Book: Member Price: \$25.96 | Nonmember Price: \$31.95  
E-book: Member Price: \$19.17 | Nonmember Price: \$23.96  
Book/E-book Set: Member Price: \$30.67 | Nonmember Price: \$38.34



**Grades 7–12**

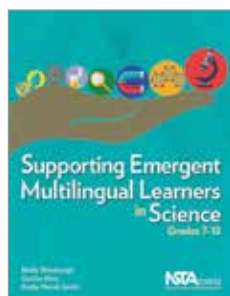
Book: Member Price: \$25.96 | Nonmember Price: \$31.95  
E-book: Member Price: \$19.17 | Nonmember Price: \$23.96  
Book/E-book Set: Member Price: \$30.67 | Nonmember Price: \$38.34

To place an order or download a free chapter, visit

**[WWW.NSTA.ORG/STORE](http://WWW.NSTA.ORG/STORE)**







**NSTA PRESS:** *Supporting Emergent Multilingual Learners in Science, Grades 7–12*

# Scaffolding

## Editor's Note

NSTA Press publishes high-quality resources for science educators. This series features just a few of the books recently released. This excerpt is from *Supporting Emergent Multilingual Learners in Science, Grades 7–12*, by Molly Weinburgh, Cecilia Silva, and Kathy Horak Smith, edited for publication here. Download the full text of this chapter at <https://bit.ly/2K4q7Tl>. NSTA Press publications are available online through the NSTA Science Store at [www.nsta.org/store](http://www.nsta.org/store).

Though natural language is often considered the dominant mode of communication in the science classroom, students also need to be supported and scaffolded in comprehending and con-

structing meaning through mathematical expressions, visual representations, and manual-technical operations (Kress et al. 2001; Lemke 2004; Molle 2015). Scaffolding, as we discussed in previous chapters, refers to the type of support that science teachers offer all students—but especially EMLs [emergent multilingual learners]—as they develop science concepts, practices, and hybrid language in the classroom. Going back to Vygotsky's (1968, 1978) concept of the zone of proximal development (as described on page 23), we now focus on ways in which EMLs collaborate with more knowledgeable others (e.g., classroom teachers and capable peers) to perform tasks they cannot yet accomplish on their own, given their level of language development.

A decision to scaffold hybrid language within the science classroom reflects an understanding that if they are to *do* science, EMLs must develop the full range of scientific language. As

you plan science lessons, you need to consider scaffolding tasks that explicitly develop scientific discourse while developing scientific concepts. Here we again remind you that we are not talking about teaching grammar or vocabulary in isolation. Instead, we need to give more explicit attention to teaching students how to use multimodal language as a meaning-making tool within the context of science lessons. An explicit focus on the hybrid language of science provides EMLs with additional ways of making sense of the new knowledge and concepts they typically encounter in the classroom.

For example, a technique we often use to scaffold hybrid language is the creation of data tables. Data tables allow students to use natural language and mathematical expressions to display data organization visually. The teacher can help create the first data table and point out the importance of each column and row. Students are then able to use that as a model for future data tables. Teachers should also model how to make a quick sketch of equipment or results and remind students that making a sketch is beneficial as a way to remember what they used or what happened. By doing so, students have a model for capturing information visually.

A critical characteristic of scaffolding is that the more knowledgeable other adapts the level of language support offered, so students, ultimately, can perform tasks independently. As we scaffold, we are aware that even though we are acting in the present, we are envisioning the future in terms of students' potential development. Often classrooms accomplish this with strategies such as "I do, we do, you do," in which the teacher models before students work in small groups and then finally alone.

Although the literature on scaffolding language and learning is extensive, the work of Hammond and Gibbons (Gibbons 2009, 2015; Hammond 2014;

Hammond and Gibbons 2005), which conceptualizes scaffolding in terms of two levels of student support, has particularly informed our practice. Hammond and Gibbons use the terms *macro-scaffolding* and *micro-scaffolding*. Macro-scaffolding refers to the planning decisions teachers make as they include language tasks in the curriculum. Micro-scaffolding, by contrast, refers to the collaborative work that occurs between student and teacher within the context of the lesson. Whether scaffolding is macro (planned) or micro (spontaneous), it is a way of "*supporting-up* such students, rather than *dumbing-down* the curriculum" (Hammond and Gibbons 2005, p. 6).

## Macro-Scaffolding

Macro-scaffolding includes many of the planning features you might expect in any class where there is good teaching. Thus, we ask you to consider the critical features of macro-scaffolding through the lens of a science educator who understands that teachers must make the hybrid language explicit. Next we identify and discuss some of the features considered essential to the planning of macro-scaffolding in the classroom.

**Background knowledge.** Even novice teachers can identify background knowledge as the backbone of lesson planning because it takes into consideration EMLs' prior experiences with science content and their level of language proficiency. Students are only capable of building new concepts and language on previous knowledge and understandings (Vygotsky 1978; Walqui 2006). Therefore, to help students build new knowledge and ultimately develop the discourse of science, you must start where they are.

**Metacognitive awareness.** As a science teacher, you are aware of the benefits of supporting metacognition—thinking about thinking—in your classroom. This involves scaffolding learners to become aware

### Professional Development Opportunity

## 2020 Workshops

### American Wilderness Leadership School

Jackson, Wyoming

- One of a kind workshop for educators - In the mountains
- Topic: Conservation & Outdoor Education for Educators
- College Credit & Continuing Education Available
- NASP instructor certification
- Tuition & travel stipend paid for a limited number of educators



Contact American Wilderness Leadership School:  
520-620-1220 ex. 231  
[www.SafariClubFoundation.org](http://www.SafariClubFoundation.org)





of their own thinking processes as they explore new science practices. In effective language classrooms, teachers explicitly teach skills that help students become aware of how and when to use appropriate cognitive approaches to accomplish any given task. Teachers use strategies such as open-ended questioning, reflective journals, and think-alouds to scaffold students' ability to monitor and reflect on their own learning. This type of metacognitive awareness is critical for second-language learners (Chamot 2005; Chamot and O'Malley 1994; Macaro 2006; Oxford 1990) because it helps solidify their learning.

**Metalinguistic awareness.** Metalinguistic awareness refers to the ability

to use language to reflect on and explain how language functions. It serves to make language visible to EMLs. What this means in the science classroom is that teachers purposefully plan opportunities to support students' understanding of how different language features function when constructing meaning. Students must have both understanding of the function and the language to communicate this knowledge. For example, when discussing ways to support students' construction of science arguments, Hand (2008) proposes that students must not only learn to use the language of science, but also learn the language of the argument (e.g., claim, evidence) and its function. On a similar note, Serafini

(2011) argues that as students become aware of the various functions of a visual representation, they develop the vocabulary to name and describe its various elements (e.g., line, pattern, shape). Developing the metalanguage for describing the features of the hybrid language supports students' ability to understand, reflect on, and use the language. When we name something, students are more likely to notice, recognize, and use it within the context of a science experience (Gibbons 2009).

**Interaction.** As teachers plan language tasks in the classroom, they create opportunities for comprehensible output (Swain 1985, 2005). Comprehensible output refers to the ways in which teachers support EMLs in using

the language of the science classroom. This again involves the intentional planning of activities in which students use the hybrid language to communicate science understandings with a partner, in small groups, and as part of whole-class discussions. Science teachers use a variety of cooperative learning strategies with which they are already familiar to scaffold language output for EMLs (Kagan 1995; Slavin 1995). These strategies are particularly beneficial, as they are structured so team members are accountable for specific tasks needed to accomplish the group goal. ●

# OPPORTUNITIES FOR ALL TEACHERS!

## MATERIALS CAMP® FOR TEACHERS

- A one-week professional development workshop
- High School Teachers: Science (especially Chemistry and Physics), Engineering, Industrial / Career and Technical Education, Art, Math, and Pre-Service Science
- Middle School Teachers: Physical Science
- Community College Instructors

## KISHOR M. KULKARNI DISTINGUISHED HIGH SCHOOL TEACHER AWARD

\$2,000 award plus up to \$500 travel reimbursement to receive the award at the ASM Awards Ceremony, given to a US or Canadian high school teacher demonstrating significant and sustained impact on students.

## “LIVING IN A MATERIAL WORLD” - K-12 TEACHER GRANTS

20 grants of \$500 annually to help K-12 teachers bring the real world of materials science into their classrooms.

asmfoundation.org | 800.336.5152



ASM MATERIALS  
EDUCATION FOUNDATION



## BLICK ON FLICKS

# *The Lion King, Version 2.0*

*The Lion King* (1994) is the second Disney animated feature to get the photo-realistic treatment from director Jon Favreau. He revisited *The Jungle Book* (1967) just a few years ago, and this project is even more ambitious. Back in 2011, I wrote a column (see the website <https://bit.ly/2yz86au>) about the DVD re-release of *The Lion King* in which I discussed animal physiology. Now I'm focusing on differences between the 1994 original and this 2019 reboot.

For the few unfamiliar with the story, *The Lion King* depicts the life of Simba, the prince of the Pride Lands and son of the king Mufasa (voiced by James Earl Jones) and Sarabi (voiced by Alfre Woodard). Simba's uncle, Scar

(voiced by Chiwetel Ejiofor), plots to kill both king and young Simba (voiced by JD McCrary) in a wildebeest stampede, but only Mufasa dies. Believing he is responsible for his father's death, Simba leaves the Pride Lands and is taken in by a warthog named Pumbaa (Seth Rogen) and Timon (Billy Eichner), a meerkat.

Simba grows into a young adult in the jungle with these two companions, taking things easy and living mainly on insects, while Scar rules the Pride Lands assisted by his hyena minions. (The three main hyenas are voiced by Florence Kasumba, Eric Andre, and Keegan-Michael Key.) Instead of continuing Mufasa's balanced approach to

hunting, Scar and the hyenas kill and eat everything they can. Simba, now voiced by Donald Glover, returns to the Pride Lands with Nala (Beyoncé) to save his birthplace from his uncle's mismanagement.

I appreciate the effort Favreau has made to update names and casting in this version to be more representative of Africa and inclusive of African Americans. For example, in the 1994 film, the three main hyenas are named Shenzi, Banzai, and Ed, only one of which is an even remotely African name, and only one of whom was voiced by an African American actor. In the current film, Ed is now Azizi and Banzai is Kamari, and all three are

voiced by African Americans. Chiwetel Ejiofor and Donald Glover voice characters formerly portrayed by Jeremy Irons and Matthew Broderick.

It is also worth noting that the new *Lion King* is a photo-realistic animated film, not a "live action" movie. Using computers, the animators created a virtual world; real animals were not filmed in the wild or even on a set. The animators observed real animals in zoos and in the wild in Africa, but they made some substantial alterations. For example, a very young lion cub does not have such huge eyes, and their eyes are closed for about a week after birth.

As in the 1994 cartoon, a number of the animals are shown in the wrong

## SMARTER SEARCHES, SMARTER YOU.

### NSTA Science Supply Guide

Guiding you to an even smarter search **The NSTA Science Supply Guide** is the most connected resource for science educators.

With enhanced features and upgraded technology, there's no easier way to source products for your lab or classroom.

**Suppliers:** Interested in connecting with science educators through our targeted search engine?

Call 1-800-816-6710 or send an inquiry to [salesinquiries@multiview.com](mailto:salesinquiries@multiview.com) for more information on staying visible to your customers year round.

[nstasciencesupplyguide.com](http://nstasciencesupplyguide.com)





part of the world (the most egregious being the leafcutter ants that actually live in South America) or with features that combine two or more species (the horns of Thompson's gazelles on bodies with springbok markings). According to director Favreau's Twitter feed, the one shot that was actually captured on film was the sunrise at the very start of the movie, although the sunrise is sped up substantially. Even near the equator, it takes about two minutes for the sun to completely rise over the horizon, and the shot in the movie is just a few seconds long.

It is possible that this photo-realistic version will help motivate more conservation of ecosystems and protection of lions in a way that the cartoon film did not. I know that the emotional effect of this movie can be much more powerful than that of the cartoon version. My children were much more afraid of the hyenas and the wildebeest

stampede in this version than when they watched the original. At the same time, I find it harder to excuse biology errors in a film that looks so much like a documentary.

Based on the view of Mount Kilimanjaro at the start of the film, I am assuming Pride Rock is in Tanzania. The area close to Kilimanjaro has a wide array of biomes, including savannah, tropical monsoon, and hot, arid, steppe. (A biome is a naturally occurring grouping of plants and animals based on the region's climate.)

The amount and distribution of rainfall through the year, and the average temperature from month to month are the main factors that impact which plants and animals live in a specific biome. A tropical monsoon region is warm all year round, and has distinct wet and dry seasons, for example. Not far from Kilimanjaro, there are even tropical rainforests and

deserts. Incredibly enough, Tanzania does contain all the environments shown in *The Lion King*; they just are not all within a one-day walk of one another.


It is possible to make some educated guesses about a biome and the season based on satellite imagery taken of a patch of land. Microsoft's Hacking STEM team partnered with NASA and the International Space Station to design a lesson built around this idea, available for free at this website: <https://bit.ly/2MziNck>.

The Shadow Lands inhabited by the hyenas at the start of the film are filled with bubbling pools of mud. These resemble some of the geothermal features found in Yellowstone Park in the United States. Hot springs, geysers, and mud pools are associated with geologically active areas, places where volcanic activity happened in the not-too-distant past. Kilimanjaro

is a stratovolcano with three distinct volcanic regions. One of these, Kibo, is considered to be dormant, not extinct, and has actively out-gassing fumaroles, so it is certainly within the realm of possibility that geothermal mud pools could exist in the area around Kilimanjaro.

Teachers wishing to motivate interest in biodiversity and the conservation of fragile biomes could use scenes from *The Lion King* to spark a discussion. Earth science teachers addressing volcanism and all the associated geology could connect to the Shadow Lands.

*The Lion King* is rated PG for sequences of violence and peril, and some thematic elements. ●

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

# NSTA Career Center

3 Simple Steps  
to Find Qualified  
Science Teaching  
Professionals



It's really  
that simple...

The NSTA Career Center is the premier online career resource connecting employer to talented science teaching professionals. Post your jobs and tap into a concentrated talent pool of professionals at a fraction of the cost of commercial boards.

Visit the NSTA Career Center to learn more  
<http://careers.nsta.org>



# Fall Conferences Highlight 3-D Learning

NSTA's fall area conferences help educators stay updated on trends in science education, and this year's conferences in Salt Lake City, Utah; Cincinnati, Ohio; and Seattle, Washington, are no exception. These events will spotlight three-dimensional teaching and learning—Science and Engineering Practices, Crosscutting Concepts, and Disciplinary Core Ideas—the performance expectations of the *Next Generation Science Standards* (NGSS) and other standards adopted by states. In addition, a separate workshop focusing on 3-D teaching and learning will be held in conjunction with each conference. The 3-D workshop in Salt Lake City includes one day at the conference in the ticket price. In the other two cities, attendees can choose to purchase the 3-D workshop only or both the workshop and the conference registration.

Area conferences offer opportunities for attendees to increase their content knowledge, and help them connect with other science educators. Educators from across the country will present hundreds of sessions about their best practices and share tips and ideas. Each conference will have an exhibit hall with more than 100 exhibitors sharing their latest products and technology.

## Salt Lake City, October 24–26

With 15 national parks and monuments located just a few hours away from Salt Lake City, its conference theme is particularly appropriate: "This Is the Place for Monumental Science!" Equally monumental is the journey of keynote speaker Mireya Mayor, primatologist and National Geographic Explorer, whose presentation *Wild About Science: My Journey From NFL Cheerleader to National Geographic Explorer* will interest fans of both sports and science.

Sessions presented as part of conference strands will focus on Navigating Phenomenal Landscapes: Using Phenomena as a Way to Guide Science Instruction; Forming Natural Bridges: Integrating Science Across Content Areas; and Hook 'em for Life: Sustaining Science Teaching and Learning.

"The design of the strands for this conference focuses on using phenom-



JACOB SLATON

ena as a way to apply NGSS skills and practices and crosscutting concepts to build excitement and interest in science," says conference chair John R. Taylor, assistant dean and biology professor at Southern Utah University. "Our goal is to provide a conference experience that provides immediate applicability so attendees feel empowered to create their own three-dimensional science instruction curricula."

Salt Lake City's 3-D workshop (October 25–26), *Making Sense of Three-Dimensional Teaching and Learning*, will develop educators' understanding of the three dimensions. Educators at all levels of comfort with 3-D instruction can benefit from the information.

## Cincinnati, November 14–16

The NSTA Cincinnati Area Conference, "Science: The Bridge to Endless Possibilities," promises to be an exciting and enriching professional learning experience! Keynote speaker Luke Dollar, National Geographic Explorer and Bashore Distinguished Professor and chair of the Department of Environment and Sustainability at Catawba College in Salisbury, North Carolina, has helped students cross bridges to conservation awareness. In his presentation, *Schools Saving Species?*, Dollar will describe his pathways from his childhood in a science teaching family through his university and graduate scientific studies that have evolved into conservation and education programs benefitting thousands of

developing-country citizens, as well as biodiversity in Africa and Madagascar.

The conference strands are Building Strong Bridges: Reinforcing the Connection Between Science and Literacy; Constructing Bridges: Building Lifelong Appreciation and Passion for Science; and Bridging the Three Dimensions of Science Teaching and Learning: Practices, Core Ideas, and Crosscutting Concepts. Several hands-on workshops, teacher presentations, and events will touch on the highlighted strands, as well as the most effective teaching practices and strategies.

On November 16, Cincinnati's 3-D workshop, *Three-Dimensional Teaching and Learning Powered by STEM*, will help educators better integrate STEM and three-dimensional standards for teaching and learning, and learn how STEM initiatives and 3-D instruction are mutually supportive. The workshop is appropriate for educators at all levels of comfort with 3-D instruction.

Conference chair Angela McMurtry, biology instructor at Arcanum High School in Arcanum, Ohio, contends, "From the exciting expert invited speakers, hands-on workshops, presentations, annual organizational meetings, award ceremonies, and short courses, you are sure to find innovative ideas and practices that will assist you in preparing students for the science in their everyday world.

"As educators, we encourage our students to learn through experiences... whether that is in the classroom or

within their everyday lives. The NSTA [Cincinnati] Area Conference provides science educators with experiential learning opportunities that will rejuvenate, reiterate, and revitalize their teaching practices. Our goal is to inspire the next generation of science practitioners and supporters."

## Seattle, December 12–14

"Washington State is excited for NSTA Seattle 'Fostering a Culture of Science.' With a rich diversity of land, climate, and people, our teachers live all standards for all students. We look forward to a wonderful learning and sharing opportunity with you," says conference chair John P. McNamara, emeritus professor of animal sciences at Washington State University.

"The State of Washington is a leader in science education, NGSS, and climate science. The NSTA Seattle Area Conference promises you deep, relevant professional development to help you meet All Standards for All Students and build a science literate society," McNamara notes.

Keynote speaker Nalini M. Nadkarni, biology professor and STEM Ambassador Program (STEMAP) director at The University of Utah, will present *Tapestry Thinking: Weaving Diverse Threads of Science and Society*, sharing how she weaves her love of forests and nature with sports, religion, the arts, and social justice to inspire non-traditional students to enjoy learning science. Attendees also can explore the conference strands Finding Joy in Experiencing Science, Providing STEM Pathways for the Future, and Building Partnerships for Effective Science Education.

On December 14, Seattle's 3-D workshop, *Assessing Three-Dimensional Learning*, will give attendees new opportunities to build assessments that move student learning forward. For this workshop, some familiarity with the NGSS or other three-dimensional standards is assumed.

On-site registration for NSTA's area conferences costs \$240 for NSTA members. Visit [www.nsta.org/conferences](http://www.nsta.org/conferences) for more information. Don't forget to follow #NSTA19 on Twitter! ●



# The NSTA Learning Center



High quality  
interactive content for  
K–12 science teachers



Earn graduate credits  
and advanced degrees



Affordable and  
user-friendly



Moderated by  
world-renowned  
faculty



Gain knowledge  
specific to your area  
of instruction



## American Museum of Natural History

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



## California University of Pennsylvania

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



## Montana State University – Bozeman

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



## NSTA Virtual Conferences

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

<http://learningcenter.nsta.org/onlinecourses>





## ASK A MENTOR, Advice Column

# Teaching About Gases, Chemistry, and Space

*I want to demonstrate different states of matter and need activities for third graders for teaching about gases.*

— D., Georgia

It's hard to teach about something we can't see! Here are a few ideas:

**Perfumes:** Open a bottle of cologne in the room. Students can observe evaporation if you pour some on a dark counter.

**Solid room air fresheners:** This is a scented material in solid form, and over time, you will see the solid disappear as it sublimates.

**"Ghost" in a bottle:** (Have theatrical fun with this.) Refrigerate a large, empty pop bottle before class. Bring it to

class, open it, and place a coin over the opening. In a few moments, you will hear the coin rattling as the gas inside the bottle heats and expands.

**Crushing a can:** (Practice this demo before class for safety.) Boil a few milliliters of water in an aluminum can until steam comes out. Grasp the can with tongs and quickly turn it upside down into a pan of ice water. The steam condenses, emptying the can of a lot of gas. Atmospheric pressure outside is now greater than the pressure inside the can, causing it to crush.

**Break a ruler using air:** Place a wooden ruler halfway over the edge of a table. Flatten a full sheet of newspaper

across the ruler. A forceful chopping motion should break the ruler. The large surface area of the newspaper has substantial atmospheric mass pushing down on it, holding the ruler in place.

*Many girls in my kindergarten class are showing a lot of interest in space. Space science is not part of my curriculum, so how would you recommend I address their interest? Can you recommend any resources?*

—M., New Mexico

Space! What a wonderful topic. Curiosity, asking questions, and looking for answers are all part of the nature of science, and all young children

have these in abundance! While you need to focus on certain topics in your science curriculum, do not fear using other topics to explore the nature of science or to quench students' thirst for knowledge.

You can foster interest in some simple ways without stealing away from your curriculum topics:

**Daily science announcements:** Include the moon phase, celestial events, and the location of planets.

**Moon observations:** Observe the Moon during recess or in the evening, and report to the class. Have a picture of the current moon phase posted in the class.

NSTA  
eBooks<sup>+</sup>Kids

SIMULATIONS • ASSESSMENTS • VIDEOS

Grade Level K–5



Lexile Level: 500L

*Be a Sky Sleuth* helps students figure out how patterns can be used to predict the positions of the Sun, Moon, and stars.

Use activities in the teacher's guides to implement three-dimensional learning in your classrooms.

English Language  
Arts Connections

Mathematics  
Connections



Thinking  
Beyond

Differentiated  
Learning

STEM for kids! Phenomenon-based, three-dimensional learning content that's designed using the 5E model and incorporates the science and engineering practices (SEPs), crosscutting concepts (CCCs), and disciplinary core ideas (DCIs). Comprehensive teacher's guides are available.

Each teacher's guide provides connections to the grade-level content (including science, ELA, and mathematics) plus tips and practical information to enhance the e-book experience. Use activities in the teacher's guides to implement three-dimensional learning in your classroom.

Visit [www.nsta.org/ebooks/GradesK-5](http://www.nsta.org/ebooks/GradesK-5) to learn more and order.

Purchases of 10+ e-books of a single title will include a detailed teacher's guide specific to that e-book.

NSTA  
eBooks<sup>+</sup>  
National Science Teachers Association



**Take-home activities:** You can download for free and build many planispheres (star finders), as well as calendars of celestial events and Moon phase handouts.

**Astronomy apps:** Use these in class, and send home a list of resources for families to use. Many excellent, free starfinder and astronomy apps are available.

**Hold a family astronomy night:** Almost all local astronomy clubs will help set up a viewing night for you.

### Resources

- NASA For Educators (<https://go.nasa.gov/2Z8bS6h>)
- International Astronomical Union astroEDU (<https://bit.ly/30VZIxQ>)
- Royal Astronomical Society of Canada's Classroom Help (<https://bit.ly/2YLXwCb>)
- In-The-Sky.org (<https://in-the-sky.org>)

Consider subscribing to these sites to get astronomy and Earth news:

- Cosmic Pursuits (see the website <https://cosmicpursuits.com>)
- EarthSky (<https://earthsky.org>)

**Chemistry is not my strength. Any hints or resources for teaching chemical equations at a basic level?**

— M., Maryland

I find it useful to demystify why we use chemical equations.

A chemical equation is simply a communication tool. It's similar to using emojis in place of writing words. Instead of emojis, chemists use a periodic table and other standard symbols to communicate what is happening when particles of matter interact. Every scientist in the world knows this shorthand, overcoming language barriers. It is the language of chemistry.

Just like when learning a language, students need to learn basic chemistry vocabulary. Before teaching chemical equations, review some basic terminology: atoms, molecules, chemical change, and chemical formulas. Then teach the notations used in writing out a chemical equation.

A chemical equation is a "recipe" with ingredients, instructions, and expected results. Many recipes have the same ingredients, but the proportion of each determines whether you get a pancake, scone, or loaf of bread. Likewise, a balanced chemical

equation gives the exact proportions of reactants to create the expected products. A chemical equation actually has more details than a recipe: The symbols indicate exactly how the atoms rearrange, form new bonds, and create new products.

In addition to searching NSTA's The Learning Center (see the website <https://learningcenter.nsta.org>), resources at these sites can help teach chemical equations:

- American Chemical Society (<https://bit.ly/2klt4oO>)
- American Association of Chemistry Teachers (<https://teachchemistry.org>)
- PhET Interactive Simulations, University of Colorado (<https://bit.ly/1pezNY8>) ●

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



## Celebrating 75 Years at NSTA

**1953** More than 600 people register for the first NSTA National Convention in Pittsburgh, Pennsylvania.

**1977** Margaret Mead, Jonas Salk, and B.F. Skinner speak at NSTA Cincinnati National Convention. Debate between Mead and Skinner airs on public television.



## AMERICAN MUSEUM OF NATURAL HISTORY Seminars on Science Online courses for educators

Receive a  
15% discount with  
code NSTAREPORTS  
upon checkout

## 6-week online graduate courses in the life, Earth, and physical sciences

### UPCOMING SESSIONS

#### FALL SESSION 1

**Sept. 16 – Oct. 27**

**Registration deadline: Sept. 9**

#### FALL SESSION 2

**Oct. 28 – Dec. 8**

**Registration deadline: Oct. 21**

**[learn.amnh.org](http://learn.amnh.org)**

# NSTA District Professional Learning Packages



## Implement Three-Dimensional Instruction with NSTA

Bring NSTA to your district to guide your implementation of *A Framework for K-12 Science Education* and 3D standards. Transform classroom instruction with programs tailored for

- Administrators
- Curriculum leaders
- Classroom teachers

“My teacher facilitators now have a much deeper understanding of what to look for when evaluating materials. I also have a much clearer vision for leading this work. Having this training before the curriculum review process is such a perfect sequence! I believe that this training will lead to continuing work in our region, and I hope to provide a structure to continue the work/learning. Thank you so much for working with me to bring this training to the region.”

—Educational Services District Leader

## Ask Us About Professional Learning Training for Districts

- **Making Sense of Three-Dimensional Teaching and Learning:** Give teachers a foundational understanding of the standards and shows them what three-dimensional instruction looks like in classrooms (modeled for each grade and discipline).
- **Administrator Institutes:** Help administrators design professional learning around 3D science standards, assessing current capabilities of teachers, and setting goals for professional learning.
- **Designing Three-Dimensional Lessons and Units:** Build your team of experts by giving them a powerful tool kit of resources and a solid understanding of three-dimensional standards. This workshop also empowers participants to work with their colleagues around the new standards.
- **Online Book Study and Discussion Forum:** This series of four web seminars combines asynchronous thought activities with discussions in private forums to give districts a flexible option for learning about three-dimensional instruction.
- **Or let us tailor a program for your needs.**

For more information, visit [www.nsta.org/district](http://www.nsta.org/district) or email [ngss@nsta.org](mailto:ngss@nsta.org).







(All dates are deadlines unless otherwise specified.)

**September 13**—Take advantage of the **early bird deadline** and register now for the **NSTA Area Conference on Science Education in Salt Lake City, Utah**. The conference will be held on October 24–26 at the Salt Palace Convention Center. Early bird registration costs \$195 for members of NSTA, Utah Science Teachers Association, American Association of Chemistry Teachers (AACT), American Association of Physics Teachers (AAPT), American Chemical Society (ACS), American Society for Engineering Education (ASEE), and National Association of Biology Teachers (NABT). One-day registration options are also available. For more information or to register, visit [www.nsta.org/saltlakecity](http://www.nsta.org/saltlakecity).

**September 17**—Discover how you can join **Leaders for Science Education: Preparing an Application for the NSTA Board and Council**, a **free NSTA Web Seminar**. Rene Corrales, a member of the NSTA Nominations Committee, will discuss the application process for the NSTA Board and Council and the important role members play in shaping the association. The seminar will be held at 6:30–8 p.m. Eastern Time (ET). For more information on NSTA Web Seminars or to register, visit <http://bit.ly/2RGhr8N>.

**September 17**—Join the **Shifting to the NGSS: Professional Book Study**

**for Secondary School Teachers**, a series of four live web seminars for teachers of grades 6–12. The book study supports educators interested in using the *Discover the NGSS: Primer and Unit Planner* enhanced e-book as they implement the *Next Generation Science Standards* (NGSS). The program includes asynchronous discussions with other participants and the presenters. The additional seminars will take place on September 24 and October 1 and 8. The seminars will be held at 7:15–8:45 p.m. ET. Registration costs \$63 for NSTA members. For more information on NSTA Web Seminars or to register, visit the website <http://bit.ly/2RGhr8N>.

**September 18**—Join Deke Arndt for an exploration of some of the observed changes in the climate system and how the National Centers for Environmental Information determines them during a **free web seminar, NSTA Science Update: Pulse of the Planet: The State of the Climate in 2019**. The event will be held at 7–8 p.m. ET. For more information on NSTA Web Seminars or to register, visit the website <http://bit.ly/2RGhr8N>.

**October 4**—Register today for **early bird savings** for the **NSTA Area Conference on Science Education in Cincinnati, Ohio**, November 14–16. Early bird registration costs \$195 for members of NSTA, Science Education Council of Ohio, Kentucky Science Teachers Association, AACT, AAPT, ACS, ASEE, and NABT. Visit [www.nsta.org/cincinnati](http://www.nsta.org/cincinnati). ●

# #ICYMI

In case you missed it, check out a few highlights from NSTA’s e-newsletters. Catch up on all the latest e-newsletters at <https://bit.ly/2X5iuEQ>.

“Eliciting Student Ideas in Science”  
One of the major instructional shifts in an NGSS classroom is allowing students to be the drivers of their learning. This can be a big (and scary) change for many teachers who still have targeted learning goals that students need to meet.  
—*Next Gen Navigator* (July 2019, <https://bit.ly/2Yr2PAD>)

“Nation’s Report Card to Be Trimmed in Cost-Saving Measure”  
The National Assessment Governing Board intends to streamline the National Assessment of Educational Progress and reduce costs by including

fewer subjects, testing fewer students, and adding testing time.  
—*NSTA Express* (July 30, <https://bit.ly/2K9R5M0>)

“What Makes a Good STEM/STEAM Toy?”  
According to a new study, *STEM/STEAM Formula for Success*, great STEM/STEAM (with the “A” representing arts) toys encourage open-ended play and trial-and-error exploration, teach problem-solving, and allow children to lead the play experience, among other attributes.

“How to Engage All Students in STEM”  
The answer—high-quality project-based learning (PBL), which is already being deployed in career and technical education (CTE) programs across the country.  
—*The STEM Classroom* (July 2019, <https://bit.ly/2wQnNZW>) ●

## NSTA Has a New Meaning

In June, NSTA members approved changing the association’s name from the National Science Teachers Association to the National Science Teaching Association.

NSTA President Dennis Schatz noted, “This name change represents a major shift in our vision to better connect with a science teaching community that has grown to include many who do not carry the formal title of ‘science teacher.’”

The new name is the first in a series of changes coming to the association dedicated to science education for all. As part of the rebranding process, NSTA will introduce a new logo and refocus programs to better support science teaching and learning with enhanced content, new and exciting digital products, more personalized services, and dynamic resources, all of which will be unveiled later this year.

“As we build the new NSTA, we will remain focused on our goal to help educators connect, collaborate, and grow professionally. We will continue to provide the trusted, high-quality resources that all stakeholders can use so that students are science literate, workforce ready, and prepared to handle the challenges ahead as global citizens,” said Beth Allan, NSTA President-Elect. ●

Index of Advertisers			
American Museum of Natural History, <a href="http://www.amnh.org">www.amnh.org</a>	21	National Science Teachers Association, <a href="http://www.nsta.org">www.nsta.org</a>	2, 10, 12, G4, G6, 13, 16, 17, 19, 20, 22
ASM Materials Education Foundation, 800-336-5152, <a href="http://www.asmfoundation.org">www.asmfoundation.org</a>	15	PASCO, 877-373-0300, <a href="http://www.pasco.com">www.pasco.com</a>	5
Carolina Biological Supply Co., 800-334-5551, <a href="http://www.carolina.com">www.carolina.com</a>	24	Safari Club International Foundation, 877-877-3265, <a href="http://www.safariclubfoundation.org/sables">www.safariclubfoundation.org/sables</a>	14
Flinn Scientific, Inc., 800-452-1261, <a href="http://www.flinnsci.com">www.flinnsci.com</a>	11	University of Nebraska Online, 888-622-0332, <a href="http://www.online.nebraska.edu">www.online.nebraska.edu</a>	G5
GEICO, 800-368-2734, <a href="http://www.geico.com/edu/NSTA">www.geico.com/edu/NSTA</a>	4	Vernier Software & Technology, 888-837-6437, <a href="http://www.vernier.com">www.vernier.com</a>	7, 9
Kavli Institute of Theoretical Physics, <a href="http://www.kitp.ucsb.edu/teachers-conference">www.kitp.ucsb.edu/teachers-conference</a>	8	Whitebox Learning, <a href="http://www.whiteboxlearning.com">www.whiteboxlearning.com</a>	G3

National Science Teaching Association  
1840 Wilson Boulevard  
Arlington, Virginia 22201

NON-PROFIT ORG.  
U.S. Postage Paid  
CAPITOL HEIGHTS, MD  
PERMIT NO. 953

## NSTA Opens Search for New Treasurer

The National Science Teaching Association announces the opening of the NSTA Treasurer position. Responsibilities include oversight of the association's financial and budgetary matters. The Treasurer is appointed by the Board of Directors for a three-year term of office, which may be renewed for another three-year term. Appointees will be expected to devote 10–12 days of service per year for this non-staff position.

An honorarium will be provided, as well as reimbursements for required

meeting attendance (travel and per diem).

For additional information about the position's responsibilities, visit <http://careers.nsta.org>. The application deadline is **November 1, 2019**.

Interested individuals are invited to submit their resume, along with a cover letter that specifies their interest in being considered for appointment, to NSTA Executive Director, 1840 Wilson Blvd., Arlington, VA 22201-3092. ●

### Quotable

*Students learn what they care about, from people they care about and who, they know, care about them.*

—Barbara Harrell Carson, U.S. author

## Because science should be simple, not stressful.

When it comes to teaching, covering new standards, delivering effective lessons, and getting results can seem overwhelming at times.

That's why we created Carolina Essentials, free science activities designed to support your instruction. So you can relax and do more of what you love (teach) and less of what you don't (stress). With Carolina Essentials, we're making it easy to be effective.



Top: Calorimetry:  
Measuring the  
Energy in Foods

Bottom: Comparative  
Metamorphosis

Explore the free resources at  
[Carolina.com/3dactivities](http://Carolina.com/3dactivities).

**CAROLINA**  
[www.carolina.com](http://www.carolina.com)