7th Annual
Hosted by NSTA

STEM Forum & Expo 2018

Philadelphia
July 11–13

#STEMforum
Collaborative STEM Activities for Coding and Robotics

Introduce your students to the coding skills they need to compete in our increasingly digital world. With mBot™, an affordable DIY robot kit, students learn entry-level coding that extends beyond the screen and lets them interact with the physical world.

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7th Annual STEM Forum & Expo, hosted by NSTA
Philadelphia, Pennsylvania • July 11–13, 2018

Wednesday Kickoff starts at 10:30 AM and continues until 6:30 PM

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National Science Teachers Association
1840 Wilson Blvd.
Arlington, VA 22201-3000
703-243-7100
E-mail: conferences@nsta.org
www.nsta.org

NSTA Affiliates
Association for Multicultural Science Education (AMSE)
Association for Science Teacher Education (ASTE)
Association of Science-Technology Centers (ASTC)
Council for Elementary Science International (CESI)
Council of State Science Supervisors (CSSS)
National Association for Research in Science Teaching (NARST)
National Middle Level Science Teachers Association (NMLSTA)
National Science Education Leadership Association (NSELA)
Society for College Science Teachers (SCST)
The 7th Annual STEM Forum & Expo, hosted by NSTA

NSTA and the STEM Forum Steering Committee are extremely grateful to the following companies and organizations for their generous support and contributions to the 7th Annual STEM Forum & Expo, hosted by NSTA.

**Sponsors**
Amplify Science
Penguin Random House
Pitsco Education
Vernier Software & Technologies

**Program Partners**
American Association of Chemistry Teachers (AACT)
American Association of Physics Teachers (AAPT)
American Society for Engineering Education (ASEE)
International Technology and Engineering Educators Association (ITEEA)
National Association of Biology Teachers (NABT)
National Council of Teachers of Mathematics (NCTM)
STEMx

The environment is important to science educators. These programs are recyclable and were printed on recycled paper.
Welcome to the 7th Annual STEM Forum & Expo, hosted by NSTA

The National Science Teachers Association is proud to host the 7th Annual STEM Forum & Expo in historic Philadelphia this year. Working collectively and in concert with all academic disciplines in formal and informal education settings, we strive with this STEM Forum to move forward and improve our world’s culture, environment, and quality of life for all individuals through STEM education. Therefore, we are thrilled to bring you this highly specialized professional development event that enables us, as educators, to help our students stay globally competitive in terms of innovation, while demonstrating real-life applications to the concepts we are teaching.

NSTA, the STEM Forum’s Steering Committee, and all our program partners have worked diligently to bring you an exciting program of sessions, featured panels, and a keynote address filled with strategies to stimulate your students’ interests in STEM, ideas to begin or enhance STEM initiatives in your school or district, as well as ways to enhance the skills and knowledge of current and future STEM leaders at all levels. It is important that all STEM educators use their teacher’s voice to promote the importance of and propel the interconnected nature of these fields forward. Please take some time this week to network with fellow STEM-minded colleagues from around the world, across the country, and those who are local to find ways to advocate for STEM education. We are confident that you will not only learn from experts in the STEM education fields, but you will also share and learn from each other.

In conclusion, we encourage you to embrace the potential that STEM can add to your educational settings by using the tools, knowledge, and resources you will accumulate. On behalf of the Steering Committee and NSTA, thank you for making STEM a priority by attending this forum. We promise this experience will be invigorating, rewarding, and energizing for you as we dive deeply into STEM here in Philadelphia.

Welcome!

Jennifer C. Williams, Steering Committee Chairperson, 7th Annual STEM Forum & Expo

Christine Anne Royce, 2018–2019 NSTA President
The National Science Teachers Association is committed to meeting today’s environmental challenges by adopting eco-friendly practices both in our own day-to-day operations and at our 7th Annual STEM Forum & Expo, conferences, workshops, and other events. In addition, we strongly encourage our contracted conference facilities to follow green practices as well. Here are some of the ways NSTA’s conference department has worked to minimize our impact on the environment:

**Online Forum Information and Personal Scheduler**
Most of your STEM Forum & Expo arrangements can now be accomplished online (www.nsta.org/stemforum). Register and make your housing reservations on the web. Program details are available to you on our website using the Session Browser. Scheduling information on our website is up to date and more complete than that available through a printed piece.

**Final Forum Programs by E-Mail**
Forum registrants are now given the option of receiving an electronic version (PDF) of the final program by e-mail approximately one week prior to the forum, further reducing printing and shipping requirements. Also, attendees are encouraged to use the NSTA Conference app, which provides all the tools necessary for a successful STEM Forum experience.

**Recycled Paper and Sustainable Print Services**
Forum programs are printed on recycled paper. In addition, Walsworth Inc., the printer for our conference materials, is in strict compliance with all environmental laws and exceeds these standards in many ways. Wherever possible, Walsworth works to reduce and recycle waste, use reduced- or low-VOC chemicals, increase the recycled content of raw materials, and use soy- or vegetable-based inks. Walsworth has also obtained certifications with the Sustainable Forest Initiative (SFI) and the Forest Stewardship Council® (FSC) to ensure paper products are being harvested from environmentally responsible sources.

**Eco-Friendly Exhibition Practices**
Our forum partner, Hargrove, Inc., offers many green product options and services in the production of our forum and conference exhibitions, including 100% recyclable carpet and padding, recycled exhibit structures, a “reclaimer” that recycles 92% of all solvents the company uses in production of graphics, use of LP natural gas in 75–90% of show-site vehicles, and many biodegradable and recycled products such as trash bags and waste baskets. Their green efforts are extended operationally with reductions in electricity, heating fuel, and water usage, as well as a move to 100% recyclable and biodegradable products.

**Pennsylvania Convention Center’s Green Practices**
The Pennsylvania Convention Center (PCC) staff is committed to reducing the environmental impact of their operations and services by becoming environmentally responsible in providing the following:

- **Waste Reduction/Recycling:** In fiscal years 2009 and 2010, the PCC recycled and diverted a combined 469.83 tons of waste from landfills, helping to reduce the impact on the environment.

- **Low Environmental Impact Cleaning Policy:** This policy requires cleaning staff to use equipment that is designed to remove pollutants with less chemicals and reduced water usage. In addition, all cleaning chemicals are Green Seal certified.

- **Food and Beverage:** PCC Culinary Services provides sustainable cutlery as well as hot/cold beverage cups, napkins, and plates made of 100% decomposable and biodegradable materials.

- **Restroom Upgrades:** Restroom paper products are made from recycled products and hand soap is Green Seal certified. Automatic dispensers for water, soap, and paper products save on waste consumption as well as automatic lighting helps to lower energy costs.

**“Go Green” at the 7th Annual STEM Forum & Expo!**
- Recycle your forum programs in the clearly marked recycle bins located throughout the Convention Center.
- Recycle or reuse your plastic badge holders—you can either turn them in at the NSTA Registration Counter or use them at future conferences.
- If you prefer to bring handouts to your session, use double-sided printing and/or recycled paper.
- Walk or use public transportation when possible at the STEM Forum & Expo.
- Bring your own refillable water bottle to the forum. Water refill stations are located at every water fountain.
- In advance of the forum, presenters are encouraged to post their presentations and handouts online on the Session Browser.
- Evaluate sessions attended online.
Meeting Location and Times

STEM Forum & Expo will take place at the Pennsylvania Convention Center. The STEM Forum attendee and exhibitor services, the exhibits, the NSTA Store, and most sessions will be located at the Convention Center (some sessions will also take place at the Philadelphia Marriott Downtown). The STEM Forum & Expo will begin on Wednesday, July 11, at 10:30 AM, starting with two hours of STEMx featured sessions, along with a First-Timers session from 1:30 to 2:30 PM, followed by the Student Panel, and an Opening Exhibits Reception. The Thursday keynote presentation will be given by Mike Massimino, author and former NASA astronaut, 4:30 to 5:30 PM.

The STEM Forum & Expo will end on Friday with a Closing Session from strand leaders, 4:30 to 5:30 PM.

Express Check-In

Registration is required for participation in all forum activities and the exhibits. Express Check-In, Attendee Services, and the NSTA Store are located in Hall C of the Convention Center. Proceed to Express Check-In to print your official badge and secure conference materials. Express Check-In and Attendee Services will be open the following hours:

- **Wed., July 11**: 10:00 AM–6:30 PM
- **Thu., July 12**: 7:00 AM–5:30 PM
- **Fri., July 13**: 7:00 AM–5:30 PM

The NSTA Store will be open the following hours:

- **Wed., July 11**: 1:00–7:00 PM
- **Thu., July 12**: 7:30 AM–5:00 PM
- **Fri., July 13**: 7:30 AM–5:00 PM

If you misplace your badge, present your personal ID at Attendee Services in the Expo Registration Area and you will be issued a replacement. Only one replacement badge will be issued.

Ground Transportation to/from Airport/Amtrak

It’s a 25-minute ride by SEPTA mass transit or a 10-minute ride in a taxi to cover the eight miles from Philadelphia International Airport (PHL) to Center City. SEPTA’s Airport Line leaves at 30-minute intervals, and a one-way fare is $7. The taxi ride costs a flat rate of $28.50. For more information, visit the Philadelphia International Airport website at www.phl.org.

Amtrak Acela and commuter trains arrive at Philadelphia’s historic 30th Street Station throughout the day, placing passengers within a short walk of Center City and 1.2 miles from the Convention Center. For more information, visit www.amtrak.com or call 800-USA-RAIL.

Getting Around Town

Center City provides plenty of opportunities for visitors to stroll and take in the sights. And, if you want to stay on the move, hop aboard the Southeastern Pennsylvania Transportation Authority (SEPTA) (www.septa.org), which provides an extensive network of buses, subways, trolleys, and regional rail lines throughout Center City and the surrounding region. For more details and to access city maps, visit bit.ly/2JfgsDh.

Parking

There are many parking options—both garages and lots—conveniently located within blocks of the Convention Center. For directions and a list of parking options and rates, visit bit.ly/2w8F5Eb.

Discounted Rental Cars

- **Alamo Car Rentals**—Receive discounts by booking online at www.alamo.com and providing the Discount Code number CD#LEADERS or calling Alamo at 844-354-6962 and providing the Discount Code number.
- **Hertz Car Rentals**—Receive discounts by booking online at www.hertz.com and providing the Discount Code number #1170024 or calling Alamo at 800-654-3131 and providing the Discount Code number.
Housing Questions or Concerns?
If you have any questions or concerns about your housing, contact Orchid.Events (during business hours) Monday through Friday, 9:00 AM–8:00 PM ET at 877-352-6710 (toll-free) or 801-505-4114, or e-mail help@orchid.events.

1. Courtyard Philadelphia Downtown
   21 N. Juniper St.

2. Hilton Garden Inn Philadelphia Center City
   1100 Arch St.

3. Home2 Suites by Hilton,
   Philadelphia–Convention Center
   1200 Arch St.

4. Philadelphia Marriott Downtown
   (Headquarters)
   120 Market St.

5. Residence Inn Philadelphia Center City
   1 E. Penn Square

Shuttle service will not be provided as all hotels are within walking distance of the Convention Center.
NSTA Exhibits

The NSTA Exhibit Hall is a must-see! NSTA brings you the leading STEM education companies and organizations to showcase products, services, curricula, and much more. You’ll discover something new and exciting in the world of STEM education.

Go to Express Check-In to print your official badge. This badge is your “ticket of admission” to the Exhibit Hall and all non-ticketed forum activities. A map display of the Exhibit Hall is accessible via our Conference app. A complete list of exhibitors and contact information starts on page 72.

Exhibit Hall Hours. Located in Hall C of the Convention Center, exhibits will be open for viewing during the following hours:

Opening Exhibits Reception
- Wed., July 11 4:30–6:30 PM

Exhibits
- Thu., July 12 9:15 AM–3:00 PM
- Fri., July 13 9:15 AM–3:00 PM

Lead Retrieval. NSTA exhibitors use lead retrieval, a paperless tracking system to allow them to receive fast, accurate information about forum attendees who have visited their booths. With the lead retrieval system, an exhibitor scans your badge as you visit the booth. This allows exhibitors to send information to you while the STEM Forum & Expo is still fresh in your mind.

Exhibitor Workshops. Exhibitor-sponsored workshops for STEM teachers are offered throughout the forum. These workshops give you an opportunity to use a variety of commercial instructional materials. Attendance is on a first-come, first-served basis. See page 84 for a complete listing of exhibitor workshops.

Presenters and Presiders Check-In
If you are presenting or presiding at a session, please check in at the Presenters/Presiders counter in the Attendees Services Area.

Wi-Fi at the Convention Center
Complimentary wireless internet is provided on all concourses, including the Grand Hall, Broad Street Atrium, Arch Street Bridge, Overlook Café area, and ballroom foyers of the Convention Center. Note: The complimentary wireless is an unmanaged service with shared 1.5Mb bandwidth. No password is required; to access, connect to “PCCWELCOME.”

In addition, complimentary Wi-Fi access is available in the lobby areas of the Marriott.

NSTA Store
Visit us at the NSTA Store to explore a wide selection of resources and gear you’ll love! You’ll find hundreds of books that uniquely blend accurate STEM content with sound teaching strategies for STEM educators of all grade ranges and disciplines. Not only do we have books covering a wide range of topics to help you sharpen your content knowledge and hone your teaching methods, but we also carry a complete line of NSTA gear you can’t find anywhere else—such as T-shirts, mugs, and classroom supplies.

We offer convenient free shipping for book purchases to addresses within the United States when you place your order on-site at the STEM Forum. Please note that free shipping is not offered to international addresses or for NSTA gear purchases. We’ve lined up a number of unique opportunities for STEM Forum-goers:

- Exclusive author signings and meet-and-greet opportunities
- Our latest books—including STEM Education Now More Than Ever; Designing Meaningful STEM Lessons; Preparing Teachers for Three-Dimensional Instruction; Argument-Driven Inquiry in Earth and Space Science; and Improving Bridge Design, Grade 8 and Packaging Design, Grade 6 (two new volumes in our STEM Road Map Curriculum Series)—as well as our newest children’s books from NSTA Kids, such as Animal Adaptations and When the Sun Goes Dark
- “I Love Science” and NSTA gear product lines to show your love of science and pride in teaching
- Member discounts of 20% on NSTA Press® items and 10% on books from other publishers
- Daily book and gear specials, product giveaways, and more
Audiovisual Needs
NSTA will fulfill AV needs originally requested on the program proposals as long as the request is within the limits of equipment that NSTA provides. For any last-minute AV needs, presenters must arrange and pay for their own equipment. Audio Visual Production Solutions, the designated AV company on-site, will be located at:

Convention Center …… Room 101
Marriott ……………………..Room 302

Business Services
Located on the second floor (200 level) between Halls B and C, the FedEx Office Print & Ship Center offers a variety of services, including photocopying, scanning, faxing, use of computer work stations, office supplies, and same-day shipping. For more information, please call 215-925-1218 or e-mail usa5530@fedex.com.

During the week of the forum, hours will be:
Monday–Friday 8:00 AM–5:00 PM

First Aid/Emergency Services and Nursing Mother’s Pod
Located in Hall B of the Convention Center, the First Aid office is clearly marked with a large first aid symbol. For all emergencies, call 215-418-4911 or dial 4911 from any house phone throughout the Convention Center, and your call will be directed to the command center who can dispatch the EMT.

In addition, a pod for nursing mothers is located on the concourse between Halls A and B. The code to access the pod will be available at the Attendee Services and Exhibitor Services counters in Hall C.

Interested in Joining NSTA?
Stop by NSTA: STEM Starts Here, located in the NSTA Store at the Convention Center. Find out more about the benefits of becoming an NSTA member, including all the best professional development and resources a STEM educator needs. If you received a six-month-free membership coupon at registration, please redeem it here.

Online Session Evaluations and Tracking Professional Development
All attendees can evaluate sessions online while simultaneously tracking their professional development certification (based on clock hours).

Help NSTA’s GREEN efforts by completing session evaluations on our conference app July 11–23, 2018, while the session is fresh in your mind!

To evaluate a session, attendees should follow these steps:

• Using the conference app, first click My Planner and log in with your e-mail address and password.
• Once logged in, click Home and then select Session & Workshop Listings to find the session you wish to evaluate.
• Once you have pulled up the session listing, then click the Rate icon to evaluate the session.
• When finished evaluating the session, click the Save button.
• Repeat this process for each session attended.

Concurrent session presenters may also complete evaluations for their own sessions in order to track professional development credit. A Professional Development Documentation Form is included following this page to help attendees keep track of sessions/events attended that are NOT available for online session evaluation. This form can also be used to take notes on sessions attended that are available for online session evaluation.

On or before August 2, 2018, NSTA will e-mail attendees instructions for accessing their respective transcripts. All information in these transcripts will be maintained (and can be accessed) indefinitely as part of an attendee’s individual profile.

Graduate Credit Opportunity
STEM Forum & Expo attendees can earn one or two graduate-level credits/units in professional development through Dominican University of California (dominicancaonline.com) course EDUO 9564. Participants must attend the conference, complete the required assignments, and pay a fee of $95 for one credit/unit or $190 for two credits/units. To learn more about the assignment requirements and registration, visit bit.ly/2Jsqar4.

Register within three weeks of the conference ending date.

Deadline is August 30, 2018.
This form is for planning purposes only. Do NOT submit to NSTA.

7th Annual STEM Forum & Expo, hosted by NSTA
Professional Development Documentation Form

All attendees can evaluate concurrent teacher and exhibitor sessions on our conference app while simultaneously tracking professional development certification (based on clock hours). Use this form to keep track of all sessions/events attended during the 7th Annual STEM Forum & Expo, hosted by NSTA. Sessions/events such as exhibit hall visits are not available for online evaluation. However, these events still qualify for professional development.

On or before August 2, 2018, NSTA will e-mail attendees instructions for accessing their respective STEM Forum transcripts. All information in these transcripts will be maintained (and can be accessed) indefinitely as part of an attendee’s individual profile.

First Name: ______________________________ Last Name: ______________________________________________

To evaluate session via the conference app, first click My Planner and log in with your e-mail address and password. Once logged in, click Home and then select Session & Workshop Listings to find the session you wish to evaluate. Once you have pulled up the session listing, then click the Rate icon to evaluate the session. When finished evaluating the session, click the Save button. Repeat this process for each session attended. See page 8 of the program for additional information.

Sample Questions:
1. I selected this session:
   a. for immediate classroom use.
   b. based on the reputation of the speaker.
   c. to improve my personal pedagogical knowledge/skill.
   d. to improve my STEM content knowledge.
2. The session met my needs.
3. The information presented was clear and well organized.
4. Safe practices were employed.
5. The session avoided commercial solicitation (n/a for exhibitor workshops and NSTA Press® sessions).
6. The session should be repeated at another NSTA conference.

Sample Responses:
1=Strongly Agree  2=Agree  3=Neutral  4=Disagree  5=Strongly Disagree

Wednesday, July 11 10:30 AM–6:30 PM
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Thursday, July 12 8:00 AM–5:30 PM
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**Saturday, July 14** 8:00 AM–4:00 PM

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**Sunday, July 15** 8:00 AM–4:00 PM

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**NSTA Conference App**

Navigate the STEM Forum & Expo from the palm of your hand! The NSTA Conference app provides all the tools necessary for a successful STEM Forum & Expo experience. Search sessions, exhibitors, and speakers to build a schedule of your favorites. Features include the ability to view session and workshop listings by time and presenter; maps of the Convention Center and Exhibit Hall; social media plugins; and a note-taking tool. Visit [www.nsta.org/conferenceapp](http://www.nsta.org/conferenceapp) to download the app.

**Lost and Found**

All lost-and-found items will be turned in at the NSTA Exhibitor Services counter at the Convention Center.

**Philadelphia Information Counter**

The Philadelphia Convention & Visitor’s Bureau will staff an on-site counter located at the Convention Center during the STEM Forum & Expo. The Information Counter is located in the lobby of 12th and Arch West, across from the 102–107 level breakout rooms. Hours of operation will be as follows:

- Wed., July 11 10:00 AM–6:00 PM
- Thu., July 12 9:00 AM–5:00 PM
- Fri., July 13 9:00 AM–5:00 PM

Visitor services representatives can provide city information, brochures, and menus, as well as make restaurant reservations.

**PSTA Counter**

The Pennsylvania Science Teachers Association (PSTA) Counter is located at the Attendees Services area in Hall C of the Convention Center. PSTA’s mission is to work toward the advancement, improvement, and coordination of science education in all areas of science at all educational levels. Stop by to meet us, get science education resources, and to join PSTA.

**Elementary STEM Showcase**

**Join Us at the**

**7th Annual**

**STEM**

**— Forum & Expo —**

in Philadelphia, PA, July 11–13

**Thursday, July 12, 2018, 10:30 AM–12 Noon**

The Elementary STEM Showcase will be one of the featured events held during the STEM Forum & Expo, as well as the only elementary session provided during the Thursday 10:30 AM–12 Noon time slot.

- Share NSTA Press books and award-winning books from the Best STEM Books list
- Demonstrate new preK–5 STEM teaching strategies
- Highlight NGSS connections to student experiences

Find more information on the STEM Forum here: [www.nsta.org/stemforum](http://www.nsta.org/stemforum)
### Conference Resources • Headquarters Staff

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<th>Executive Office</th>
<th>Conference Division</th>
<th>Marketing, Social Media &amp; eMessaging</th>
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<tr>
<td>David Evans, Executive Director</td>
<td>Delores Howard, Associate Executive Director</td>
<td>Lauren Jonas, Assistant Executive Director</td>
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<td>Michelle Butler, Executive Administrator and Manager</td>
<td>Dina Weiss, Associate Director</td>
<td>Korey Ledbetter, Managing Editor, Books (NSTA Press)</td>
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<td>Linda Crossley, Assistant Director/Managing Editor</td>
<td>Andrea Silen, Associate Editor</td>
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<td>Donna Fletcher, Conference Coordinator</td>
<td>Donna Yudkin, Book Acquisitions Coordinator</td>
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<td>Beverly Shaw, Conference Administrator</td>
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<td>Kimberly McDonald, Registration Supervisor/Administrative Assistant</td>
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| Learning Center | The Science Teacher |                       |
|                       | Stephen C. Metz, Field Editor |                       |
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| Journals |                       |                      |
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| The Science Teacher |                       |                      |
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| Journal of College Science Teaching |                       |                      |
| Ann Cutler, Field Editor |                       |                      |
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NSTA Mission Statement

The mission of NSTA is to promote excellence and innovation in science teaching and learning for all.

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Conference Resources • Future Conferences

All cities are subject to change pending final negotiation.

National Conferences on Science Education

St. Louis, Missouri
April 11–14, 2019

Boston, Massachusetts
April 2–5, 2020

Chicago, Illinois
April 8–11, 2021

Houston, Texas
March 31–April 3, 2022

8th Annual STEM Forum & Expo, hosted by NSTA
San Francisco, California—July 24–26, 2019

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

10th Annual STEM Forum & Expo, hosted by NSTA
Detroit, Michigan—July 28–30, 2021

Area Conferences on Science Education

2018 Area Conferences
Reno, Nevada—October 11–13
National Harbor, Maryland—November 15–17
Charlotte, North Carolina—November 29–December 1

2019 Area Conferences
Salt Lake City, Utah—October 24–26
Cincinnati, Ohio—November 14–16
Seattle, Washington—December 12–14

2020 Area Conferences
Pittsburgh, Pennsylvania—October 29–31
New Orleans, Louisiana—November 19–21
Phoenix, Arizona—December 10–12

2021 Area Conferences
Portland, Oregon—October 28–30
National Harbor, Maryland—November 11–13
Los Angeles, California—December 9–11
Keynote Presentation

Thursday, July 12, 4:30–5:30 PM

Mike Massimino
Author, Former NASA Astronaut, and Professor of Professional Practice, Columbia University

Lessons from Space

Mike Massimino served as a NASA astronaut from 1996 until 2014 and flew in space twice: STS-109 on space shuttle Columbia in March 2002 and STS-125 on space shuttle Atlantis in May 2009—the final two Hubble Space Telescope servicing missions. Mike became the first human to tweet from space, was the last human to work inside of Hubble, and set a team record with his crewmates for the most cumulative spacewalking time in a single space shuttle mission. Mike currently lives in New York City where he is an engineering professor at Columbia University and an adviser at the Intrepid Sea, Air, and Space Museum.

NSTA wishes to thank Penguin Random House for sponsoring this speaker.

(See page 49 for details.)

First-Timers Orientation

Come learn about the STEM Forum & Expo program and networking opportunities for registrants who are first-time attendees. See page 26 for details.

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Lower Elementary/Early Childhood

Students in the lower elementary grades are beginning to understand the world around them and the role they play in it. They are curious and want to make sense of their surroundings. By providing students with inquiry-based experiences in Science, Technology, Engineering, and Mathematics, we can unlock each student’s natural curiosity and help them understand the world in an engaging way. The foundational skills learned and mastered through the integration of STEM during the early years, if done right, will help these students be critical thinkers and makers who can innovate the future they will be a part of. Sessions in this strand will emphasize open-ended and active exploration, play, and investigation of the real world through the lens of NGSS.

Upper Elementary

How do we respond to research that indicates that by the time our students reach the fourth grade, a third of them will lose interest in science? How do we ensure that our students develop a solid foundation in the STEM areas so that they are prepared to both work and live in the 21st century? To reverse this trend and ignite their interest in future STEM careers, elementary students need quality learning activities and experiences that spark curiosity, promote confidence, support the rigor of current standards, and develop competence in STEM subjects. The sessions in this strand showcase programs and instructional strategies that support STEM and have been successfully integrated into the elementary core curriculum.

Middle Level

Engaging students through opportunities to explore STEM fields of study that support the NRC Framework and the Next Generation Science Standards is a top priority at the middle school level. A successful middle school STEM program allows students to create, innovate, communicate, collaborate, and iterate projects that are driven by their own interests. The sessions in this strand showcase learning environments where Science, Technology, Engineering, and Mathematics interconnect to serve as a vehicle for discovery, innovation, and independent problem solving while also meeting rigorous content standards.

High School

As we prepare high school students to enter the workforce and college, students must not only understand but apply their understanding in the context of real-world problem solving. Nowhere is this more important than in STEM for grades 9–12. The sessions in this strand will highlight innovative, hands-on, student-centered approaches to STEM topics that cross subject boundaries.

Partnerships

Partnerships among community, business/industry, and education-focused entities often connect preK–16 schools and universities to valuable resources. Leveraging those partnerships can also be key to preparing students to meet the needs of a dynamic workforce that is constantly changing. As the nation recognizes the importance of STEM education to our economic future, collaborations in STEM education between preK–16 and business and cultural communities are becoming increasingly prevalent. The sessions in this strand highlight select preK–16 partnership initiatives that have been successfully implemented and have demonstrated positive outcomes.

Administrators

Successful STEM programs at the primary and secondary levels align the interrelated nature of science and mathematics education with an emphasis on technology and engineering through hands-on and real-life applications where students develop the skills and mind-sets needed to answer complex questions, investigate global issues, and develop solutions for real challenges. This is an incredibly exciting time in education as we shift to support the development of these skills in STEM and across the curriculum. The sessions in this strand will highlight how administrators can best support innovative, hands-on, student-centered approaches to STEM education.
The Toshiba/NSTA ExploraVision science competition for K-12 students engages the next generation in real world problem solving with a strong emphasis on STEM. ExploraVision challenges students to envision and communicate new technology 20 years in the future through collaborative brainstorming and research of current science and technology. Beyond engaging your students in problem solving, team-based learning, critical thinking, and communication skills, ExploraVision aligns with the Next Generation Science Standards.

The SCIENCE OF
A-ha!

Through Toshiba’s shared mission partnership with NSTA, the Toshiba/NSTA ExploraVision competition makes a vital contribution to the educational community.
Introductions and Moderator:

Student Panelists
Ryanne Leslie and Gabby Adams, Springside Chestnut Hill Academy, Philadelphia, PA

For more than 50 years, the U.S. Army has supported a wide range of educational opportunities in STEM for our youth and undergraduate students, as well as our valued teachers. From elementary school through undergraduate school, students of all proficiency levels, interests, and social and economic backgrounds are encouraged to participate in real-world STEM experiences while also engaging with Army-sponsored mentors. These STEM experiences include competitions; STEM enrichment programs; and opportunities for apprenticeships, internships, and scholarships. Visit www.usaeop.com for more information.

NSTA Press Sessions
NSTA Press® books offer new classroom ideas and standards-based strategies. Join NSTA Press authors for these sessions linked to the topics of their books.

Thursday, July 12
11:00 AM–12 Noon
Eureka! Grades 3–5 Science Activities and Stories

1:30–2:30 PM
Argument-Driven Inquiry in Middle School: Promoting Science Proficiency by Transforming Lab Activities

Friday, July 13
9:30–10:30 AM
Need Money? Write a Grant!

Argument-Driven Inquiry in the Elementary School Classroom: Promoting Science Proficiency by Transforming Lab Activities

3:00–4:00 PM
Using Children’s Literature to Inspire STEM Learning
That’s a Wrap—A STEM-tastic Celebration

Wrap Up/Strand Leaders’ Reports

Friday, July 13, 4:30–5:30 PM

116, Convention Center

Join us for a STEM-tastic wrap-up session from the 7th Annual STEM Forum & Expo’s Steering Committee. Share in fond memories and reflect upon the deep learning experienced at this year’s STEM Forum. Celebrate the engaging sessions, panels, workshops, and networks created during your time in Philadelphia. You will have the opportunity to question our Steering Committee members and you will discover ways to become involved in future STEM Forums. One lucky attendee will have the chance to win a free registration to the 8th Annual STEM Forum & Expo in San Francisco in 2019 and we’ll also raffle off several gift cards to the NSTA Store.

Steering Committee:

- **Jennifer C. Williams**, Steering Committee Chairperson, and Department Chair, Lower School Science, Isidore Newman School, New Orleans, LA
- **Adriana Guerra**, Lower Elementary/Early Childhood Strand Leader, and Kindergarten Teacher, E.P. Foster STEM Academy, Ventura, CA
- **Brandi Leggett**, Upper Elementary Strand Leader, and Instructional Coach, Rosehill Elementary School, Shawnee Mission, KS
- **Kenneth Williams**, Middle Level Strand Leader, and STEM Teacher, Oxon Hill Middle School, Fort Washington, MD
- **Kerri Murphy**, High School Strand Leader, and Math Teacher, Oliver Ames High School, North Easton, MA
- **Garrett Mason**, Partnerships Strand Leader, and Educational Consultant, Denver, CO
- **Damaries Blondonville**, Administrators Strand Leader, and Project Manager, Prince George’s County Public Schools, Oxon Hill, MD
Making Sense of Three-Dimensional Teaching and Learning

Separate Pricing
Saturday–Sunday, July 14–15
8:00 AM–4:00 PM
Philadelphia Marriott Downtown

During this two-day workshop, participants build a solid understanding of the three dimensions and how they integrate, and take home a powerful toolkit of resources to further their implementation efforts.

Participants receive:

• Discover the NGSS: Primer and Unit Planner enhanced e-book
• The NSTA Quick-Reference Guide to the NGSS, K–12, edited by Ted Willard

Presenters:

• Kate Soriano is supporting New Jersey K–12 teachers in their transition toward the Next Generation Science Standards as a curriculum and professional development specialist with the Center for Innovation in Engineering and Science Education at Stevens Institute of Technology in Hoboken, New Jersey. Kate serves on the EQuIP Science Peer Review Panel and is an NSTA instructional coach of three-dimensional teaching and learning. She holds a BS in geology and geophysics from Boston College, an MS in geology from the University of Wisconsin–Madison, and an MA in education from Humboldt University.

• Ted Willard is associate executive director of Science Standards for the National Science Teachers Association. In this role, he supports implementation of the Next Generation Science Standards and three-dimensional learning more broadly by creating resources. In addition, he edited NSTA’s Quick-Reference Guide to the NGSS and oversees the content of the NGSS@NSTA Hub. Prior to joining NSTA, Ted spent 12 years at Project 2061 for the American Association for the Advancement of Science (AAAS).

Workshop including Forum registration
Member $675  Nonmember $750

Workshop only
Member $575  Nonmember $650
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- Everyone enjoys member pricing: 20% off bestseller NSTA Press® titles.
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Visit www.nsta.org/store to make a purchase today, or call 800-277-5300.
Designed by Robert Indiana, the “Love” sculpture in Philadelphia’s JFK Plaza is a fitting tribute to the city of brotherly love—(philos, “love” or “friendship,” and adelphos, “brother”).
Wednesday, July 11

10:30–11:30 AM  Presentations

**STEMx Session: WOW! So That’s a STE(A)M Classroom**  
(Grades P–12)  
116, Convention Center  
Alice Gilchrist (agilchrist@s2temsc.org), S2TEM Centers SC, Greenwood, SC  
Do you know what to look for when observing a successful STE(A)M classroom? Becoming a supportive STE(A)M administrator takes one step at a time so come and take your first step with us.

**STEMx Session: “Making” the Connection: Igniting Students’ Interest in Jobs They Didn’t Know They Wanted**  
(Grades 5–12)  
117, Convention Center  
Heather Sherman (@hbelle88), Ohio STEM Learning Network/Battelle, Columbus  
Evan Curran (@EvanCurran3; currane@battelle.org), Tennessee STEM Innovation Network-Battelle, Nashville  
Julie Francis (@julieafsan1), Battelle, Columbus, OH  
Hear about the connections between the makerspace and the workplace, specifically about pathways in advanced manufacturing, and brainstorm ways to help students learn about the many opportunities in this area.

10:30–11:30 AM  Hands-On Workshop

**STEMx Session: Making It Matter: Giving Purpose to STEM**  
(Grades P–8)  
118A, Convention Center  
Jodi Zeis (mrszteachesme@yahoo.com), S2TEM Centers SC, Orangeburg, SC  
Engage in purposeful STEM activities and discuss strategies that engage students underrepresented in STEM, including ESOL, special education, and students from high poverty areas.

12 Noon–1:00 PM  Presentations

**STEMx Session: Retooling Leader Growth for STEM Learning**  
(Grades K–12)  
116, Convention Center  
Becky Ashe (@BeckyAshe; becky.ashe@knoxschools.org), L&N STEM Academy, Knoxville, TN  
Stephanie Johnson (johnsonsa@battelle.org), Ohio STEM Learning Network/Battelle, Columbus  
Come experience growth activities featured in a multi-state cohort professional development effort to build capacity in leaders to promote STEM learning. Learn how to get involved yourself!
STEMx Session: The Power of Place-Based Education: Helping Rural Educators Leverage Local Assets  
(Grades 1–12) 117, Convention Center  
Brandi Stroecker (@STEMIgnites; @theTSIN; stroecker.brandi@gmail.com) and Evan Curran (@EvanCurran3; currane@battelle.org), Tennessee STEM Innovation Network-Battelle, Nashville  
Interested in place-based education? Hear how the Tennessee Rural STEM Collaborative leverages PBE to increase rural educators’ capacity to connect with valuable expertise and access assets that focus on STEM locally.

STEMx Session: Be Adaptable—Switch Up Your Approach to STEM Through Transdisciplinary Problem-Based Learning  
(Grades P–12) 118A, Convention Center  
Sheli Smith (@pastfoundation; sheli@pastfoundation.org) and Annalies Corbin (@annaliescorbin; annalies@pastfoundation.org), PAST Foundation, Columbus, OH  
Holly Lavender (@HollyLavender2), Ohio Dept. of Education, Columbus  
Come hear how you can adapt your TPBL approach to meet the needs of your students and community. Adaptable Approaches to STEM explores how employing real problems establishes new instructional strategies that amplify project-based delivery, promote options in assessment, and respond to culturally relevant workforce development.

1:30–2:30 PM  Presentation  
First-Timers Orientation  
(Grades P–12) 122B, Convention Center  
NSTA Board and Council  
Come learn about the STEM Forum & Expo program and networking opportunities for registrants who are first-time attendees. Join us for tips on navigating the forum and learn how to make the most of the amazing opportunities available over the next few days.

2:30–4:00 PM  Opening Session  
Student Panel Discussion: The Power of STEM Education  
(General) 118C, Convention Center  
Student Panelists  
Ryanne Leslie and Gabby Adams, Springside Chestnut Hill Academy, Philadelphia, PA  
The need for STEM literacy—the ability to understand and apply concepts from science, technology, engineering, and mathematics in order to solve our nation’s most complex problems—is growing exponentially. The requirement for STEM literacy goes beyond the traditional STEM occupations of scientist, engineer, and mathematician. In addition, the United States and the Army have a growing need for highly qualified, STEM-literate technicians and skilled workers in advanced manufacturing, logistics, management, and other technology-driven fields.

For more than 50 years, the U.S. Army has supported a wide range of educational opportunities in STEM for our youth and undergraduate students, as well as our valued teachers. From elementary school through undergraduate school, students of all proficiency levels, interests, and social and economic backgrounds are encouraged to participate in real-world STEM experiences while also engaging with Army-sponsored mentors. These STEM experiences include competitions; STEM enrichment programs; and opportunities for apprenticeships, internships, and scholarships. More information is available at www.usaecop.com.

A diverse panel of students from the U.S. Army Educational Outreach Program (AEOP) will describe their experiences with the AEOP programs they have participated in, the importance of STEM in their lives and school experiences, how STEM will help them in their futures, and why they think STEM is important. AEOP aims to provide both students and teachers with diverse opportunities that effectively engage, inspire, and attract the next generation of STEM talent and expose participants to Department of Defense (DoD) STEM careers.
4:30–6:30 PM  Opening Exhibits Reception

Exhibit Hall C, Convention Center

Please join us for this exclusive sneak preview of the Exhibit Hall. Be among the first to take in the sights and sounds of the Expo as you enjoy complimentary refreshments throughout the exhibit hall. Exhibitors will have hands-on activities, free resources, giveaways, best practices, and more—all tailored specifically to teachers’ needs. Brand-new and soon-to-be-released STEM resources will be featured by industry leaders. Don’t forget to come back for our regular exhibit hours on Thursday and Friday.

For a complete list of exhibitors, see page 72.
Since 2003, millions of visitors a year come to the Liberty Bell Center in Philadelphia to view the iconic symbol of freedom—the Liberty Bell, positioned in a glass chamber with a view of Independence Hall in the background.
8:00–9:00 AM  Featured Panels

**Recruiting and Retaining Minorities and Women in Engineering**
(General) 118B, Convention Center
Moderator: Nancy R. Martin (nancy@nancymartin.com), Nancy R. Martin Consulting, LLC, Niskayuna, NY

Panelists:
Karen Johnsen, Early Talent Program Manager, GE Healthcare, Milwaukee, WI
Andrew Reid, Senior Planning Analyst, Con Edison, New York, NY
Karen Davis (kmdavi01@syr.edu), Director, Career Services, College of Engineering and Computer Science, Syracuse University, Syracuse, NY

There is so much written on this topic that many people think it is impossible to attract women and minorities in the STEM field. It isn’t. Come meet professionals who have successfully inspired women and minorities to join engineering and stay there. Learn what you can do as educators to keep your students interested in a STEM career and discover the lifelong benefits of careers in engineering. In particular, get ready to understand the lasting impact you make on your students, and why what you do right now matters the most.

**Design for Success: Engaging Diverse Learners in STEM**
(General) 118C, Convention Center
Moderator: Janella Watson (watson@childrenmuseum.org), Associate Director, Providence Children’s Museum, Providence, RI

Panelists:
Dana Schloss, Director of Exhibit Experiences, and Satbir Multani (smultani@nysci.org), Design Lab Manager, NYSCI, Corona, NY
Gina Tesoriero (ginateso@uw.edu), Graduate Research Assistant and PhD Student, Learning Sciences and Human Development, College of Education, University of Washington, Seattle
Amanda Solarsh (amandasolarsh@gmail.com), Middle School STEM Educator, Simon Baruch MS104, New York, NY

Join a panel of educators from K–12 and museum settings as they share educator moves to create equitable STEM learning environments. Learn strategies to engage diverse learners in design engineering, making, and sensory-rich STEM exploration. Take part in active discussion with the panel and walk away with inspiration and practical approaches for using design and making to support all students.

**The STEM Influence on Autonomous Vehicles**
(General) 119A, Convention Center
Moderator: Seun Phillips (phillips12@michigan.org), Director, PlanetM, Michigan Economic Development Corp., Lansing

Panelists:
Ajit Sharma, Advisor, Lime Lab, Detroit, MI
Patrick Hillberg (patrick.hillberg@siemens.com), Solutions Architect, Workforce Development, Siemens PLM Software, Detroit, MI

Can you imagine driving next to a car on a highway without a driver or any passengers inside? There is a lot of conversation around connected and autonomous vehicles, but how exactly are we going to make this happen? It is estimated that the new driverless vehicle economy could be worth $800 billion by 2035 and $7 trillion by 2050. This has an immense impact on the economy and, most importantly, the STEM workforce. In order to bring driverless vehicles to life, we must understand human behavior and extrapolate unlimited amount of data to ultimately accomplish the key goal of increasing driver safety and saving lives. Join us as we talk about the technology, economy, and how STEM education plays a key role in making driverless vehicles a reality.

**Leveraging Partnerships to Ensure a Future-Ready Workforce**
(General) 119B, Convention Center
Moderator: J. Wesley Hall (hallj@battelle.org), Executive Director, STEMx at Batelle, Nashville, TN

Panelists:
David Burns (burnsd@battelle.org), Director, Education Operations, Ohio STEM Learning Network/Battelle, Columbus
Michael Stone (mstone@pefchattanooga.org), STEM Director of Innovative Learning, Public Education Foundation, Chattanooga, TN
Jill Lansing (jill.lansing@suny.edu), Assistant Vice Chancellor, Empire State STEM Network, SUNY, Albany, NY

How do we prepare students for jobs that don’t yet exist? As leaders in education, we need to leverage every advantage at our disposal to ensure students’ coursework is relevant and that they have experiences in the community that build their understanding of the requirements for the jobs of tomorrow. Join leaders from across the country as they discuss innovative partnerships that are reshaping how students develop skills for success in future STEM careers and are laying the foundation for America’s future-ready workforce.
Thursday, 8:00–9:00 AM

8:00–9:00 AM Presentations

Teaching Engineering, Motion, and Energy Through Rube Goldberg
(Grades 1–8) 117, Convention Center
Elaine Sevin (elainesevin@newmanschool.org), Isidore Newman School, New Orleans, LA
This introduction to STEM for elementary classrooms will allow participants to explore motion and energy while creating their own Rube Goldberg machine using found objects.

Teach Your Elementary Students How to Code a Computer Game!
(Grades 2–5) 307, Convention Center
Mary Ellen O’Donnell (maryellen.m.odonnell@gmail.com), Village Glen West School, Los Angeles, CA
Find out how simple it is to teach coding to elementary students using the Scratch programming language. A coding, science, or math background is not necessary. The only thing needed is computer and internet access. Get the tools to develop a game that students can code and then play back in the classroom! Students learn programming concepts and get practice in logic and conceptual thinking.

8:00–9:00 AM Hands-On Workshops

Tips for Successfully Teaching NGSS Science and Engineering Practices
(Grades 1–8) 113B, Convention Center
Jessica Cellitti (jmn334@drexel.edu), Magdalene Moy (mkm99@drexel.edu), and Rasheda Likely (rsl67@drexel.edu), Drexel University, Philadelphia, PA
After analyzing their own curriculum for science and engineering practices, teachers will be given resources to ensure all science and engineering practices are being met throughout their curriculum.

Quick and Easy STEM Starters
(Grades 3–6) 115B, Convention Center
Kristi Eschberger (kristi@girlstart.org), Girlstart, Austin, TX
Spark STEM excitement in your classroom using STEM icebreakers! These 10-minute (or less!) hands-on activities encourage collaboration and communication, and leave students wanting more.

Advancing STEM Concepts with Explorations and Problem Solving with a Focus on Physical Structures and Everyday Household Objects
(Grades 3–6) 115C, Convention Center
Donna Knoell (dknoell@sbcglobal.net), Educational Consultant, Overland Park, KS
Enable all K–6 students to recognize the presence, impact, and potential of STEM and the essential integration of all STEM disciplines. Attention will be paid to integration of STEM disciplines in classroom explorations, by analyzing and constructing physical structures and everyday household objects, advancing learning and igniting engagement, critical thinking, and creativity. Handouts.

Kinder-Engineers: Using Picture Books to Integrate STEM into the Kindergarten Classroom
(Grades P–2) 118A, Convention Center
Jennifer Shettel (@readndr) and Brandy Speas (brspeas@millersville.edu), Millersville University, Millersville, PA
Picture books are perfect for connecting STEM and literacy learning! Engage in hands-on engineering challenges using children’s literature as launchpads to learning.

8:00 AM–5:00 PM Meeting

Shell Science Lab Regional Challenge Winners Workshop
(By Invitation Only) 307, Marriott
For more information, visit www.nsta.org/shellsciencelab/regional.aspx.
9:15 AM–3:00 PM  Exhibits

Come stroll through the exposition picking up tips, product samples, and ideas to spark your imagination. Please note that no sessions are scheduled today from 12 Noon to 1:30 PM during our exclusive exhibit hall hours.

9:30–10:30 AM  Featured Panel

STEM in Philadelphia: Combining Efforts to Tackle the STEM Education Gap in Philadelphia

Moderator: Ambra Hook, PFT Health and Welfare Fund, Philadelphia, PA

Panelists:
Jamie Bracey, Director, National Center for Inclusive Competitiveness, College of Engineering, Temple University, Philadelphia, PA
Phil Brooks, Director of STEM Initiatives, Office of Workforce Development, City of Philadelphia, PA
Sandra Dunham, Science Coordinator, PFT Health and Welfare Fund, Philadelphia, PA
Emily McGady, Science Curriculum Coordinator, School District of Philadelphia, PA
Michele Lee, Cochair, Philadelphia STEM Ecosystem, Philadelphia, PA
Darryl Williams (dwilliams@fi.edu), Senior Vice President, The Franklin Institute, Philadelphia, PA

In Philadelphia, there are several entities that are working hard to mitigate the decline in STEM performance in public and charter schools. In the past, many of the established programs in the Philadelphia area have operated autonomously from others. Join us to meet the local area STEM Partners and hear what steps are being put into place to resolve this problem so we all can move together toward increasing collaborative efforts between partners, teachers, and students here in the Greater Philadelphia area.

9:30–10:30 AM  Presentations

STEM Ambassadors in Rural Maine: Leveraging Partnerships

Jennifer Atkinson (jatkinson@mmsa.org), Maine Mathematics and Science Alliance, Augusta
William Otto (chemxpert@yahoo.com), University of Maine at Machias

Join us as we demonstrate how several nimble institutional partners have coordinated and leveraged their efforts to provide high-quality STEM learning for middle school and college students.

This World of Humans: A New Science Podcast from Visionlearning with Free Teaching Guides

Nathan Lents (@nathanlents; nlents@jjay.cuny.edu) and Anthony Carpi, John Jay College of Criminal Justice, New York, NY

This World of Humans is a new podcast covering recent discoveries in biology and social science with free teaching guides and a variety of activities.

Engaging K–5 Students in Engineering Through Problem Scoping

Jeffrey Kohoutek (jeffrey.kohoutek@spps.org), Crossroads Elementary School, Saint Paul, MN
Andrea Appel (andrea.appel@spps.org), Saint Paul (MN) Public Schools

We will use problem scoping to show participants how to give their learners a personally meaningful, motivating, and engaging context as they work through the engineering design.

Building and Sustaining a Culture of STEM in Early Childhood Programs

Holly King (@HollyKingEd; hking@advanc-ed.org) and Lisa Sutherland (lsutherland@advanc-ed.org), AdvancED, Tempe, AZ

Understand and integrate the elements essential to building and sustaining a STEM culture in your early childhood program, through partnerships and a clear program vision.
Expanding English Language Learner Vocabulary Through STEM  
(Grades K−5)  
118C, Convention Center  
Rebecca Haystead (rebecca.haystead@venturausd.org), Frances Flores (frances.flores@venturausd.org), and Elizabeth Walker-Martinez (@epfoster18; elizabeth.walkermartinez@venturausd.org), E.P. Foster STEM Academy, Ventura, CA  
Presider: Jena Branstetter (jena.branstetter@venturausd.org), Balboa Middle School, Ventura, CA  
Explore effective strategies that increase the acquisition and usage of academic language and vocabulary of English language learners and other subgroups through NGSS and STEM.

NABT Presents: Integrating 3D Technology in the Social Sciences  
(Grades 6−12)  
119A, Convention Center  
Jennifer Pfannerstill (jennifer.pfannerstill@gmail.com), North Shore Country Day School, Winnetka, IL  
3D modeling and printing provide a vehicle for incorporating STEM skills into other disciplines. Students and teachers can design cross-curricular projects that use 3D-printed objects to represent social science concepts.

ITEEA Session: Engineering for All—Designing Solutions for Social Good  
(Grades 6−College)  
119B, Convention Center  
Jennifer Buelin (iteea@iteea.org), International Technology and Engineering Educators Association, Reston, VA  
Find out how to employ authentic social contexts for a hands-on approach to teaching STEM ideas and practices using the Engineering for All curriculum.

Developing Eco-Awareness in Children  
(Grades P−6)  
120A, Convention Center  
Kimberly Mack (@drkmackcps; mackkim@cps-k12.org), Jonaya Brown (browjon@cps-k12.org), Jamie Blessing (blessij@cps-k12.org), Erica Watson (watsone@cps-k12.org), Stephanie Norton, and Deborah Elkins-Brown (browdeb@cps-k12.org), John P. Parker School, Cincinnati, OH  
We will share our processes in developing a Global Environmental Literacy program in an urban elementary school with 100% poverty rate, using STEM and 21st-century skills.

Phenomena, Questions, and Models  
(Grades 4−12)  
120C, Convention Center  
Kelly Moore (@kellyramey; kellymoore@tntech.edu) and Leslie Suters (lsuters@tntech.edu), Tennessee Tech University, Cookeville  
Investigate the use of anchoring phenomena in lessons with an emphasis on the science and engineering practices. We will discuss the integration of questioning, models, and phenomena in the classroom.

Setting Up an Aquatic Monitoring Program for a Local Stream  
(Grades 10−College)  
125, Convention Center  
Thomas Hinckley (thinckley@landmark.edu), Landmark College, Putney, VT  
Create a groundswell of interest in your science students by having them set up a real stream monitoring program that involves the data collection and analysis of parameters that determine stream health.

Modeling Stellar Evolution and Supernovas Using NASA Images, Data, and STEM Analysis Tools  
(Grades 7−12)  
126A, Convention Center  
Donna Young (dlyoung.nso@gmail.com), NASA/NSO UoL Coordinator, Bullhead City, AZ  
Model stellar evolution processes using NASA images, plotting H-R diagram transitions, and determining the chemistry and physics of supernovas using NASA STEM image analysis tools.
Thursday, 9:30–10:30 AM

9:30–10:30 AM Hands-On Workshops

9:30–10:30 AM Hands-On Workshops

**9:30–10:30 AM Hands-On Workshops**

**STEM-In-A-Tank: Aquaponics Goes to Elementary School**
(Grades K–6)
115A, Convention Center
Carla Zembal-Saul (@czem; czem@psu.edu), Penn State, University Park, PA
Jesse Maine (@JesseMaine; jmaine@southerntioga.org), Southern Tioga School District, Blossburg, PA
Leann Tepsich-Cox (@LeannTCox; tlc.leann@gmail.com), Steelton-Highspire School District, Steelton, PA

Elementary teachers in urban and rural districts collaborate with industry to bring real-world STEM learning to life for their students through aquaponics in the classroom.

**Can You Think of a Career Without STEM?**
(Grades 3–8)
115B, Convention Center
Saundra Wever Frerichs (@SaundraFrerichs; sfrerichs3@unl.edu), University of Nebraska–Lincoln Extension 4-H
Karly Black (@karlyblackblack; karly.black@unl.edu), University of Nebraska at Lincoln

In this interactive session, you will identify the many careers that involve STEM and how to make connections to these careers during STEM learning experiences.

**Creating Effective Robotics, Engineering, and Technology Makerspaces: What and How?**
(Grades 3–6)
115C, Convention Center
Donna Knoell (dknoell@sbcglobal.net), Educational Consultant, Overland Park, KS

Attention will be paid on how to create an effective makerspace specifically designed to advance robotics, technology skills, and engineering principles, as well as increase learning and engagement to fulfill the NGSS. Emphasis will be placed on criteria for what to include, how to use it to reach diverse populations, and how to measure its effectiveness.

**Inviting Engineering into the Elementary Classroom**
(Grades K–5)
118A, Convention Center
Seth Marie Westfall (sethmariewestfall@gmail.com), Racine (WI) Unified School District

A major shift in implementing the NGSS involves students actively engaging in science using the eight science and engineering practices. Explore strategies to invite these practices into elementary science labs/explorations. Leave with a template guiding you on flipping traditional science labs to incorporate the science and engineering practices.

**PolyWhat? Application of STEM Using Polymers**
(Grades 4–12)
120B, Convention Center
Sherri Rukes (@polychemgirl; sherri.rukes@d128.org), Libertyville High School, Libertyville, IL

Deepen your students’ STEM experience by adding various polymer inquiry/engineering design challenges. Take traditionally fun polymer activities and turn them into NGSS investigations to create more critical thinkers in the classroom.

**Philly Scientists: Designing Mobile Apps for Urban Youth Mapping the Biodiversity of Their Cities**
(Grades 4–7)
121B, Convention Center
Rasheda Likely (rsld7@drexel.edu) and Magdalene Moy (mkm99@drexel.edu), Drexel University, Philadelphia, PA

We will introduce an NGSS- and career awareness–focused curriculum that incorporates mobile apps and digital badges to map urban biodiversity.

**Engineering Laser Security Systems**
(Grades 6–8)
122A, Convention Center
Corbin Rice (corbin.rice@mplsk12.mn.us), Northeast Middle School, Minneapolis, MN
Justine Kim (jukim@umn.edu), University of Minnesota, Minneapolis

With knowledge of the properties of light, students design laser security systems for a traveling museum exhibit.

**What Is the Science Behind the Yeti Cup Design?**
(Grades 6–College)
123, Convention Center
Stacy Thibodeaux (@stacythib; svthibodeaux@gmail.com), Southside High School, Youngsville, LA

Participants will analyze various materials as insulators, and then design and build the newest model of the famous Yeti cup.

**How a Teacher Can Fund STEM Programs**
(Grades P–12)
124, Convention Center
Becky Miller (millerb@okaloosaschools.com) and Katherine Stephens, Bluewater Elementary School, Niceville, FL

It is challenging to fund standards-based STEM activities for any classroom teacher. Find out how to successfully write a grant to fund activities, find business partners, and achieve success in your program.
Meet Ya at the Moon  
(Grades 3–6) 304/VIP, Convention Center  
Stefanie Nguyen (@stef_neung; nguyen.stef@gmail.com), St. Gabriel’s Catholic School, Austin, TX  
Diana McGuire (@3rdgradebuzz; mcguire.diana@gmail.com), Mathews Elementary School, Austin, TX  
Explore authentic learning through literature while teaching the design process and space concepts in an engaging Project-Based Learning. This project is based on a fiction/nonfiction pairing—*Space Case* by Stuart Gibbs and *Next Time You See the Moon* by Emily Morgan (NSTA Kids).

Those Darn Squirrels  
(Grades K–1) 307, Convention Center  
Nichole LeGrant (legrantn@pcsb.org), Kim Parsons (parsons_k@pcsb.org), and Marie Hill (@Spacetunes; hillm@pcsb.org), Douglas L. Jamerson, Jr. Elementary School, Saint Petersburg, FL  
Join us as we connect kindergarten and first-grade science standards using the book *Those Darn Squirrels* and STEAM strategies by engineering a squirrel-proof bird feeder.

9:30–10:30 AM  
Exhibitor Workshops  
Using Models to Uncover Student Misconceptions in Chemistry  
(Grades 9—College) 103A, Convention Center  
Sponsor: 3D Molecular Designs  
Keri Shingleton, Holland Hall, Tulsa, OK  
Karen Avery, Montoursville Area High School, Montoursville, PA  
Gina Vogt (gina.vogt@3dmoleculardesigns.com), 3D Molecular Designs, Milwaukee, WI  
Uncover students’ conceptual understanding of atoms, molecules, and compounds using NGSS science and engineering modeling practices. Explore chemistry topics in polarity, pH, density, solubility, bonding, and much more with three-dimensional teaching and learning manipulatives! Make learner thinking visible through student-centered simulations of dissociation and neutralization. Great formative assessment probes provided!

Integrating Chromebook and BYOD with Vernier Technology  
(Grades 3–12) 105 A/B, Convention Center  
Sponsor: Vernier Software & Technology  
David Carter (info@vernier.com), Vernier Software & Technology, Beaverton, OR  
Participate in fun and engaging experiments that compare grip strengths, investigate pressure/volume relationships, and match position graphs, all using Vernier digital tools with Chromebooks or BYOD. See how sensor-based experiments teach students about data collection and analysis—practices that promote STEM inquiry, improve STEM literacy, and authentically boost test scores.

NGSS—Which Way Is Best? Recovering Copper from Waste Solutions  
(Grades 6–8) 107 A/B, Convention Center  
Sponsor: Lab-Aids, Inc.  
Denis Baker, Lab-Aids, Inc., Ronkonkoma, NY  
Students investigate the use of reactions with three metals for reducing copper waste and reclaiming copper from a used copper-etching solution. Students use data from their investigation and text sources to develop an evidence-based argument for which metal is the best choice for recovering copper from the waste solution.

Save a Nickel and Learn to Trickle!  
(Grades 6–12) 109 A/B, Convention Center  
Sponsor: Texas Instruments  
Fred Fotsch, Texas Instruments, Dallas  
Explore some of the parameters involved in irrigating a garden or lawn more efficiently. This hands-on workshop combines some simple computer coding (no experience necessary) with a few inexpensive sensors to create a smart irrigation system. Appropriate for middle school to high
Putting the “E” in STEM: Engineering in the Middle School Science Classroom  
(Grades 6–9)  111 A/B, Convention Center  
Sponsor: U.S. Army Educational Outreach Program (AEOP)  
Matthew Hartman, eCYBERMISSION Content Manager, NSTA, Arlington, VA  
Bringing engineering (the E in STEM) into science classes can be a challenge. We will help you understand the value of integrating engineering in your science classes and give some tips on how to make the integration seamless. There will also be an explanation of the online STEM competition eCYBERMISSION and how it relates to engineering in the science classroom.

Demystifying the NGSS and STEM Through the Phenomenon of Earthquakes  
(Grades 3–12)  112 A/B, Convention Center  
Sponsor: STEMscopes  
Terry Talley (ttalley@acceleratelearning.com), STEMscopes, Houston, TX  
STEM-based NGSS instruction is based in the 5E and provides avenues for the three dimensions of the Framework and NGSS performance expectations. Join us for technology-based simulations and engineering design challenges that are part of the hands-on component studying the phenomenon of earthquakes.

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Thursday, 10:30 AM–12 Noon

Special Session
Elementary STEM Showcase!
(Grades P–5)  
Hall B, Convention Center  
Sponsored by Amplify and Pitsco Education


Ela Ben-Ur (ela@olin.edu), Olin College of Engineering, Cambridge, MA
Lynne Cherry (lncherry@aol.com), Young Voices for the Planet, Thurmont, MD
Shelly Counsell (slcnsell@memphis.edu), The University of Memphis, TN
Timothy Dalby (tdalby@wilmingtonfriends.org), Wilmington Friends School, Wilmington, DE
Kevin Fleming (kevin.james.fleming@gmail.com), Area Cooperative Educational Services, Hamden, CT
Jennifer Gallo-Fox (gallofox@udel.edu), Laurie Drumm, Makenzie Mullen (mmullen@udel.edu), and Lauren Stegeman (stegeman@udel.edu), University of Delaware, Newark
Joan Gillman (joan.gillman@calhoun.org), The Calhoun School, New York, NY
Adriana Guerra (adriana.guerra@venturausd.org), E.P. Foster STEM Academy, Ventura, CA
Rachelle Haroldson (rachelle.haroldson@uwrf.edu), University of Wisconsin–River Falls
Laura Hummel (lhummel@pa.gov), Pennsylvania Dept. of Education, Harrisburg
Barbara Johnson (johnsof@lmsd.org), Belmont Hills Elementary School, Bala Cynwyd, PA
Pamela Lottero-Perdue (plottero@towson.edu), Towson University, Towson, MD
Gregory Lyman (greg.lyman@cwu.edu) and Timothy Sorey (tim.sorey@cwu.edu), Central Washington University, Ellensburg
Lori Norton-Meier (lori.nortonmeier@louisville.edu), University of Louisville, KY
Mary Palmer (mpalmer@swctennessee.edu), Southwest Tennessee Community College Macon Cove Campus, Memphis
Christine Ramirez (christine_e_ramirez@mcpsmd.org), Kemp Mill Elementary School, Silver Spring, MD
Ruth Ruud (ruadtruth61@gmail.com), Cleveland State University, Cleveland, OH
Ellen Schiller (schilee@grsu.edu), Grand Valley State University, Grand Rapids, MI
Patti Taylor (pattitaylor@stmalachychicago.com), St. Malachy School, Chicago, IL
Juliana Texley (jtexley@att.net), 2014–2015 NSTA President, and Science Writer/Instructor, Alpena, MI
Sylvia Vardell (svardell@twu.edu), Texas Woman’s University, Denton

Laurie Wallmark (laurie.wallmark@raritanval.edu), Raritan Valley Community College, Somerville, NJ
Seth Marie Westfall (sethmariewestfall@gmail.com), Racine (WI) Unified School District
Janet Wong (janet@janetwong.com), Pomelo Books, Princeton, NJ

The Elementary STEM Showcase brings together approximately 30 leaders in STEM education who will provide a variety of preK–5 STEM teaching strategies and resources. Featured materials include NSTA Press® books, award-winning books from the Best STEM Books list, and strategies from the NSTA preK–5 journal, Science & Children.

NGSS connections to student experiences will be highlighted during this flea market–style sharing experience where participants will engage in hands-on activities and interact with presenters about STEM investigations. Participants will learn from this energy-filled experience and leave with ideas to use with students and colleagues.

The Elementary STEM Showcase will be one of the featured events held during the STEM Forum & Expo, as well as the only elementary session provided during the Thursday 10:30 AM–12 Noon time slot. All attendees have a chance to win an iPad!
11:00 AM–12 Noon  Presentations

The Involvement of Modern Business in Educational STEAM Projects with Students
(Grades 9–College)  102A, Convention Center
Mikhail Epshtein (mikhail.epshtein@csi.cuny.edu), College of Staten Island, NY
The possible mechanisms of supporting the interaction between schools and businesses in STEAM education programs will be described. Such partnerships will be shown as one of the resources of innovation development in the region.

PULSE 2.0: A Partnership to Understand and Lead STEM Education
(Grades K–8)  102B, Convention Center
Lauren Beal (@Lauren_beal26; lauren_beal@iu13.org), Rachael Haverstick (@rach_haverstick; rachael_haverstick@iu13.org), and Ed Gooch (@edgoochSTEM; ed_gooch@iu13.org), Lancaster-Lebanon IU13, Lancaster, PA
Joins us as we present our approach to supporting STEM education by bringing together colleges, districts, and community agencies to provide a unique professional development framework.

Teaching in a Makerspace
(Grades 9–12)  103C, Convention Center
Hanna Below (hbelow@ehove.net), EHOVE Career Center, Milan, OH
Does your school have an underused makerspace collecting dust? Hear how one science teacher has used 3D printers, lasers, vinyl cutters, and more to transform her classroom to a Project-Based Learning environment.

Grounding STEM Education Programs in NGSS Practices
(Grades 6–12)  117, Convention Center
David Lockett (@DavidJLockett; david.lockett@lwcharter.schools.com), Edward W. Bok Academy, Lake Wales, FL
Interested in exploring ways to support classroom teaching in integrating the NGSS practices? Want to move toward an inquiry-based approach in which students take more responsibility for their learning? Then come to this session.

NCTM Session: “Design a School” STEM Project for Geometry Class
(Grades 9–12)  118B, Convention Center
Paul Kelley (@paulrkelley; paulkelley@comcast.net), Anoka High School, Anoka, MN
Students in geometry class designed a school for the year 2050, including a site plan, floor plan, scale model, written proposal, and class presentation. Come see how it’s done!

Using National Science Olympiad STEM Classroom Materials to Address NGSS Crosscutting Concepts and Content
(Grades 3–12)  118C, Convention Center
Donna Young (dlyoung.nso@gmail.com), NASA/NSO UoL Coordinator, Bullhead City, AZ
Hear about National Science Olympiad competitions, including events and supporting resources that are easily incorporated into existing curricula to actively engage students with STEM activities and projects.

All Teachers Are STEM Teachers: STEM Across the Curriculum
(Grades 6–8)  119A, Convention Center
Karen Kingrea (kkingrea@aol.com), Kathleen Weeks (weeksK@icdurham.org), and Cynthia Rains (rainsC@icdurham.org), Immaculata Catholic School, Durham, NC
Teachers from STEM and non-STEM disciplines share projects and procedures that helped them achieve STEM certification. Take home ready-to-use project plans and assessment ideas.

Electronic Circuits and Adopting a Maker Mind-Set
(Grades 4–College)  119B, Convention Center
Rebecca Abramson, Educational Maker, Springfield, MA
Electronics are everywhere, but which ones are right for your classroom? Find out how to pick the technology that’s the best fit and how to learn the “language” to teach it.

STEM to Engage Emerging Bilingual Students
(Grades 6–8)  307, Convention Center
Michele Schuler (@schulerScience; mlschuler@aacps.org), Anne Arundel County Public Schools, Annapolis, MD
Every teacher is a language teacher! Find out how STEM pedagogy across content helps to build academic language for emergent bilingual students.
Thursday, 11:00 AM–12 Noon

Marathon Races and Water Drinking Contests: The Effects of Osmosis on the Cell
(Grades 9–12) 125, Convention Center
Cahleen Shrier (cshrier@apu.edu), Azusa Pacific University, Azusa, CA
Learn about an osmosis lab using a novel, inexpensive, non-toxic cell “model” in the context of a marathon runner and a water drinking contestant.

From Zero to STEM Hero—A District’s Journey to Introducing STEM in High Schools
(Grades 9–12) 126B, Convention Center
Krystal Briley (ksuthe@rocketmail.com) and Marielle Myers (@marielle_myers; marielle.myers@cpsb.org), Calcasieu Parish School Board, Lake Charles, LA
In a district with zero opportunity for STEM exposure in high school, one teacher was able to start a program at her school from the ground up that led to providing 3D-printed prosthetic devices for local children in the district. Hear about her journey, including gaining approval to offer the course, building a STEM curriculum, securing funds for essential STEM equipment, discovering the benefits of community outreach, and much more.

Sustaining Integrated STEM: The Essential Elements of Success for One Middle School Team
(Grades 4–College) 304/VIP, Convention Center
Meg Gardner (mgardner@colgate.edu), Colgate University, Hamilton, NY
Discussion centers on an investigation of one public middle school teacher team that reimagined traditional instruction to interconnect STEM disciplines using a novel curriculum, space, and time.

Evaluate Your Sessions Online!
Help NSTA’s GREEN efforts by completing session evaluations on our conference app July 11–23, 2018, while the session is fresh in your mind!
(See page 8 for details.)
How to Grow STEAM/STEM in Your School and Community
(Grades K–12) 118A, Convention Center
Emily Loving (@scienceCCPS; emily_loving@ccpsnet.net) and Marsha Rogers (marsha_rogers@ccpsnet.net), Chesterfield County Public Schools, Midlothian, VA
Explore the journey one division took to grow a division-wide STEAM event from 150 students to over 1,400 students in just three years. Get ideas and tips from what we’ve learned that can help you grow STEAM/STEM in both your schools and community.

Unleashing the Next Innovation Generation: How Innovations and Their Stories Engage Students in Problem-Based Learning
(Grades 4–9) 120B, Convention Center
Lucie Howell (lucieh@thehenryford.org), The Henry Ford, Dearborn, MI
Cheri Sterman (csterman@crayola.com), Crayola, Easton, PA
Let’s activate students’ STEM and 21st-century skills. Drawing on historical and contemporary innovations, participants will apply design thinking approaches to solve authentic real-world challenges.

Reimagining Spaces for STEAM: An Architecture Design Workshop
(Grades 3–12) 121B, Convention Center
Claire Gallagher, Georgian Court University, Spring Lake, NJ
Karina Ruiz (@ruizpdx; karina.ruiz@bric-arch.com), BRIC Architecture, Inc., Portland, OR
John Dale (jdale@hed.design), HED (Harley Ellis Devereaux), Los Angeles, CA
Work with a team of architects to design a space that will best support STEAM learning outcomes. Explore best practices in the design of learning environments and study exemplar spaces for the teaching and learning of science.

Explore Building Mousetrap Vehicles to Integrate Science, Technology, Engineering, and Mathematics
(Grades 9–College) 122A, Convention Center
Karen Ostlund (@karen_ostlund; klostlund@utexas.edu), 2012–2013 NSTA President, and The University of Texas at Austin
Alden Balmer, McNeil High School, Austin, TX
Build a mousetrap vehicle and discover how to integrate science, technology, engineering, and mathematics (STEM) by modifying variables to increase speed or distance traveled.

Looking to STEM to Cure Diabetes and Breast Cancer
(Grades 9–12) 122B, Convention Center
Jeffrey Lukens (jeffreylukens0613@gmail.com), Sioux Falls (SD) School District
Presider: Marwa Abd Elwahed Tawfik, Maadi STEM School for Girls, Cairo, Egypt
What once was wishful thinking is becoming more real by the day. Top researchers are making strides in the treatment and cure of Type 1 diabetes and breast cancer. Come experience the heroics of today’s research scientists.

Who Is Drowning in Our Trash?
(Grades 9–12) 123, Convention Center
Jessica Kohout (@MrsKohout; jessica_kohout@hcpss.org), Reservoir High School, Fulton, MD
Stacy Thibodeaux (@stacythib; stribodeaux@gmail.com), Southside High School, Youngsville, LA
Create the next generation of STEM leaders through 3-D learning by solving a real-world problem using engineering design and solutions.

Polymers: Teaching “Hard” Concepts with Gooey Labs
(Grades 7–12) 126A, Convention Center
Debbie Goodwin (nywin@hotmail.com), Retired High School Science Teacher, Chillicothe, MO
Enhance and deepen science and math concepts taught in traditionally “fun” polymer labs. Add more scientific processes to make them inquiry-based. Take home a CD of information.
Thursday, 11:00 AM–12 Noon

11:00 AM–12 Noon  Exhibitor Workshops
The Process of Science: Modeling How Science Develops
(Grades 5–College)  103A, Convention Center
Sponsor: 3D Molecular Designs
Gina Vogt (gina.vogt@3dmoleculardesigns.com), 3D Molecular Designs, Milwaukee, WI
Karen Avery, Montoursville Area High School, Montoursville, PA
Keri Shingleton, Holland Hall, Tulsa, OK
How do we learn about things we cannot see? Explore innovative 3D models that foster student knowledge about the process of discovery and how scientists learn about things they often cannot directly perceive. Use reverse engineering and tangram puzzles that encourage understanding about the ever-changing world of science.

Drive the Future of Coding with mBot
(Grades 3–12)  105 A/B, Convention Center
Sponsor: Vernier Software & Technology
David Carter (info@vernier.com), Vernier Software & Technology, Beaverton, OR
Come explore the fundamentals of coding with mBot, an app-enabled, programmable robot. In this hands-on workshop, use your science, mathematics, and problem-solving skills to navigate mBot. Preview Vernier’s Coding with mBot: Self-Driving Vehicles activities module while learning mBot’s simple block-based programming software.

NGSS—Designing Ocean Breakwaters
(Grades 6–8)  107 A/B, Convention Center
Sponsor: Lab-Aids, Inc.
Denis Baker, Lab-Aids, Inc., Ronkonkoma, NY
Use new tools to model the effect of ocean waves on a cliff as you design and test breakwater structures to prevent beach erosion. Strong support for middle level NGSS engineering practices provided. Supports Developing a Model, Designing Solutions, Engaging in Argument from Evidence, and CCSS ELA. From the SEPUP Middle School Land, Water, and Human Interactions unit, 3rd ed.—redesigned for NGSS. Supports MS-ESS3-3 and ETS1-2, ETS1-3.

Are You Moody?
(Grades 6–12)  109 A/B, Convention Center
Sponsor: Texas Instruments
Fred Fotsch, Texas Instruments, Dallas
We will bring science and coding together as participants learn to do some basic coding (no experience necessary) while developing a mood ring! The science of color mixing is explored while determining the right body temperature thresholds. Is fuchsia flirty? Should green be groovy? It’s up to you!

Claim-Evidence-Reasoning (CER): Scientific Explanation Ideas for ESL and Bilingual Science
(Grades 3–12)  112 A/B, Convention Center
Sponsor: STEMscopes
Pam O’Brien (pobrien@acceleratelearning.com), STEMscopes, Mechanicsville, VA
CER is a way for students to explain observed phenomena in a scientific way and discover how observations and data from an investigation are connected to science knowledge. Change how lab instructions are conducted and make science investigations meaningful for students. ELD strategies will be shared and modeled for an equitable learning environment.

Monday Morning STEM Activities for Your Middle School Classroom!
(Grades 5–8)  113A, Convention Center
Sponsor: Nasco
Jordan Nelson, Nasco, Fort Atkinson, WI
Alan Gomez, The STEM Academy®, Park City, UT
Join us for this hands-on workshop featuring classroom activities that support NGSS and state standards. Free access to hundreds of hours of ready-to-go activities and content to all who attend!
1:30–2:30 PM  Featured Panel
Leading for STEM Success: Leadership Practices for a Successful STEM Learning Environment
(General)  118B, Convention Center
Moderator: Damaries Blondonville (da.blondonville@pgcps.org; dblondy35@gmail.com), Project Manager, Prince George’s County Public Schools, Oxon Hill, MD

Panelists:
Kim Cherry Burnett (kim.cherry@dc.gov), Deputy Chief, STEM Office of Teaching and Learning, District of Columbia Public Schools, Washington, DC
Johann Lee (johann.lee@dc.gov), Principal, Kimball Elementary School, Washington, DC
Carlos Covarrubias (carlos.covarrubias@venturausd.org), Former Principal, E.P. Foster STEM Academy, Ventura, CA

The panel will focus on the leadership behaviors necessary to lead successfully in a STEM learning environment. Whether you are a school-based administrator, directing a district-level STEM program, or coordinating an after-school STEM program, there are unique challenges and needs regarding each. The leadership skill and content proficiency of the individual plays a pivotal role in the district performance and the overall success of the educators delivering the instruction and ultimately the achievement of the students engaging in the learning. The goal of this discussion is to unpack and share the successful leader behaviors and practices that support the overall efforts of a STEM program’s mission and vision.

1:30–2:30 PM  Presentations

Scaling Up STEM: A Countywide Approach
(Grades K–6)  102B, Convention Center
Ed Gooch (@edgoochSTEM; ed_gooch@iu13.org) and Rachael Haverstick (@rach_haverstick; rachael_haverstick@iu13.org), Lancaster-Lebanon IU13, Lancaster, PA
Hear how various community partners are collaborating to spread STEM education across Lancaster County, Pennsylvania, using the Engineering by Design TEEMS resource.

Creating a Robotics Curriculum from Nothing
(Grades 9–12)  103C, Convention Center
Andy Wilcox (awilcox@rockhursths.edu), Rockhurst High School, Kansas City, MO
Hear how Rockhurst High School researched and continues to develop its current robotics curriculum and how it can be a model for others.

STEM for ALL Students: Addressing Diversity and Equity
(Grades K–12)  116, Convention Center
Jen Gutierrez (@jengutierrez18; jengutierrez63@gmail.com), IntegratedSTEMk12, LLC, Chandler, AZ
Discussion centers on the critical importance of addressing the diverse and unique learning needs of all students in STEM education.

Publish in an NSTA Journal
(General)  117, Convention Center
Ken Roberts (ken_r@nsta.org), Assistant Executive Director, Journals, NSTA, Arlington, VA
Linda Froschauer (fro2@me.com), 2006–2007 NSTA President, Pasadena, CA
Patty McGinnis (@patty_mcginnis; pattymcginnis1@gmail.com), Arcola Intermediate School, Eagleville, PA
Elizabeth Barrett-Zahn, Columbus Elementary School, New Rochelle, NY
Meet with the editors of NSTA’s award-winning journals to learn how to successfully prepare and submit an article for publication.
Thursday, 1:30–2:30 PM

**From Class to Club to Culture: STREAM**  
(Grades P–8)  
119A, Convention Center  
Judith Deeley (@deeleyju; jdeeley@gacsfl.com), Guardian Angels Catholic School, Clearwater, FL  
Hear how a preK–8 school embraces the challenge of becoming a certified STREAM school. Discussion centers on goals, strategies, sample lessons, and learning experiences related to this cultural shift.

**NSTA Press® Session: Argument-Driven Inquiry in Middle School: Promoting Science Proficiency by Transforming Lab Activities**  
(Grades 6–8)  
119B, Convention Center  
Victor Sampson (@drvictorsampson; victor.sampson@utexas.edu), The University of Texas at Austin  
ADI is an innovative instructional model based on current research on how people learn science, and is designed to foster the development of science proficiency.

**Lights, Camera, Science!**  
(Grades 6–8)  
120C, Convention Center  
Steven Gaskill (gaskisg@nv.ccsd.net) and Heather Rampton, K.O. Knudson Middle School, Las Vegas, NV  
We will present methods to integrate video and science standards, with examples from middle school engineering design challenges, data collection, and particle and molecular modeling.

**NCTM Session: Making the Most of the M in STEM—Mathematics, Modeling, and More**  
(General)  
121A, Convention Center  
Cathy Seeley (@cathysseeley; cseeley@utexas.edu), Speaker/Author/Consultant, Austin, TX  
Every preK–12 student needs STEM knowledge, starting with quantitative reasoning and scientific thinking. Help all students think, reason, and solve problems in math, STEM, and more.

**Yes, You Can! Tips and Tricks for Presenting at an NSTA Conference**  
(General)  
125, Convention Center  
Jennifer Williams (@ScienceJennifer; jenniferwilliams@newmanschool.org), Isidore Newman School, New Orleans, LA  
Dedric McGhee (@dedricmcghee; mcgheed@scsk12.org), Shelby County Schools, Memphis, TN  
Adriana Guerra (adriana.guerra@venturausd.org), E.P. Foster STEM Academy, Ventura, CA  
So you have this great idea! Now what? Learn from present and past STEM Forum & Expo steering committee members on how to take a successful classroom activity, strategy, or lesson and turn it into a successful proposal and presentation worthy of being presented at a future NSTA conference.

**How Are You Hearing Me? Engaging Students in a 3-D NGSS Learning Progression About Cell Phones**  
(Grades 9–12)  
126B, Convention Center  
Bradford Hill (@sciencebradford; bradford_hill@beaverton.k12.or.us), Mountainside High School, Beaverton, OR  
The phenomenon—on speaker phone a student asks “How are you hearing me?” That launches us into a learning progression that targets the NGSS Waves performance expectations.

**Students as Creators**  
(Grades 1–11)  
304/VIP, Convention Center  
Denise Wright (@DenisecWright; ienjoyteaching@gmail.com), Horry County Schools, Myrtle Beach, SC  
Review virtual tools that allow science students to be creators instead of consumers of content. Discussion centers on tools, such as augmented reality, digital science storytelling, and explaining and diagramming models. The emphasis of providing student choice will be highlighted.
1:30–2:30 PM  Hands-On Workshops

Creating a Sustainable Future: STEM Interdisciplinary Decision-Making with Model-Eliciting Activities
(Grades K–5)  113B, Convention Center
Deborah Kozdras (@USFStavros; dkozdras@usf.edu), University of South Florida, Tampa
Christine Angel Danger (@AngelDanger10; angeldanger10@gmail.com), Hillsborough County Public Schools, Thonotosassa, FL
If kids ruled the world, what would they do? We will provide Model-Eliciting Activities (MEAs), interdisciplinary lessons where students make evidence-based decisions about real-world sustainability problems.

Developing STEM Skills Outside of the School Day
(Grades P–3)  113C, Convention Center
Saundra Wever Frerichs (@SaundraFrerichs; sfrerichs3@unl.edu), University of Nebraska–Lincoln Extension 4-H
Karly Black (@karlyrblack; karly.black@unl.edu), University of Nebraska at Lincoln
Learn how to implement the Click2Science approach to ongoing blended professional development to improve the STEM facilitation skills of staff in OST programs.

Growing a STEM Culture
(Grades P–5)  115B, Convention Center
Christine Ramirez (@MissRamirez01; christine_e_ramirez@mcpsmd.org), Kemp Mill Elementary School, Silver Spring, MD
Joanne Robbins (@JoD1018; joanne_d_robbins@mcpsmd.org), Georgian Forest Elementary School, Silver Spring, MD
Zulay Joa (@Zulay81203344; zulay_joa@mcpsmd.org), Glenallan Elementary School, Silver Spring, MD
Join us and gain a perspective from three different STEM start-up programs. We will share a range of STEM-based implementations that engage students, families, and community.

Equity in Engineering Education
(Grades 3–12)  121C, Convention Center
Gina Tesoriero (@Miss_STEM; ginateso@uw.edu), University of Washington, Seattle
Amanda Solarsh (amandasolarsh@gmail.com), Simon Baruch MS104, New York, NY
Ensure that all students have a voice during the design process and access to the development of skills needed to empower them to contribute to the multicultural society.

STEM+Computational Thinking
(Grades K–8)  115C, Convention Center
Ying Zhang (@Phoenix_SH; 1462417753@qq.com) and Fang Ruan (1308003121@qq.com), Shanghai STEM+ Research Institute
Join in for hands-on STEM+CT activities, intriguing findings, and featured stories from a five-year empirical research conducted in 200 Shanghai schools.

Children’s Literacy Success with NSTA’s Publications!
(Grades P–5)  120B, Convention Center
Shelley Lee (leeshe@uwstout.edu), 1995–1996 NSTA President, and University of Wisconsin–Stout, Menomonie
Forrest Schultz (schultzf@uwstout.edu) and Emily Hines (hines@uwstout.edu), University of Wisconsin–Stout, Menomonie
LeRoy Lee (leroy@wisconsinscience.net), 1986–1987 NSTA President, and Wisconsin Science Network, DeForest
Achieving children’s literacy through science is not an easy task. But the secret is using NSTA’s publications: eBooks+ and Teaching Science Through Trade Books.

Working It Out! STEM It!
(Grades 6–8)  121B, Convention Center
Judith Lucas-Odom (@Judith_Odom; judyps23@yahoo.com), Chester High School, Chester, PA
Encounter strategies that make using STEM easier! Get the “How” and connections to incorporate STEM in every classroom!
Thinking Outside of the [Nest] Box: STEM Engagement Focused On Nesting Birds
(Grades 5–8) 122A, Convention Center
Robyn Bailey (@NestWatch; nestwatch@cornell.edu) and Holly Faulkner, The Cornell Lab of Ornithology, Ithaca, NY
Capture students’ imagination with a birdhouse (aka “nest box”). We’ll demonstrate engaging activities from The Cornell Lab of Ornithology’s new STEM curriculum that connects birds’ nests to the NestWatch citizen science project.

Infiniscope Teaching Network: Providing Authentic STEM, Interactive, Web-Based Learning Experiences Using NASA Data and Imagery
(Grades 5–12) 309/310, Marriott
Jessica Swann (@etx_infiniscope; jlswann@asu.edu), Arizona State University, Tempe
Bring your own device and explore the Infiniscope Teaching Network, providing free, collaborative, compelling, NGSS-focused learning experiences using NASA data and imagery.

Making Time for Independent Inquiry
(Grades 9–12) 123, Convention Center
Cecilia Tang (@ctangscience) and John Politano (politaj@garnetvalley.org), Garnet Valley High School, Glen Mills, PA
Finding time for students to develop their independent research skills is challenging. Discussion centers on best practices for increasing open-ended investigations in both introductory and AP biology courses.

NABT and BSCS Present: Identify and Interpret—A Strategy to Help Students Make Sense of Difficult Information
(Grades 10–12) 124, Convention Center
Jaclyn Reeves-Pepin (@jreevespepin; jreevespepin@nabt.org), National Association of Biology Teachers (NABT), Warrenton, VA
A key tool from the BSCS/NABT Biology Teacher Academy, the powerful Identify and Interpret (I2) strategy can be used in any STEM classroom to help students make sense of the information presented in graphs, complex figures, and data tables.

The Uncultivated Relationship
(Grades 8–12) 126A, Convention Center
Anthony Meals (@Mr_Meals; ameals@usd384.org) and Ruth Lehmann Hutson (hutsonruth@gmail.com), Blue Valley High School, Randolph, KS
Jay Super (jsuper@usd266.com), Maize High School, Maize, KS
Science and agricultural educators have the same goal: prepare students to apply scientific principles to solve real-world problems. So let’s do it together!

AACT Session: Incorporating Simulations, Animations, and Videos into Your Chemistry Curriculum
(Grades 9–12) 307, Convention Center
Kimberly Duncan (@chemduncan; @AACTconnect; kimberly.z.duncan@gmail.com), American Association of Chemistry Teachers, Washington, DC
Learn about simulations, animations, and videos from the American Association of Chemistry Teachers (AACT) that you can use to introduce/reinforce chemistry topics for your students.
1:30–2:30 PM  Exhibitor Workshops

“Going with the Flow” of Genetic Information
(Grades 8–College)  103A, Convention Center
Sponsor: 3D Molecular Designs
Keri Shingleton, Holland Hall, Tulsa, OK
Karen Avery, Montoursville Area High School, Montoursville, PA
Gina Vogt (gina.vogt@3dmoleculardesigns.com), 3D Molecular Designs, Milwaukee, WI
Guide your students in the development and use of models as tools for “making sense” of phenomena. Learn how to help your students “think with models” to explain the cellular processes of transcription and translation as they relate to a genome sequencing molecular story. Handouts!

Classroom to Code Room: Integrating Core Content, Creativity, and Imagination
(Grades 3–College)  103B, Convention Center
Sponsor: UBTECH Robotics, Inc.
Jeff Piontek (jeff.piontek@ubtechedu.com), UBTECH Robotics, Inc., Los Angeles, CA
Make, design, program, and play while exploring the elements of our robotics and makerspace kits. Learn from the industry leader in humanoid robotics using our NGSS- and CCSS-focused curriculum to foster innovation and creativity in STEM.

Wonders of Electrons Workshop by Mand Labs
(Grades 5–College)  104 A/B, Convention Center
Sponsor: Mand Labs
Gurpawan Mand (mand@mandlabs.com), Mand Labs, Phoenix, AZ
Convert your classrooms into one electronic playground. Join the founder of Mand Labs KIT-1 and learn to create interesting hands-on projects based on electrical science and electronics, such as automatic night lamp, touch-activated switch, and many more. The goal is to help teachers in demonstrating abstract concepts of physics.

Explore the New FREE STEM Curriculum by the U.S. Government
(Grades 4–12)  105 A/B, Convention Center
Sponsor: STEM Lessons Based on GPS
John Johnson, U.S. Government Contractor, Columbia, MD
The U.S. government wants your feedback on its new GPS-STEM curriculum. This curriculum promotes interest in STEM by combining NGSS with fun everyday uses of GPS! Together we’ll explore the inquiry-based lessons, low-cost activities, and highlights of STEM careers across topics related to Earth, space, and life science, and movement.

Improve Students’ STEM Competencies with Personalized Online Labs That Grade Themselves
(Grades 4–10)  107 A/B, Convention Center
Sponsor: Inq-ITS an Apprendis product
Janice Gobert, Rutgers University, New Brunswick, NJ
Online labs that grade themselves can help your students master science inquiry practices, data literacy, mathematics, and computational thinking while conducting inquiry about science phenomena. Join Janice Gobert, professor at Rutgers Graduate School of Education, to learn how you can inform your instruction with these ready-to-go formative assessments. BYOD!

When the Wheels Are Turning, the Students Are Learning!
(Grades 6–12)  109 A/B, Convention Center
Sponsor: Texas Instruments
Fred Fotsch, Texas Instruments, Dallas
Get up to speed on coding! Appropriate for middle school or high school, this session will bring coding and hands-on engagement together as you learn how to program a robotic vehicle (called a Rover) to perform different challenges. Code your rover to navigate an obstacle course, play a song while traveling from one place to another, or make it investigate a model of Martian terrain just like the Curiosity rover! No coding experience is necessary.
Teaching Science Through Conservation  
(Grades K–8) 111 A/B, Convention Center  
Sponsor: U.S. Fish and Wildlife Service  
Catherine Gatenby (catherine_gatenby@fws.gov) and Denise Wagner (denise_wagner@fws.gov), U.S. Fish and Wildlife Service, Elkins, WV  
Bianna Patrick (bianna_patrick@fws.gov), U.S. Fish and Wildlife Service, State College, PA  
Adrienne McGill (adrienne_mcgill@fws.gov), U.S. Fish and Wildlife Service, Amargosa, NV  
Susan Morse (susan_morse@fws.gov), U.S. Fish and Wildlife Service, Falls Church, VA  
Energize your students with some great materials from the U.S. Fish and Wildlife Service to help you teach science and bring nature and conservation into your classes! Join us as we explore lesson plans and techniques to connect your students with migratory fishes, birds, and more just outside your doors.

STEM Teacher–Science Teacher: What’s the Difference?  
(Grades 3–12) 112 A/B, Convention Center  
Sponsor: STEMscopes  
Virginia Rhame (vrhame@nise.institute), National Institute for STEM Education, Houston, TX  
Distinguishing between science and STEM is important as teachers integrate STEM in their practice. Join us to discuss the unique nature of STEM, the research-based instructional strategies necessary to support its outcomes, and a STEM certification pathway that encourages self-reflection and growth in STEM teaching.

Award-Winning STEM Enrichment Program for Grades 4–8  
(Grades 4–8) 113A, Convention Center  
Sponsor: Flinn Scientific, Inc.  
Janet Hoekenga, Flinn Scientific, Inc., Batavia, IL  
Discover FlinnSTEM Powered by IMSA Fusion created by leading educators from the internationally recognized Illinois Math and Science Academy®. The 14 modules, each offering 32 hours of instruction, integrate with STEM courses or after-school STEM programs. Interactive lessons blend inquiry-based student content and teacher professional development.

3:00–4:00 PM Presentations

May the Force Be with You: A STEM Wars Night to Remember!  
(General) 102A, Convention Center  
Jennifer Meadows (@meadowsjr007; jrmeadows@tntech.edu), Meghan Clemons (@TeachMHamilton; mpengland21@students.tntech.edu), and Faith Gipson (@FaithGipson; fgpison42@students.tntech.edu), Tennessee Tech University, Cookeville  
Leverage collaboration with a local university to create a middle school STEM family engagement event with intergalactic style!

Using Models to Teach Forensics: Crime Scene Blood Spatter Evidence Tells a STEM Story  
(Grades 8–College) 103C, Convention Center  
Anthony Bertino (abertino@nycap.rr.com), Retired Educator, Schenectady, NY  
Patricia Nolan Bertino (nolanp@nycap.rr.com), Retired Educator, Schenectady, NY  
Using inexpensive models, apply math and physics to blood’s direction, impact angle, convergence, and origin. Determine if evidence is consistent with eyewitness accounts. Handouts.

Mars Rover Simulation: Integrating STEM into the Curriculum in a Meaningful Way  
(Grades 3–8) 116, Convention Center  
Adam Sherland (sherlanda@ensworth.com), Ensworth Lower/Middle School Campus, Nashville, TN  
Welcome to mission control! Probe how we created a comprehensive grade 5 project to integrate multiple disciplines in an immersive STEM experience.

Enhancing STEM Outcomes: Recognizing and Removing Hidden Learning Barriers  
(General) 117, Convention Center  
Maria Sargent (msargent@ashland.edu), Ashland University, Ashland, OH  
Discussion centers on recognizing neurological processing disorders that reduce STEM outcomes, such as challenges related to visual, auditory, or sensory processing; reading (irlen, timing dysfunction); as well as dyscalculia and dysgraphia. Simulations used to enhance understanding will be shared.
**NGSS Transition Boot Camp**  
(Grades K–8)  
118B, Convention Center  
Adriana Guerra (adriana.guerra@venturausd.org), Carlos Covarrubias (carlos.covarrubias@venturausd.org), Rebecca Haystead (rebecca.haystead@venturausd.org), Elizabeth Walker-Martinez (@epfoster18; elizabeth.walkermartinez@venturausd.org), and Frances Flores (frances.flores@venturausd.org), E.P. Foster STEM Academy, Ventura, CA  
Jena Branstetter (@MrsBranstetter; jena.branstetter@venturausd.org), Balboa Middle School, Ventura, CA  
We will demonstrate how to leverage the power of a Professional Learning Community to move forward with a school’s transition to the Next Generation Science Standards.

**Integrating Science Process and Math Skills Through Citizen Science and Schoolyard Investigations**  
(Grades 3–8)  
121A, Convention Center  
Kelly Schaeffer (@BirdSleuth; kms448@cornell.edu), The Cornell Lab of Ornithology, Ithaca, NY  
Meeting science and math standards go hand in hand with student investigations and citizen science. Motivate students with birds, schoolyard projects, and real data using free resources.

**NCTM Session: Catalyzing Change in High School Mathematics: Initiating Critical Conversations**  
(Grades 9–College)  
118C, Convention Center  
Karen Graham (karen.graham@unh.edu), University of New Hampshire, Durham  
Hear about key recommendations and implications of NCTM’s recent publication, Catalyzing Change in High School Mathematics, as well as discussion of next steps.

**STEM Teaching for Dummies: How to Build a STEM Kid Using Nothing But Who’s Already in Your Class**  
(Grades 3–12)  
119A, Convention Center  
Karla Smith (karlasmith@dallasisd.org), Dallas (TX) ISD  
Carlos Quezada (quezadaesparza@dallasisd.org), John J. Pershing Elementary School, Dallas, TX  
Discover how a growth mind-set and transformational teaching can increase involvement and success of inner city Hispanic and African American students in STEM classrooms.

**Ebola Virus: Biology and the Epidemiology of a Virus to Be Used as a Teaching Guide**  
(Grades 11–College)  
125, Convention Center  
Laura Lorentzen (llorentz@kean.edu) and Kristie Reilly (kreilly@kean.edu), Kean University, Union, NJ  
We will share an easy-to-use resource document for academics who teach college freshman or AP biology to incorporate into a unit lesson on viruses.

**“Try Everything” Access to All: Projects in Physics Classes That Are Conceptual, Problem Based, and Advanced**  
(Grades 9–12)  
126B, Convention Center  
Carol O’Brien (@CarolAOBrien1; cobrien@haverford.org), The Haverford School, Haverford, PA  
An equation alone won’t solve a problem. Out-of-the-box thinking increases if you provide questions, supplies, and expectations of teamwork. Inquisitive, critical-thinking, communicative problem-solvers emerge!

**From Guitars to Renewable Energy—Engaging Students in Rigorous Energy Phenomena**  
(Grades 6–College)  
304/VIP, Convention Center  
Parker Mullins (@cebrightfutures; pmullins@b-e-f.org), Bonneville Environmental Foundation, Portland, OR  
Bradford Hill (@sciencebradford; bradford_hill@beaverton.k12.or.us), Mountainside High School, Beaverton, OR  
Join us as we explain how engineering simple amplifiers and electric guitars prepared students to develop regional energy plans and clean energy initiatives.

**Getting to the HEART of Biomedical Engineering**  
(Grades 9–College)  
309/310, Marriott  
Sarah Rivera (@SarahRiveraSTEM; riveras@perry-lake.org), Perry High School, Perry, OH  
Learn about the engineering design process applied to a biomedical science class’s hands-on project involving the human heart.
Thursday, 3:00–4:00 PM

3:00–4:00 PM  Hands-On Workshops

Creating High-Quality STEM Integration Learning Experiences for Students
(Grades 4–8)  115B, Convention Center
Jeffrey Kohoutek (jeffrey.kohoutek@spps.org), Crossroads Elementary School, Saint Paul, MN
Andrea Appel (andrea.appel@spps.org), Saint Paul (MN) Public Schools
Come participate in an engaging activity that combines STEM, evidence-based reasoning, problem solving, and other skills. You’ll learn how to authentically integrate engineering into your science curriculum.

Mystery River
(Grades 4–7)  115C, Convention Center
Kate Tummino (katelease@hotmail.com), Frostburg State University and Mt. Savage School, Cumberland, MD
Get hands-on experience with investigating the causes and effects of water pollution. Some activities include creating a polluted river, reading and using map skills, designing 3D objects in Tinkercad, using a 3D printer, writing an action proposal, and much more.

Talk the Talk: Building Science Vocabulary in STEM Experiences
(Grades K–2)  118A, Convention Center
Cynthia Gardner (ccg623@gmail.com), Maryville College, Maryville, TN
Chris Sacerdote, Lander University, Greenwood, SC
Isthmus…peninsula…gulf? Oh, My! How can we build science vocabulary in the context of STEM experiences?

Building Engineers Through Block Play
(Grades P–5)  120B, Convention Center
Heidi Usgaard (husgaard@scc.k12.wi.us), St. Croix Central Elementary School, Roberts, WI
Presider: Shelley Lee (leeshe@uwstout.edu), 1995–1996 NSTA President, and University of Wisconsin—Stout, Menomonie University
Use block play to build engineering practice in the primary classroom. While examining the importance of block play, we will understand the STEM connection block play builds.

Real-World Problem Solving with Creative Circuits and “Shark Tank”
(Grades 6–9)  121C, Convention Center
Amanda Solarsh (amandasolarsh@gmail.com), Simon Baruch MS104, New York, NY
Gina Tesoriero (@Miss_STEM; ginateso@uw.edu), University of Washington, Seattle
Delve into how to incorporate science content and real-world problem solving into an innovative classroom design challenge with the Shark Tank Circuit Challenge.

Engineering Design in Middle School Chemistry
(Grades 6–8)  122A, Convention Center
James Kessler, American Chemical Society, Washington, DC
Using the free resource, middleschoolchemistry.com, learn how to help students engage in engineering design to solve a problem by using and refining chemical reactions that release energy.

Using Cooperative Controversy to Shift Conceptualizations
(Grades 9–College)  123, Convention Center
Jessica Cellitti (jmn334@drexel.edu), Penny Hammrich (psh33@drexel.edu), and Jonan Donaldson, Drexel University, Philadelphia, PA
High school teachers will be given a chance to engage in a simple but effective strategy called Cooperative Controversy that has been used to shift conceptualizations of science and uncover misconceptions. After participating themselves, teachers will be given the tools to use this strategy for a variety of interdisciplinary STEM topics in their own classrooms.

WIDA Session: Engaging Language Learners in Science and Engineering
(Grades 1–12)  124, Convention Center
Kira Cunningham (#WIDA; kira.cunningham@wisc.edu), University of Wisconsin–Madison
Explore the latest strategies to engage English language learners in the science and engineering practices.

STEMLogs: Bringing Grades 1–5 Science Notebooks to the Next Gen Level
(Grades 1–5)  307, Convention Center
Tamara Frailey (@NavEd_Tami; tjfrailey@gmail.com), NavEd Productions LLC, St. Petersburg, FL
Engineer a model STEMLog and get your students thinking critically, creatively, and collaboratively! Foster ingenuity and inspire even the most reluctant writers.
3:00–4:00 PM  Exhibitor Workshops

Attract Students to Water Concepts with Magnetic Water Molecule Models
(Grades 5–College)  103A, Convention Center
Sponsor: 3D Molecular Designs
Gina Vogt (gina.vogt@3dmoleculardesigns.com), 3D Molecular Designs, Milwaukee, WI
Karen Avery, Montoursville Area High School, Montoursville, PA
Keri Shingleton, Holland Hall, Tulsa, OK
Engage students by modeling chemical and physical properties of water using hands-on/minds-on magnetic water molecules. Experiment with liquids to enhance model-based understanding of real-world phenomena. Explore common water phenomena such as density, solubility, cohesion, and adhesion. Evaluate student understanding as they create and communicate their own 2D models.

Zombie Attack!
(Grades 6–12)  109 A/B, Convention Center
Sponsor: Texas Instruments
Fred Fotsch, Texas Instruments, Dallas
Get ready as you are immersed in the post-apocalyptic world that is infected with ZOMBIES! You must use your creativity and ingenuity to come up with a solution to a zombie attack! With a basic understanding of frequency and sound and a quick introduction to some basic programming on a calculator, you may just be able to thwart the…Zombie Attack!

4:30–5:30 PM  Keynote Presentation
Lessons from Space
(General)  Ballroom B, Convention Center
Sponsored by Penguin Random House
Mike Massimino, Author, Former NASA Astronaut, and Professor of Professional Practice, Columbia University, New York, NY
Welcome: Christine Anne Royce, NSTA President, and Shippensburg University, Shippensburg, PA
Mike Massimino’s childhood fascination with space was born the day Neil Armstrong set foot on the Moon, but his journey to becoming an astronaut was as unlikely as it is compelling. With his book, Spaceman: An Astronaut’s Unlikely Journey to Unlock the Secrets of the Universe, he has written an inspiring ode to following your dreams and finding your place in this world—or out of it. Mike’s journey began in a blue-collar town and then soared to the Hubble Telescope—1.86 million feet above Earth. He’ll share the surreal wonder and beauty of space and take the audience into a world where science meets thrilling adventure, focusing on persistence and teamwork and revealing what having “the right stuff” really means.
Dating back to 1702, Philadelphia’s Elfreth’s Alley is touted as “our nation’s oldest residential street.”
8:00–9:00 AM  Featured Panels

**Recruiting and Retaining Minorities and Women in Engineering**  (General)  118B, Convention Center

**Moderator:** Nancy R. Martin (nancy@nancymartin.com), Nancy R. Martin Consulting, LLC, Niskayuna, NY

**Panelists:**
- Karen Johnsen, Early Talent Program Manager, GE Healthcare, Milwaukee, WI
- Andrew Reid, Senior Planning Analyst, Con Edison, New York, NY
- Karen Davis (kmdavis01@syr.edu), Director, Career Services, College of Engineering and Computer Science, Syracuse University, Syracuse, NY

There is so much written on this topic that many people think it is impossible to attract women and minorities in the STEM field. It isn’t. Come meet professionals who have successfully inspired women and minorities to join engineering and stay there. Learn what you can do as educators to keep your students interested in a STEM career and discover the lifelong benefits of careers in engineering. In particular, get ready to understand the lasting impact you make on your students, and why what you do right now matters the most.

**Design for Success: Engaging Diverse Learners in STEM**  (General)  118C, Convention Center

**Moderator:** Janella Watson (watson@childrensmuseum.org), Associate Director, Providence Children’s Museum, Providence, RI

**Panelists:**
- Dana Schloss, Director of Exhibit Experiences, and Satbir Multani (smultani@nysci.org), Design Lab Manager, NYSCI, Corona, NY
- Gina Tesoriero (ginateso@uw.edu), Graduate Research Assistant and PhD Student, Learning Sciences and Human Development, College of Education, University of Washington, Seattle
- Amanda Solarsh (amandasolarsh@gmail.com), Middle School STEM Educator, Simon Baruch MS104, New York, NY

Join a panel of educators from K–12 and museum settings as they share educator moves to create equitable STEM learning environments. Learn strategies to engage diverse learners in design engineering, making, and sensory-rich STEM exploration. Take part in active discussion with the panel and walk away with inspiration and practical approaches for using design and making to support all students.

**The STEM Influence on Autonomous Vehicles**  (General)  119A, Convention Center

**Moderator:** Seun Phillips (phillips12@michigan.org), Director, PlanetM, Michigan Economic Development Corp., Lansing

**Panelists:**
- Ajit Sharma, Advisor, Lime Lab, Detroit, MI
- Patrick Hillberg (patrick.hillberg@siemens.com), Solutions Architect, Workforce Development, Siemens PLM Software, Detroit, MI

Can you imagine driving next to a car on a highway without a driver or any passengers inside? There is a lot of conversation around connected and autonomous vehicles, but how exactly are we going to make this happen? It is estimated that the new driverless vehicle economy could be worth $800 billion by 2035 and $7 trillion by 2050. This has an immense impact on the economy and, most importantly, the STEM workforce. In order to bring driverless vehicles to life, we must understand human behavior and extrapolate unlimited amount of data to ultimately accomplish the key goal of increasing driver safety and saving lives. Join us as we talk about the technology, economy, and how STEM education plays a key role in making driverless vehicles a reality.

**Leveraging Partnerships to Ensure a Future-Ready Workforce**  (General)  119B, Convention Center

**Moderator:** J. Wesley Hall (hallj@battelle.org), Executive Director, STEMx at Batelle, Nashville, TN

**Panelists:**
- David Burns (burnsd@battelle.org), Director, Education Operations, Ohio STEM Learning Network/Battelle, Columbus
- Michael Stone (mstone@pefchattanooga.org), STEM Director of Innovative Learning, Public Education Foundation, Chattanooga, TN
- Jill Lansing (jill.lansing@suny.edu), Assistant Vice Chancellor, Empire State STEM Network, SUNY, Albany, NY

How do we prepare students for jobs that don’t yet exist? As leaders in education, we need to leverage every advantage at our disposal to ensure students’ coursework is relevant and that they have experiences in the community that build their understanding of the requirements for the jobs of tomorrow. Join leaders from across the country as they discuss innovative partnerships that are reshaping how students develop skills for success in future STEM careers and are laying the foundation for America’s future-ready workforce.
Friday, 8:00–9:00 AM

8:00–9:00 AM Presentations

**Teach Engineering Practices on the Cheap with Concrete**  
(Grades 7–12)  
103C, Convention Center  
Debbie Goodwin (nywin@hotmail.com), Retired High School Science Teacher, Chillicothe, MO  
Teach engineering using concrete and other composite materials. Discover inexpensive STEM projects that engage students using the #1 building material in the world. NGSS correlations.

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8:00–9:00 AM Hands-On Workshops

**Literature-Inspired STEM: Hands-On Activities That Connect STEM, Art, and the Environment**  
(Grades P–4)  
115A, Convention Center  
Kelly Schaeffer (@BirdSleuth; kms448@cornell.edu), The Cornell Lab of Ornithology, Ithaca, NY  
Explore free teacher-tested activities designed to engage diverse young learners through hands-on exploration, outdoor investigation, and multidisciplinary learning...all inspired by read-aloud children’s books.

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**Morning Meeting and Science Inquiry**  
(Grades P–5)  
115B, Convention Center  
Shelley Lee (leehe@uwstout.edu), 1995–1996 NSTA President, and University of Wisconsin–Stout, Menomonie  
Heidi Usgaard (husgaard@scc.k12.wi.us), St. Croix Central Elementary School, Roberts, WI  
Emily Hines (hinese@uwstout.edu), University of Wisconsin–Stout, Menomonie  
Begin to use the structure of a morning meeting to build on children’s natural sense of wonder about the world around them to increase science inquiry.

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**Robotics Education in Elementary Classrooms**  
(Grades 3–6)  
118A, Convention Center  
Chenghui Nie (felixme6@gmail.com), Robo Sensei Inc., Chicago, IL  
I’ll share best practices and challenges for teaching with various robots, including LEGO® WeDo construction kits, Dash the Robot, VEX, Jimu Robot, and RoboticsU…and their corresponding curricula in elementary classrooms.

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9:15 AM–3:00 PM Exhibits

Exhibit Hall C, Convention Center  
Come stroll through the exposition picking up tips, product samples, and ideas to spark your imagination. Please note that no sessions are scheduled today from 12 Noon to 1:30 PM during our exclusive exhibit hall hours.

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9:30–10:30 AM Presentations

**NSTA Press® Session: Need Money? Write a Grant!**  
(Grades P–12)  
102A, Convention Center  
Patty McGinnis (@patty_mcginnis; pattymcginnis1@gmail.com), Arcola Intermediate School, Eagleville, PA  
The author of Be a Winner! A Science Teacher’s Guide to Writing Successful Grant Proposals will share valuable ideas and tips for writing a successful classroom grant proposal.

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**The Role of Visionary Leadership in the Integration of Making into One School District: A Case Study**  
(Grades 6–12)  
102B, Convention Center  
Keith Trahan (keithtrahan@pitt.edu) and Cynthia Tananis, University of Pittsburgh, PA  
Review research findings on how school leaders integrated makerspaces and courses into their middle schools and high schools, creating an exciting atmosphere of innovation and learning.

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**Solids: The Neglected “State” of Chemistry**  
(Grades 7–12)  
103C, Convention Center  
Debbie Goodwin (nywin@hotmail.com), Retired High School Science Teacher, Chillicothe, MO  
Use solids to make chemistry more relevant for students. Hands-on STEM activities using solid materials (metals/polymer/ceramics) make concepts easier to teach/learn. NGSS correlations. Take home a CD of information.
**NSTA Press® Session: Argument-Driven Inquiry in the Elementary School Classroom: Promoting Science Proficiency by Transforming Lab Activities (Grades 3–5)**  
116, Convention Center  
**Victor Sampson** (@drvictorsampson; victor.sampson@utexas.edu), The University of Texas at Austin  
ADSI is an innovative instructional model based on current research on how people learn science, and is designed to foster the development of science proficiency.

**Building Underwater Robots (ROVs) in the Classroom**  
(Grades 6–12)  
120C, Convention Center  
**Maureen Barrett** (mbarrett@mtlaurelschools.org), Thomas E. Harrington Middle School, Mount Laurel, NJ  
Get an in-depth look at resources for remotely operated vehicles (ROVs) and discover how middle school students are exploring ocean technology by building ROVs in a STEM classroom.

**STEM Safari Saturdays: Family-Focused Learning Events for Young Children Supported by Preservice Teachers (Grades P–3/College)**  
117, Convention Center  
**Jane Baker** (jbakertntech.edu) and **Jennifer Meadows** (@meadowsjr007; jmmeadows@tntech.edu), Tennessee Tech University, Cookeville  
Preservice teachers and families with young children benefit from a morning of STEM learning. Join us for ideas for your own family STEM events!

**Argumentation and Explanations with CER and the KLEWS Chart (Grades 4–12)**  
121A, Convention Center  
**Kelly Moore** (@kellyramey; kellymoore@tntech.edu) and **Leslie Suters** (lsuters@tntech.edu), Tennessee Tech University, Cookeville  
We will explore how to use different student supports with argumentation and explanations in the STEM classroom to engage students in inquiry-based activities. Emphasis will be on using a CER (Claim, Evidence, and Reasoning) statement framework and a KLEWS (What do we KNOW, what are we LEARNING, what is our EVIDENCE, what do we still WONDER about, what SCIENCE principles/concepts help explain the phenomena?) chart.

**The Milwaukee Master Teacher Partnership: Enhancing Teacher Practice in Secondary Math and Science (Grades 9–College)**  
118C, Convention Center  
**Michael Steele** (steelem@uwm.edu), University of Wisconsin–Milwaukee  
I’ll describe the activities and outcomes of a five-year partnership between an urban school district and an urban research university focused on improving STEM teaching.

**NABT Presents: Giant Replica Animals—A Capstone Biology Project That Integrates STEM (Grades 9–12)**  
119A, Convention Center  
**Jennifer Pfannerstill** (jennifer.pfannerstill@gmail.com), North Shore Country Day School, Winnetka, IL  
Learn how students can use STEM skills to plan, build, and design the components of a larger-than-life replica of an animal, learning about the anatomy, physiology, and ecology of the animal as a capstone project.

**Where Are the Next Generation Science Standards in Pennsylvania? (General)**  
126B, Convention Center  
**Christine Anne Royce** (@caroyce; caroyce@aol.com), NSTA President, and Shippensburg University, Shippensburg, PA  
Pennsylvania science standards are now 16 years old. Discussion centers on why these standards are still in use, how we can change that, and why and how classroom teachers can take the lead to help make new science standards a reality in this era of STEM.

**Innovative Learning + Innovative Assessment in STEM (Grades 8–College)**  
304/VIP, Convention Center  
**Eric Walters** (@EWaltersScience; ewalters@marymountnyc.org), Marymount School of New York, NY  
Come learn about forward-thinking methodologies in teaching, learning, and assessment in the high school STEM curriculum.
Friday, 9:30–10:30 AM

Hands-On Workshops

**Discover the Interconnectedness of Human Sustainability and Earth’s Ecosystems with One Health!**
*(Grades 9–College)*

Laura Kahn *(LauraKahn1; lkahn@princeton.edu)*, Princeton University, Princeton, NJ
Laura Schoenle *(@LauraSchoenle)*, Hamilton College, Clinton, NY
Explore interdisciplinary problem solving with One Health!
Learn to use interactive case studies to illuminate the interconnections between human, animal, and environmental health that integrate the NGSS.

**9:30–10:30 AM**

**Using Hands-On Performance Assessment in Grades 3–5 Classrooms: Assessing Student Mastery of the Science Practices, DCIs, and CCSS**
*(Grades P–9)*

Deborah Tucker *(deborahlt@aol.com)*, Independent Science Education Consultant, Napa, CA
Grant Gardner *(@AssessmentServ; grantmgardner@msn.com)*, Assessment Services, Inc., Pepperell, MA
Explore hands-on performance assessment as a way to formatively assess student mastery of the CCSS and NGSS while engaging in a hands-on performance task.

**Engaging Young Children and Families Through the George Washington Carver STEAM InVenTures**
*(Grades P–3)*

Akil Rahim *(@AkilsCreations; akrahim@mac.com)*, AC Learning Design Studios, LLC, Ellicott City, MD
Apply crosscutting concepts to Discover, Investigate, Simulate and Create Opportunities (DISCO) using George Washington Carver STEAM InVenTures that make ongoing environmental awareness a family affair.

**The Wonderful World of Weather**
*(Grades 4–8)*

Joan Gillman *(joangillman@hotmail.com)*, The Calhoun School, New York, NY
Come learn about the fascinating world of weather. Go on a scavenger hunt to find the warmest and coolest temperatures. Use a computer simulation to make your own thunderstorm.

**Foam Gliders, the Engineering Design Process, and Controlling Variables**
*(Grades 1–8)*

Denise Post *(@dpost365)*, Salt Brook Elementary School, New Providence, NJ
Melissa VanWingerden, Allen W. Roberts Elementary School, New Providence, NJ
Take learning to new heights. Participants will work through a lesson in which they will be using foam plates and the Engineering Design Process to improve on the original glider design while changing only one variable at a time.

**Story Starts to STEM: Using Children's Literature to Engage Young Students in STEM**
*(Grades P–4)*

Jennifer Williams *(@ScienceJennifer; jenniferwilliams@newmanschool.org)*, Isidore Newman School, New Orleans, LA
Promote your students’ enthusiasm and understanding of STEM concepts by integrating children’s literature into project-based experiments and activities. Come explore the seamless blend of “story time” and STEM. Leave with a bibliography of suggested titles with coordinating STEM activities.

**Engineering, Thinking, and Doing! Activities That Work!**
*(Grades 6–8)*

Judith Lucas-Odom *(@Judith_Odom; judyps23@yahoo.com)*, Chester High School, Chester, PA
Engage your students in STEM activities that use the engineering design process and content area together effectively!
Strengthening Science Reasoning and Language for All Students Through Active 3-D Learning
(Grades 3–8) 122B, Convention Center
Rita MacDonald (rkmacdonald@wisc.edu), Wisconsin Center for Education Research, Madison
David Crowther (crowther@unr.edu), NSTA Retiring President, and University of Nevada, Reno
Explore balloon popping (or not popping) and learn how to engage ALL students in the collaborative reasoning and complex discussion of the rigorous and sophisticated three-dimensional framework.

AACT Session: Elementary and Middle School Chemistry: Demonstrations and Lab Activities on a Shoestring Budget
(Grades 1–9) 123, Convention Center
Kimberly Duncan (@chemduncan; @AACTconnect; kimberly.z.duncan@gmail.com), American Association of Chemistry Teachers, Washington, DC
Discovery engaging demonstrations, labs, and activities that can help elementary and middle school teachers teach chemistry topics.

Finding STEM’s Interdisciplinary Nexus: Big Ideas as Portals to Cross-Disciplinary Learning
(Grades 6–12) 124, Convention Center
Daniel Schermele (@schermele; dan.schermele@ascendlearning.org), Brooklyn Ascend High School, Brooklyn, NY
Participants will make an Appalachian string instrument and have interactive discussion about interdisciplinary curriculum development, culturally relevant learning, and new knowledge demonstration through learning artifacts. Note: Hands-on activities are limited to the first 30 participants.

ITEEA Session: Exploring the Designed World Through Engineering byDesign™ Advanced Technological Applications
(Grades 11–12) 125, Convention Center
Anita Deck (adeck@iteea.org), International Technology and Engineering Educators Association, Crab Orchard, WV
Joanna Papadopoulos, ITEEA-International Technology and Engineering Educators Association, Reston, VA
Get ready for active engagement during this fast-paced session of exploration of the designed world—graphics communication, biotechnology, information technology, and robotics.

Hands-On Curriculum: Embedding a Free STEM Video Game
(Grades 8–12) 126A, Convention Center
Michael Briscoe (@NavalEngineers; fleet@navalengineers.org), American Society of Naval Engineers, Fairfax, VA
FLEET is a free engineering video game that applies science, engineering, and mathematics. Four schools’ implementation grants allowed for activities and curricula that engaged students.

Storytelling Through Stop-Motion, Makey Makey, and Ozobots
(Grades 3–6) 309/310, Marriott
Stefanie Nguyen (@stef_nguyen; nguyen.stef@gmail.com), St. Gabriel’s Catholic School, Austin, TX
Diana McGuire (@3rdgradebuzz; mcguire.diana@gmail.com), Mathews Elementary School, Austin, TX
Students develop storyboards that they then use to create stop-motion, interactive storyboards, and Ozobot tales.
9:30–10:30 AM  Exhibitor Workshops

Middle School Matters: Modeling Phases with Magnetic Water Molecules
(Grades 5–8)  
103A, Convention Center
Sponsor: 3D Molecular Designs
Keri Shingleton, Holland Hall, Tulsa, OK
Karen Avery, Montoursville Area High School, Montoursville, PA
Gina Vogt (gina.vogt@3dmoleculardesigns.com), 3D Molecular Designs, Milwaukee, WI
Engage your students in three-dimensional learning by modeling the chemical and physical properties of water using magnetic water molecules. Construct physical representations of the three phases of water to explain water density anomalies. Help your students visualize how water molecules interact with sodium chloride to dissolve salt crystals. Handouts!

DNA Glow Lab: A New Way to Investigate DNA Structure
(Grades 6–College)  
103B, Convention Center
Sponsor: miniPCR
Ezequiel Alvarez-Saavedra (team@minipcr.com), miniPCR, Cambridge, MA
Ready for a completely new approach to studying DNA in the classroom? Have your students directly investigate how factors like temperature, pH, and genetic sequence affect DNA structure. Go beyond building paper and candy models—use modern biotechnology techniques to introduce an authentic lab component to your DNA unit…and it glows!

Take the Leap Forward into a Specimen-Free Science Lab
(Grades 7–College)  
104 A/B, Convention Center
Sponsor: Animalearn
Nicole Green (ngreen@animalearn.org), Animalearn, Jenkintown, PA
Join Animalearn as we explore the latest non-animal methods. Gain hands-on experience with innovative dissection resources. Attendees will win classroom resources that will wow students!

From Gene to Protein—The Central Dogma and Genetic Medicine
(Grades 9–College)  
105 A/B, Convention Center
Sponsor: HHMI BioInteractive
Ann Brokaw (abrokaw44@gmail.com), Rocky River High School, Rocky River, OH
Using new BioInteractive resources, engage students in a model of the central dogma of gene expression and how it’s affected at different levels by various genetic diseases. Engage with treatment strategies that show how advances in genetic medicine can intercede at different stages of gene expression.

NGSS—Waves: Make an Abstract Concept Become Visible!
(Grades 6–8)  
107 A/B, Convention Center
Sponsor: Lab-Aids, Inc.
Denis Baker, Lab-Aids, Inc., Ronkonkoma, NY
Experience two exemplary NGSS-focused activities from SEPUP that build up to “Waves and Their Applications in Technologies for Information Transfer” (MS-PS4-2). Anchored in the context of health issues around various types and levels of wave exposure, these activities model seamless integration of the three dimensions, ELA, and math standards. We will explore the relationship between visible light frequency and energy through the use of a phosphorescent material and use light boxes to explore reflection and refraction.

Are You Moody?
(Grades 6–12)  
109 A/B, Convention Center
Sponsor: Texas Instruments
Fred Fotsch, Texas Instruments, Dallas
We will bring science and coding together as participants learn to do some basic coding (no experience necessary) while developing a mood ring! The science of color mixing is explored while determining the right body temperature thresholds. Is fuchsia flirty? Should green be groovy? It’s up to you!
AEOP and the STEM Pipeline: Encouraging STEM for All Students and Educators  
(Grades 5—College)  
111 A/B, Convention Center  
Sponsor: U.S. Army Educational Outreach Program (AEOP)  
Erin Lester, eCYBERMISSION Project Manager, NSTA, Arlington, VA  
Engage your students in real-world STEM activities in a fun environment and give them the opportunity to earn awards and recognition that will propel them toward a career in STEM. Students of all proficiency levels, interests, and social and economic backgrounds are encouraged to participate in real-world STEM experiences while also engaging with scientists and engineers. Discover new opportunities for you and your students.

Cubelets Robot Blocks for Computational Thinking, Iterative Design, and Emergence  
(Grades P–8)  
112 A/B, Convention Center  
Sponsor: Modular Robotics  
Emily Eissenberg, Modular Robotics, Boulder, CO  
Cubelets are robot blocks that introduce the fundamental concepts behind algorithmic and computational thinking. Join in to explore Cubelets with time to collaboratively plan for classroom instruction around computational thinking, design thinking, and empowering student learners.

The NGSS Awakens: A Practitioner’s Approach to Transitioning to Three-Dimensional Learning  
(Grades K–9)  
113A, Convention Center  
Sponsor: Amplify  
Brian Suter, Neshaminy High School, Langhorne, PA  
Come join Brian Suter as he shares his experiences thus far in his journey to transition to the NGSS in his daily classroom and across the Neshaminy School District, serving as the lead science teacher. Receive access to an online curriculum that will allow you to open your students’ eyes as to how three-dimensional and phenomenon-based learning connects to their daily lives and future careers.

11:00 AM–12 Noon  
Featured Hands-On Workshop  
Design Thinking: A Hands-On Workshop for Navigating Challenges in Your Class, School, and Life  
(General)  
118A, Convention Center  
Organizers:  
Ela Ben-Ur (ela@innovatorscompass.org), Founder, Innovators’ Compass, and Assistant Adjunct Professor, Olin College, Cambridge, MA  
Garrett Mason (garrett.w.mason@gmail.com), Educational Consultant, Denver, CO  
With five powerful questions, students and adults can practice Design Thinking as they creatively overcome their many everyday challenges. Administrators and teachers, please join us as we delve into applying Design Thinking in this hands-on workshop. Tackle a challenge of your own with a peer. See people of all ages getting unstuck. Envision how Design Thinking might enhance your STEM program—and expand how problem solving happens in your classroom and school.

Surf & Turf Programming: Connected Learning Through Collaborative Partnerships  
(Grades 7–12)  
102A, Convention Center  
Nevada Winrow (@blackgirlsdivetr; president@blackgirls-divefoundation.org), Black Girls Dive Foundation, Owings Mills, MD  
Amy Heemsoth, Khaled Bin Sultan Living Oceans Foundation, Hyattsville, MD  
Join us for an in-depth discussion on establishing effective partnerships to bridge informal and formal learning contexts to cultivate STEM identities and aquatic-based STEM interests among African American children in middle school and high school.

Engage! Inquiry-Based STEM Learning Through Hands-On Experimentation  
(Grades 9–12)  
103C, Convention Center  
Amanda Purdy (@DrPurdySpeaks; amanda.purdy@fccc.edu), Fox Chase Cancer Center, North Wales, PA  
Presider: Jaye Gardiner (jaye.gardiner@fccc.edu), Fox Chase Cancer Center, Philadelphia, PA  
Learn how to engage students in hypothesis-driven STEM projects and learn about resources available for integrating experiments into the classroom.
**Using Stormwater as an Integrating Phenomenon in Urban Classrooms**  
*7th Annual STEM Forum & Expo*, hosted by NSTA  
(Grades 3–8) 116, Convention Center

Celina Steiger (celinas@islandwood.org) and Derek Jones (derekj3@gmail.com), IslandWood, Bainbridge Island, WA

Join us for an interactive look at how a community-based stormwater curriculum and scaffolded teacher support engage students in solving real-world STEM problems.

**What’s Happening with STEM in Libraries?**  
(Grades P–12) 117, Convention Center

Chandra Jones (@chandramakes; cjones@denverlibrary.org), Denver Public Library, Denver, CO

Hear about the many ways that libraries are supporting STEM education. This panel will feature library folks from school and public libraries, reporting on what they’re up to. Time allowed to ask the panelists questions.

**Moving from Pockets of Innovation to a Comprehensive and Cohesive STEAM Program**  
(Grades K–12) 118C, Convention Center

Ben Smith, Lincoln Intermediate Unit 12, New Oxford, PA

STEM programs should include a balance of activities to provide students the opportunity to explore their passions. Learn how to build a program that meets the four disciplines of STEM: Build, Code, Create, and Design.

**NGSS Implementation Boot Camp**  
(Grades K–8) 119A, Convention Center

Adriana Guerra (adriana.guerra@venturausd.org), Carlos Covarrubias (carlos.covarrubias@venturausd.org), Elizabeth Walker-Martinez (@epfoster18; elizabeth.walkermartinez@venturausd.org), Rebecca Haystead (rebecca.haystead@venturausd.org), and Frances Flores (frances.flores@venturausd.org), E.P. Foster STEM Academy, Ventura, CA

Jena Branstetter (@MrsBranstetter; jena.branstetter@venturausd.org), Balboa Middle School, Ventura, CA

Our team will demonstrate how to leverage the power of a Professional Learning Community to continue moving forward with your school’s implementation of the Next Generation Science Standards.

**Solve a One Health Mystery!**  
(Grades 6–8) 119B, Convention Center

Lauren Brierley (laurenelizabethbrierley@gmail.com), Staff Veterinarian, Concord, OH

Thomas Micek (thomasmicek@hotmail.com) and Hannah Metzel (hannahjmetzel@gmail.com), Georgia Jones-Ayers Middle School, Miami, FL

Gretchen Kaufman (gkaufman10@gmail.com), Washington State University, Pullman

Joann Lindenmayer (joann.lindenmayer@gmail.com), Tufts University School of Medicine, Boston, MA

Get your students excited about working together using One Health to discover our interdependent world and build 21st-century NGSS skills in the classroom.

**5Ez Steps to Building an Elementary Science Curriculum**  
(Grades K–5) 120A, Convention Center

Clay Nolan (@STEMuClaytion; @CABOCESit; clay_nolan@caboces.org) and Tim Cox (tcox@caboces.org), Cattaraugus-Allegany-Erie-Wyoming BOCES, Olean, NY

Our established lessons are built on the 5E (Engage, Explore, Explain, Elaborate, and Evaluate) lesson model. We will share how to design a process for constructing an elementary STEM curriculum that meets the NGSS and gets results.

**Mentoring the Next Generation of Technologists**  
(Grades 6–9) 120C, Convention Center

Eric Larson (@ITFuturesEric; elarson@comptia.org), Creating IT Futures Foundation, Downers Grove, IL

Through curricula, projects, partnerships, and mentorship, Creating IT Futures’ NextUp initiative aims to spark curiosity and passion for technology in teens through meaningful engagement.

**STEM for All: Self-Contained General Education and Beyond**  
(Grades 6–12) 121A, Convention Center

Debra Coen (debocon@gmail.com), West Orange High School, West Orange, NJ

Explore how adaptations and extensions to STEM projects help ALL students be prepared for the 21st century and a world of critical thinking/problem solving.
Submit Your Nominations for the NSTA Board of Directors and Council

The annual NSTA Nominations for Board of Directors and Council engages science educators in leadership positions. The NSTA Board of Directors and Council work together to promote excellence and innovation in science teaching and learning for all.

This year’s offices that are open for entries are President, Coordination and Supervision, High School Level Science Teaching, College Level Science Teaching, and District Directors for NSTA Districts III, V, IX, XI, XV, and XVII.

Submit all applications for nomination by October 19, 2018

Learn more about eligibility and requirements at www.nsta.org/about/governance/nominations
Do You Need a Science Lab? Win a Shell Science Lab Makeover ($20,000 Value) for Your School  
(Grades K–12) 126B, Convention Center  
Ruth Ruud (ruudruth61@gmail.com), Cleveland State University, Cleveland, OH  
Amanda Upton (aupton@nsta.org), Senior Manager, Nominations and Teacher Awards Program and Competitions, NSTA, Arlington, VA  
Are you a K–12 science or STEM teacher in need of a science lab makeover? Attend this session and learn how you can apply to win the Shell Science Lab or Regional Makeover! You will have an opportunity to actually begin to complete the application and have your questions answered.

Toy Design as a Vehicle for Vertical Collaboration in a K–12 Setting  
(Grades K–12) 304/VIP, Convention Center  
Aruna Chavali (achavali@marymountnyc.org), Marymount School of New York, NY  
Hear about a project that has served as a vehicle for vertical collaboration to address a relevant social need. While opportunities for vertical collaboration in a K–12 setting are abundant, it can be a daunting task for teachers to create projects that allow for authentic collaboration among students in different grade levels, different developmental stages, and different points in the curriculum.

Inquiring Minds Want to Know: Overcoming Barriers to Inquiry-Based Learning in the Traditional and Virtual Classrooms  
(Grades K–12) 307, Convention Center  
Rachael Cipolla (@mrs_cipolla; rachael.cipolla@pacyber.org) and Jessica Fetterman (@jesifetterman28; jessica.fetterman@pacyber.org), The Pennsylvania Cyber Charter School, Midland  
Have a desire for your students to connect deeper with content? We will examine how one’s teaching identity is linked to successful inquiry implementation.

11:00 AM–12 Noon Hands-On Workshops

Assembly Required! Upcycled Materials Only for This Marble Run  
(Grades P–6) 113B, Convention Center  
Georgia Littleton (georgia.littleton@boonevilleschools.com), Booneville Elementary School, Booneville, AR  
Allow me to showcase my students’ work. It will excite and motivate you to create a marble run from upcycled materials with your students. Do you have what it takes to build a marble run and stay within the 2’ x 2’ x 2’ dimensions?

Coding Like CRAZY for Kids  
(Grades 3–5) 113C, Convention Center  
Valencia Thornton, CRAM Academy, Lithonia, GA  
Explore the elements of coding, including an introduction to Python coding language. Receive an overview of computers and how they process information using the binary system.

Robotic Tech Tools “Debug” Science Concepts  
(Grades 2–7) 115A, Convention Center  
Frederick Hellbusch (@fhellbusch63; fhellbusch26@gmail.com), K–6 Science/STEAM Specialist, Potomac, MD  
Explore various robotics tools that can be used within a learning environment to unpack science concepts. By creating engaging experiences, learners use problem-solving skills, logic, and creativity as they use innovation. Learners are more than just problem solvers; they’re problem seekers… and purpose inspires innovation.

Meteoroids, Asteroids, and Moons, Oh My!  
(Grades 3–8) 115B, Convention Center  
Joan Gillman (joangillman@hotmail.com), The Calhoun School, New York, NY  
Have you ever wanted to visit a moon, asteroid, or meteoroid? Then this STEM-focused hands-on workshop is for you. We will design, build, and test moon landing devices that allow two “marshmallow” people to land softly on the Moon.

STEMsational Resources for the Literacy Classroom  
(Grades 1–5) 115C, Convention Center  
Amy Kretchman (@mskretchman236; kretchman@wps.k12.va.us), John Kerr Elementary School, Winchester, VA  
Learn how to integrate STEM projects through read-aloud books/novels. Get hands-on with STEAM Bins and learn how to incorporate them into your classroom routine!
Design Challenges Versus 3-D Design Investigations: Where’s the Rigor?
(Grades 6–8) 120B, Convention Center
Grace Andrews (@nysci; gandrews@nyscience.org) and Deon Daniels (@nysci; ddaniels@nyscience.org), NYSCI, Corona, NY
Christopher Hernandez (chernandez13@schools.nyc.gov), Robert F. Wagner Middle School, New York, NY
Engage in a tower building challenge followed by an evaluation of design investigations. Finally, we’ll brainstorm methods for designing rigorous three-dimensional long-term science investigations.

Moving Toward 3-D Assessment: Hands-On Performance Assessment Tasks in Grades 6–8
(Grades 6–8) 122A, Convention Center
Deborah Tucker (deborahlt@aol.com), Independent Science Education Consultant, Napa, CA
Grant Gardner (@Assessmentserv; grantmgardner@msn.com), Assessment Services, Inc., Pepperell, MA
Engage in a hands-on performance task and explore how this form of assessment is used to demonstrate student mastery of the CCSS and NGSS.

AACT Session: Building a Periodic Table Unit Plan Using American Association of Chemistry Teachers (AACT) Resources
(Grades 9–12) 123, Convention Center
Kimberly Duncan (@chemduncan; @AACTconnect; kimberly.z.duncan@gmail.com), American Association of Chemistry Teachers, Washington, DC
Come learn how to put together a successful unit plan using the wide variety of classroom resources available on AACT’s website.

Bringing Active STEM Learning Through an Experiment-Based Game Challenge
(Grades 2–College) 125, Convention Center
Chrystian Vieyra (@chrysvieyra; chrysvieyra@gmail.com), Vieyra Software, Washington, DC
Diana Price (price@alexlibraryva.org), Alexandria Public Library, Alexandria, VA
We will provide an overview of family-friendly informal STEM education programming that was developed by a science teacher, a STEM library specialist, and a software engineer.

Data Analysis Made Easy: Connecting Math and Science Through Technology
(Grades 6–College) 126A, Convention Center
Karlheinz Haas (@Karl0294; khaas@thepineschool.org), The Pine School, Hobe Sound, FL
Increase student engagement in analysis and evaluation of real data. Engage students of different ability levels in mathematical modeling with measurements not previously accessible in the classroom.

Measure It! Student-Friendly Climate Change Data Investigations
(Grades 5–8) 309/310, Marriott
Pat Harcourt (pharcourt@umces.edu), MADE-CLEAR, Annapolis, MD
Come try out activities on climate change that are designed to engage middle school students in experimental design, data collection and analysis, argument from evidence, and communication.
**11:00 AM–12 Noon  Exhibitor Workshops**

**5 E'sy Ways to Investigate Enzymes**  
*(Grades 6–College)*  
103A, Convention Center  
Sponsor: 3D Molecular Designs  
**Gina Vogt** (gina.vogt@3dmoleculardesigns.com), 3D Molecular Designs, Milwaukee, WI  
**Keri Shingleton**, Holland Hall, Tulsa, OK  
**Karen Avery**, Montoursville Area High School, Montoursville, PA  
ENGAGE your students in investigating enzyme structure/function using multiple modeling strategies. EXPLORE and EXPLAIN catabolism, anabolism, and competitive and non-competitive inhibition with hands-on/minds-on instructional materials. ELABORATE on insecticide inhibition at an enzyme active site resulting in unintended consequences. EVALUATE student learning with an enzyme molecular story. Handouts!

**Sickle Cell Genetics Lab: Diagnosing Baby Marie**  
*(Grades 7–College)*  
103B, Convention Center  
Sponsor: miniPCR  
**Ezequiel Alvarez-Saavedra** (team@minipcr.com), miniPCR, Cambridge, MA  
Join in for a hands-on activity that will expose you to the fundamental principles of DNA analysis by gel electrophoresis. Help the Robinson family make a genetic diagnosis!

**Hands-On STEM for Grades K–8**  
*(Grades 3–6)*  
104 A/B, Convention Center  
Sponsor: SAE International  
**Andrea DeMello** (andrea.demello@sae.org) and **Bonnie Thibodeau** (bonnie.thibodeau@sae.org), SAE International, Warrendale, PA  
Looking for a hands-on way to keep students engaged with STEM concepts? A World In Motion (AWIM) is a teacher-administered, industry volunteer–assisted program that incorporates STEM learning experiences through hands-on activities. Receive an overview of AWIM’s methodology and learn how to breathe new life into your classroom by challenging students to design and construct balloon-powered cars.

**Quantitative Reasoning—From Data to Evidence Using BioInteractive Resources**  
*(Grades 9–College)*  
105 A/B, Convention Center  
Sponsor: HHMI BioInteractive  
**Robert Cooper** (bcooper721@gmail.com), Pennsbury High School, West Campus, Fairless Hills, PA  
Bring more quantitative reasoning into your biology classroom and show your students how data becomes evidence for or against a scientific claim. Free classroom-ready HHMI BioInteractive resources that engage students in quantitative reasoning about natural selection, mosquito control, and cancer will be presented.

**NGSS—Designing Better Chemical Batteries**  
*(Grades 6–8)*  
107 A/B, Convention Center  
Sponsor: Lab-Aids, Inc.  
**Denis Baker**, Lab-Aids, Inc., Ronkonkoma, NY  
Students investigate how chemical energy can be transformed via a chemical process into electrical energy. After building a prototype wet cell, students brainstorm improvements and build, test, and evaluate new prototypes to meet a set of predetermined criteria within specified constraints.

**STEAM-a-LAMA-DING-DONG**  
*(Grades 6–12)*  
109 A/B, Convention Center  
Sponsor: Texas Instruments  
**Fred Fotsch**, Texas Instruments, Dallas  
Music is a great way to get kids excited about STEAM. Learn how to use a graphing calculator, a TI-Innovator hub, and some imagination to get middle school and high school students excited about coding and engineering. No experience necessary!

**Exploring Air Quality and Energy Choices with Environmental STEM Activities**  
*(Grades 6–College)*  
111 A/B, Convention Center  
Sponsor: U.S. Environmental Protection Agency (EPA)  
**Gayle Hagler** (hagler.gayle@epa.gov) and **Rebecca Dodder** (dodder.rebecca@epa.gov), U.S. EPA Research Triangle Park, Durham, NC  
**Melissa Anley-Mills** (anley-mills.melissa@epa.gov), U.S. EPA, Washington, DC  
Foster critical thinking and STEM skills with your students via hands-on educational tools developed by the EPA. Our researchers will lead you in building an air sensor, playing our free Generate board game of energy choices, and using our Village Green stations to explore air quality and data.
Bioprinting and Soft Material 3D Printing in Education
(Grades 7–College) 112 A/B, Convention Center
Sponsor: CELLINK LLC
Patrick Thayer (pt@cellink.com), CELLINK LLC, Blacksburg, VA
Explore how the use of soft material 3D printers and bioprinters can be used in education from the middle school to high school level. We will print materials such as alginites, gelatins, and chocolate.

Monday Morning STEM Activities for Your High School Classroom!
(Grades 8–12) 113A, Convention Center
Sponsor: Nasco
Jordan Nelson, Nasco, Fort Atkinson, WI
Alan Gomez, The STEM Academy®, Park City, UT
Join us for this hands-on workshop featuring classroom activities that support NGSS and state standards. Free access to hundreds of hours of ready-to-go activities and content to all who attend!

1:30–2:30 PM Presentations

Pa Developing a STEM Ecosystem to Prepare All Students for Career Readiness
(General) 102A, Convention Center
Ben Smith, Lincoln Intermediate Unit 12, New Oxford, PA
It takes the entire village to raise a prepared and productive STEM student. The STEM ecosystem brings together partners in all areas of the community to identify resources and promote opportunities for preK–20 students. Come learn about our efforts at creating an ecosystem and learn how to develop yours.

Pa Engaging Undergraduate Students in Experiential Learning Opportunities
(College) 102B, Convention Center
Hamideh Talafian (@hamidehtalafian; hamideh.talafian@gmail.com) and Tamara Galoyan (toma.galoyan@gmail.com), Drexel University, Philadelphia, PA
Presider: Penny Hammrich (plh33@drexel.edu), Drexel University, Philadelphia, PA
Review findings from a second-year evaluation of research on experiential learning opportunities for undergraduate students in the area of energy and environment.

HS Forensics Bone Analysis: What Bones Tell Us (NGSS and STEM)
(Grades 8–College) 103C, Convention Center
Anthony Bertino (abertino@nycap.rr.com), Retired Educator, Schenectady, NY
Patricia Nolan Bertino (nolanp@nycap.rr.com), Retired Educator, Schenectady, NY
Skeletons analysis provides clues: age, sex, height, ethnic background, diet, lifestyle, geographic origins, and more. Applying STEM, discover what is “written in bones” in colonial Jamestown, Romanovs, and African American Burial Ground.

LE Using Real-World Problems to Support Early Childhood STEM Investigations
(Grades P–K) 117, Convention Center
Holly King (hking@advanc-ed.org) and Lisa Sutherland (lsutherland@advanc-ed.org), AdvancEd, Tempe, AZ
Identify the elements of effective real-world challenges and practice creating meaningful early learning STEM investigations that stimulate and build on children’s natural curiosity.

M Make Your Job Easier: Teach Students to Ask Better Questions
(General) 119B, Convention Center
Sarah Westbrook (@RightQuestion; @SarahRQI; sarah.westbrook@rightquestion.org), The Right Question Institute, Boston, MA
Nicole Bolduc (@nicolejbolduc; nbolduc@ellingtonschools.net), Ellington Middle School, Cambridge, MA
How can student curiosity spark creativity, innovation, and deeper learning? Explore the Question Formulation Technique, which teaches students to ask questions and drive scientific inquiries.
Designing, Building, and Growing a Middle School Garden
(Grades 6–8) 121A, Convention Center
Kenneth Fisher (@kenfish3; fisherk@hudson.k12.oh.us), Hudson High School, Hudson, OH
Provide fertile experiences with a STEM unit exploring how we maximize our potential to achieve optimal results in any environment and create a school garden and living lab.

Increase Students’ Interest in Coding with a STEM Partnership
(Grades 5–6/College) 125, Convention Center
Michiko McClary, Claflin University, Orangeburg, SC
Review findings from surveys on a STEM partnership between a university and local P–12 school districts and how it provided an opportunity for college students to engage elementary and middle school students from a rural community in coding.

PhysiCalc: An Integrated, Team-Taught Approach to Calculus and Physics
(Grades 9–College) 304/VIP, Convention Center
Margarita Kelly (@TeamPhysiCalc; mkelly@dextersouthfield.org), Dexter Southfield School, Brookline, MA
Tom Morey (lmtails@yahoo.com), Bishop Hendricken High School, Warwick, RI
Add rigor to your lessons with a team-taught AP physics and AP calculus course. We will present our experience in co-teaching AP physics and calculus, providing a framework for integrating science and math in a team-taught environment.

Global Impacts of Infectious Disease: Topics to Engage Students in Biological Sciences
(Grades 10–12) 307, Convention Center
Daniel Goduti (@danielgoduti; dgoduti@haverford.org), The Haverford School, Haverford, PA
More than 1 billion people worldwide suffer from NTDs—have your students even heard of them? Learn how we engage students in biology by challenging them to address issues of global health and disease.

STEM Events for Dummies: How to Host a Fun, Frugal, and Fabulous STEM Family Night!
(Grades P–8) 309/310, Marriott
Emily Tucker (@STEMilyTucker; etucker@charlotteprep.org), Charlotte Preparatory School, Charlotte, NC
Feeling overwhelmed? I’ll give you a step-by-step planning guide for choosing a theme, organizing volunteers, and purchasing supplies on a budget. Relax… you’ve got this!
1:30–2:30 PM  Hands-On Workshops

Kindergarten Physical Science STEM Labs (Kindergarten)  113C, Convention Center
Rebecca Haystead  (rebecca.haystead@venturausd.org), E.P. Foster STEM Academy, Ventura, CA
Jena Branstetter  (jena.branstetter@venturausd.org), Balboa Middle School, Ventura, CA
Participate in a creative and engaging kindergarten physical science STEM lab. Walk away with hands-on CCSS and NGSS-focused lessons.

Balance and Art: A STEM Unit with Calder Mobiles (Grades 3–5)  115A, Convention Center
Justine Kim  (jukim@umn.edu), University of Minnesota, Minneapolis
Explore the concepts of balance in science, math, and art. Use what you learn to engineer your own inspired Calder-esque mobile.

Animating English Language Arts Through Computer Programming Using Scratch Jr. (Grades K–2)  118A, Convention Center
Phuong Uzoff  (phuong.uzoff@outlook.com), El Segundo (CA) Unified School District
Discover how to connect English language arts with computer programming by coding a story on Scratch Jr. to make an animation. The session will start with reading Ashley Spires’ book The Most Magnificent Thing.

Constructing Tower and Bridge Models with Scale Drawings (Grades K–2)  120B, Convention Center
Amber Robinson  (robinsonam@pcsb.org) and Rafael Robinson  (robinsonra@pcsb.org), Douglas L. Jamerson, Jr. Elementary School, Saint Petersburg, FL
Develop K–2 student understanding of scale models and drawings through collaborative engineering challenges connecting engineering and architecture.

Paired Inquiry for STEM Investigations (Grades 4–8)  121B, Convention Center
Kelly Moore  (@kellyramey; kellymoore@tntech.edu) and Leslie Suters  (lsuters@tntech.edu), Tennessee Tech University, Cookeville
Build student skills in the inquiry process with the use of “paired inquiry” to support student investigations in the STEM classroom.

Read and Write Like an Engineer with NASA’s New BEST Educator Guides (Grades 5–10)  122A, Convention Center
Laurie Cook  (laurie.cook@okstate.edu), Oklahoma State University, Stillwater
Diane McElwain  (diane.mcelwain@nasa.gov), NASA Glenn Research Center, Cleveland, OH
How should an educator address the CCSS for informational text within STEM? Use NASA’s BEST engineering activities as a springboard for reading, writing, and speaking informational text!

ITEEA Session: Building Grades 3–5 Integrative STEM through Technology, Engineering, Environment, Mathematics, and Science (TEEMSTM) (Grades 3–5)  122B, Convention Center
Anita Deck  (adeck@iteea.org), Steven Barbato  (@barbats; sbarbato@iteea.org), and Joanna Papadopoulos  (@iteea), International Technology and Engineering Educators Association, Reston, VA
Discover this project-based, student-centered approach as you engage in Engineering by Design™ Grades 3–5 TEEMS NxtGEN™ course materials that intentionally integrate multiple discipline areas and walk away with fun-infused engineering design challenges.

Measure, Mix, and Stir Computational Thinking into Your Science Classes (Grades 6–12)  123, Convention Center
Rachelle Haroldson  (rachelle.haroldson@uwrf.edu), University of Wisconsin–River Falls
Integrate computational thinking to turn your science lessons into STEM lessons with various computer science tools (Ozobots, Scratch, Bootstrap) and resources (YA books and graphic novels).

Lotions, Potions, and Scrubs: Polymer Science in Cosmetics (Grades 6–12)  126A, Convention Center
Sherri Rukes  (@polychemgirl; sherri.rukes@d128.org), Libertyville High School, Libertyville, IL
Examine the various chemicals and chemistry behind some of the most common cosmetic products. Learn how to make various cosmetics, as well as the polymer science behind them. Handouts.
1:30–2:30 PM  Exhibitor Workshops

**Constructing and Crossing Cell Membranes**
(Grades 8–College) 103A, Convention Center
Sponsor: 3D Molecular Designs
Karen Avery, Montoursville Area High School, Montoursville, PA
Keri Shingleton, Holland Hall, Tulsa, OK
Gina Vogt (gina.vogt@3dmoleculardesigns.com), 3D Molecular Designs, Milwaukee, WI
Support three-dimensional learning with materials that engage students in an exploration of the unique chemical and physical properties of water and the phospholipid bilayer that separates cells from their surrounding environment. Construct a model to explain diffusion, osmosis, and active and passive transport across cell membranes.

**What Does STEM Got to Do with Electrophoresis System Design?**
(Grades 9–College) 103B, Convention Center
Sponsor: MiniOne Systems
Richard Chan (info@theminione.com), MiniOne Systems, San Diego, CA
Everything! MiniOne Electrophoresis System is designed from the ground up for the education market, guided by an understanding of the needs of teachers and students. Learn about the design principles, engineering challenges, and outside-the-box thinking that shaped the final product and how you can bring STEM into your biology classroom.

**Increasing Engagement in STEM Through Competition and Gamification: A Case Study/Lessons Learned**
(Grades 6–12) 104 A/B, Convention Center
Sponsor: Intellitek, Inc.
Joshua Schuler (jschuler@iscefoundation.org), Intellitek, Inc., Derry, NH
Discover how students and educators with no or little coding or robotics experience can develop foundational skills in a relatively short period of time and compete in one of the most sought-after STEM professions—coding—through a fun, interactive online platform.

**DNA Profiling with BioInteractive Resources**
(Grades 9–College) 105 A/B, Convention Center
Sponsor: HHMI BioInteractive
Robert Cooper (bcooper721@gmail.com), Pennsbury High School, West Campus, Fairless Hills, PA
Pique your students’ interest in DNA by introducing them to DNA profiling through case studies, including twins switched at birth; exoneration of the wrongly convicted; identifying missing persons; identifying earthquake victims; and wildlife conservation. This workshop features free HHMI BioInteractive resources and is appropriate for honors, AP, or IB biology.

**CLEAR! Whap! Shocking the Heart with CODE!**
(Grades 6–College) 109 A/B, Convention Center
Sponsor: Texas Instruments
Fred Fotsch, Texas Instruments, Dallas
Learn the basics of how the heart works and how an automatic electronic defibrillator can save a life. We will create an artificial heart that BEATS (well, it flashes)—writing code to put the artificial heart in sinus rhythm and a defibrillator to shock it when it gets out of rhythm! A 3D-printed heart is optional. No coding experience is necessary. Appropriate for middle school and high school students.

**The Longitudinal Results of Camp Invention’s STEAM Pedagogy**
(Grades P–8) 111 A/B, Convention Center
Sponsor: National Inventors Hall of Fame
Alaina Rutledge, National Inventors Hall of Fame/Camp Invention, North Canton, OH
Review findings from our recent longitudinal study exploring innovation. How do inventors and hands-on STEAM learning impact our children? Find out what is next for summer out-of-school-time STEAM programming. Explore how we inspire and motivate children to use creative and critical problem solving while immersed in real-life science investigations.

**Bluebird: Activated Objects for the Connected Classroom**
(Grades 6–College) 112 A/B, Convention Center
Sponsor: Teknikio
Deren Guler (deren@teknikio.com), Teknikio, Brooklyn, NY
Watch a demonstration of our Bluebird Internet of Things classroom kit. With the kit, you can teach concepts of networking, connected products, data analysis, and collection, as well as help students translate these abstract concepts into physical objects that are activated via the internet. Plus, build projects with Teknikio toolkits and electronic parts and find out how they can be embedded into everyday materials.
Putting the “A” in STEAM  
(Grades 5–College) 113A, Convention Center  
Sponsor: Nasco  
**Jordan Nelson**, Nasco, Fort Atkinson, WI  
Learn how to create high-interest STEM and Art projects! Create your own unique name tag and then delve into circuitry using paper crafts, fun light-up wearables, vibrobots, and interactive circuitry projects with LEGO®. Projects range from beginners to advanced users and programming.

3:00–4:00 PM Presentations

**Charles E. Smith Jewish Day School and George Washington University’s Project for Integrated STEM Education**  
(Grades 1–5/College) 102A, Convention Center  
**Beth Short** (@bethshort), The George Washington University, Washington, DC  
**Alexis Soffler** (asoffler@cesjds.org) and **Erin Magee** (emagee@cesjds.org), Charles E. Smith Jewish Day School, Rockville, MD  
We will highlight a researcher-practitioner partnership between an elementary school and a university to design a curriculum using NGSS crosscutting concepts as a through-line for integration.

**Art and Science Collide: Engaging Students Through STEM-Based Comics**  
(Grades 7–College) 103C, Convention Center  
**Jaye Gardiner** (@jayeperview; jaye.gardiner@fccc.edu), Fox Chase Cancer Center, Philadelphia, PA  
**Presider: Amanda Purdy** (amanda.purdy@fccc.edu), Fox Chase Cancer Center, North Wales, PA  
Discover how you can use comic creation in the classroom to engage students in STEM and increase their understanding and communication skills using JXX Comics.

**Get Your Engines Ready**  
(Grades 4–6) 116, Convention Center  
**Ellen Martin** (@ellennitram3; martine@wps.k12.va.us), Garland R. Quarles Elementary School, Winchester, VA  
Using scientific investigations, cars are raced with different variables—height/length, the effects of friction, and height/the speed of the car—and then students’ own variables.

**Safer Makerspaces and STEM Labs: A Collaborative Approach!**  
(General) 117, Convention Center  
**Tyler Love** (tsl48@psu.edu), Penn State Harrisburg, Middletown, PA  
Safer design guidelines, practices, and policies for makerspaces and collaborative STEM labs will be discussed from Ken Roy and Tyler Love’s (NSTA Safety Board) book.

**Enhancing Program Quality in Out-of-School-Time: Effects of Professional Development on STEM Knowledge and Skills**  
(Grades K–8) 118B, Convention Center  
**Saundra Wever Frerichs** (@SaundraFrerichs; sfrerichs3@unl.edu), University of Nebraska–Lincoln Extension 4-H  
**Karly Black** (@karlyrblack; karly.black@unl.edu), University of Nebraska at Lincoln, Pawnee City  
Hear about the theoretical basis and recent research results supporting the positive impact of the Click2SciencePD ongoing, blended professional development approach in out-of-school time programs.

**Robotics and Collaboration in an Early Elementary STEM Curriculum**  
(Grades P–2) 120A, Convention Center  
**Chani Lichtiger**, Yavneh Academy, Paramus, NJ  
Robotics in early elementary education? Absolutely! Learn practical advice for implementing STEM robotics projects across a range of curricula.
Physical Science and Technology: A New Course
(Grades 8–9) 304/VIP, Convention Center
Thomas Hardy (thardy@ivesinc.com), Educational Consultant, Hyattsville, MD
Hear about a new course in physical science with true STEM content along with unique experiments and the rationale for the structure of the course.

Zoom In! Learning Science with Data
(Grades 9–12) 307, Convention Center
Bill Tally and Erin Bardar, EDC Center for Children and Technology, New York, NY
Discover a new online curriculum platform, Zoom In, designed to develop high school students’ evidence-based thinking, data analysis, and writing skills as they examine important questions related to key Earth science and biology concepts.

Analyze and Interpret Weather and Climate Data with a Web-Based Graphing Tool
(Grades 6–8) 309/310, Marriott
Matthew Mirabello (mmirabello@amnh.org), American Museum of Natural History, New York, NY
Explore weather and climate data through an online graphing tool that simplifies data visualization so students can focus on analysis and interpretation. Local data available!

Connecting the School Community Through a Halloween-Themed Hands-On STEM Night
(Grades 3–6) 113B, Convention Center
Kristi Eschberger (kristi@girlstart.org), Girlstart, Austin, TX
Halloween is a great time to get your school community excited about STEM. Incorporating spooky physics, creepy chemistry, and more is the perfect way to ensure participation.

Let’s Get Wet: Wind, Water, and Weather
(Grades P–3) 113C, Convention Center
Ruth Ruud (ruudruth61@gmail.com), Cleveland State University, Cleveland, OH
Juliana Texley (@JulianaTexley; texle1j@gmail.com), 2014–2015 NSTA President, and Science Writer/Instructor, Alpena, MI
Don’t look now, but the NGSS asks that you teach Earth sciences as early as kindergarten, and the NGSS have specific goals for early primary. No more procrastinating! The good news is that you have your equipment. Come get easy activities, lit basics, and basic teacher background so that you can start right away!

NSTA Press® Session: Using Children’s Literature to Inspire STEM Learning
(Grades K–5) 115A, Convention Center
Kim Stilwell (@kimstilwellNSTA; kstilwell@nsta.org), Manager, New Business Development, NSTA, Arlington, VA
Take my recess, but please don’t take my science time! Never before has it been so easy to interest students in reading and science. Resources such as Picture-Perfect Science Lessons will have students eager to be at school. Success stories will be shared about schools that are successfully integrating ELA and science standards through the use of children’s picture books to engage students and teach STEM concepts. Leave with ideas you can implement in your classroom.

Going Wild
(Grades 3–6) 115B, Convention Center
Stefanie Nguyen (@stef_nguyen; nguyen.stef@gmail.com), St. Gabriel’s Catholic School, Austin, TX
Diana McGuire (@3rdgradebuzz; mcguire.diana@gmail.com), Mathews Elementary School, Austin, TX
We will share authentic making and service learning in conjunction with the book The Wild Robot by Peter Brown. This Project-Based Learning will teach high-tech and low-tech prosthetic making.
“Scenarios” That Engage Students in STEM Learning
(Grades 1—8)  115C, Convention Center
Jo Anne Vasquez (jvasquez@stemlessonessentials.com),
1996–1997 NSTA President, and Rocks to Rainbows, LLC,
Gilbert, AZ
Joel Villegas (@villegasjoel8; jvillegas@pinalesa.org), Pinal County School Office Education Service Agency, Florence, AZ
“Scenarios” engage students in relevant STEM experiences. They set up the problem and “driving question” to solve. Experience how creating scenarios can enhance your STEM units.

Finding STEM in Fairy Tales and Folk Stories
(Grades P–3)  118A, Convention Center
Shelley Lee (leeshe@uwstout.edu), 1995–1996 NSTA President, and University of Wisconsin–Stout, Menomonie
Heidi Usgaard (husgaard@scc.k12.wi.us), St. Croix Central Elementary School, Roberts, WI
Use the familiar characters and storylines of fairy tales and folklore to spark innovative thinking, science inquiry, and engineering practice through STEM opportunities.

Get Creative! Develop Students’ Science and Engineering Practices, Inspired by Birds
(Grades 3–8)  120B, Convention Center
Kelly Schaeffer (@BirdSleuth; kms448@cornell.edu), The Cornell Lab of Ornithology, Ithaca, NY
Birds are a springboard for scientific investigations and design challenges that develop students’ science and engineering practices. Explore free hands-on activities that will excite and challenge!

Employ Design Thinking with 3D Printing While Learning to Code
(Grades K–12)  121C, Convention Center
Ben Smith, Lincoln Intermediate Unit 12, New Oxford, PA
3D printers open up a learning path allowing students to design, build, communicate, and share their own solutions to real-world problems through the lens of content standards. When combined with design thinking, it makes a powerful learning tool. Finally, see how to apply coding to design to visualize code.

Analysis of Supernova Remnants Using Spectroscopy with NASA Data and STEM Tools
(Grades 9–12)  122B, Convention Center
Pamela Perry (pperry@lewistonpublicschools.org), Lewiston High School, Lewiston, ME
Donna Young (dlyoung.nso@gmail.com), NASA/NSO UoL Coordinator, Bullhead City, AZ
Identify elements in the spectra of supernova remnants to determine the properties of collapsed and exploded stars using NASA X-ray data and image analysis tools.

Green Machines
(Grades 6–12)  124, Convention Center
Dartayvia Thomas, Glenn Hills High School, Augusta, GA
Discover various strategies and activities that can be used in the classroom relating to environmental concerns and discrepancies. Emphasis will be placed on the greenhouse effect with activities such as model creations and simulations.

STEM Behind Forensics
(Grades 8–12)  126A, Convention Center
Jeffrey Lukens (jeffrey lukens0613@gmail.com), Sioux Falls (SD) School District
From helping to determine the time of a victim’s death to analyzing DNA samples from crime suspects, this workshop has it all! Come get your hands wrapped around the STEM of crime solving!
Friday, 3:00–4:00 PM

3:00–4:00 PM  Exhibitor Workshops
Dynamic DNA: Exploring DNA Structure and Function with Physical Models
(Grades 8–College)  103A, Convention Center
Sponsor: 3D Molecular Designs
Gina Vogt (gina.vogt@3dmoleculardesigns.com), 3D Molecular Designs, Milwaukee, WI
Keri Shingleton, Holland Hall, Tulsa, OK
Karen Avery, Montoursville Area High School, Montoursville, PA
Explore a variety of hands-on/minds-on instructional materials that introduce students to DNA as a double-stranded helical molecule, as information (a sequence of As, Ts, Gs, and Cs) that encodes proteins, and as a 3.2 billion base-pair genome. Analyze the ß-globin gene to discover the anatomy of a gene.

Constructing Explanations with HHMI BioInteractive
(Grades 6–College)  105 A/B, Convention Center
Sponsor: HHMI BioInteractive
Sydney Bergman (bergmans@hhmi.org), Howard Hughes Medical Institute, Chevy Chase, MD
Students often struggle with how to structure explanations, particularly those about evolution. Explore a framework that helps students make connections between natural selection and change in populations over time, using free classroom-ready resources from HHMI BioInteractive. This framework is adaptable for middle school through higher ed educators.

4:30–5:30 PM  Closing Session
That’s a Wrap—A STEM-tastic Celebration
(General)  116, Convention Center
Jennifer C. Williams, Steering Committee Chair, and Isidore Newman School, New Orleans, LA
Adriana Guerra, Lower Elementary/Early Childhood Strand Leader, and E.P. Foster STEM Academy, Ventura, CA
Brandi Leggett, Upper Elementary Strand Leader, and Roschill Elementary School, Shawnee Mission, KS
Kenneth Williams, Middle Level Strand Leader, and Oxon Hill Middle School, Fort Washington, MD
Kerri Murphy, High School Strand Leader, and Oliver Ames High School, North Easton, MA
Garrett Mason, Partnerships Strand Leader, and Educational Consultant, Denver, CO
Damaries Blondonville, Administrators Strand Leader, and Prince George’s County Public Schools, Oxon Hill, MD
Join us for a STEM-tastic wrap-up session from the 7th Annual STEM Forum & Expo’s Steering Committee. Share in fond memories, connect themes present within and across our strands, and reflect upon the deep learning experienced at this year’s STEM Forum. Celebrate the wonderful sessions, panels, workshops, speakers, and networks created during your time in historic and progressive Philadelphia. Be ready to ask steering committee members questions about this year’s and next year’s STEM Forum & Expo in San Francisco.

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Exhibitors

Some exhibitors have classified their products by grade level.

Elementary E  
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Maps of the Exhibit Hall on our conference app.

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The National Science Teachers Association administers and provides support to U.S. Army Educational Outreach Program that engage students in real-world STEM experiences. Learn about eCYBERMISSION, an online competition free to grades 6–9 students, as well as GEMS and Camp Invention, summer STEM enrichment programs for grades K–12 teachers and students.

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Exhibitors

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The International Technology and Engineering Educators Association is the professional organization for technology, innovation, design, and engineering educators. Our mission is to promote technological literacy for all by supporting the teaching of technology and engineering and promoting the professionalism of those engaged in these pursuits.

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NABT is the “leader in life science education,” supporting a community of K–16 educators committed to providing the best biology and life science education to all students. Join NABT to connect with fellow teachers, scholars, and scientists that will help you keep up with trends and friends in the profession.

Founded in 1920, the National Council of Teachers of Mathematics (NCTM) is the world's largest mathematics education organization, comprised of individual members and affiliates throughout the United States and Canada. The National Council of Teachers of Mathematics advocates for high-quality mathematics teaching and learning for each and every student.

National Geographic Learning, a part of Cengage, provides quality preK–12, academic, and adult education instructional solutions for reading, science, social studies, mathematics, world languages, ESL/ELD, advanced, honors, electives, career and technical education, and professional development. See our new catalog at NGL.Cengage.com/catalog.

The National Institute for STEM Education (NISE) embodies a movement to narrowly and clearly define the practices of a successful STEM teacher through the National Certificate of STEM Teaching. Through NISE, educators establish a common language and set of standards for creating 21st-century STEM classrooms, campuses, and districts.

The National Institute of Biomedical Imaging and Bioengineering (NIBIB) supports research to create biomedical technologies to improve health. Stop by our booth to play our bioengineering game, check out our new health apps, watch cool videos, and learn about other free science education resources.

WHERE BIG IDEAS BECOME THE NEXT BIG THING. Camp Invention is the only nationally recognized nonprofit summer enrichment program for K–6 students that is inspired by the greatest innovators around—the Inductees of the National Inventors Hall of Fame®. At Camp Invention, children are empowered to question, brainstorm, collaborate, and invent!
PASCO scientific  
10101 Foothills Blvd.  
Roseville, CA 95747  
Phone: 916-786-3800  
E-mail: dferrari@pasco.com  
Website: www.pasco.com

PASCO, the award-winning leader in hands-on, inquiry-based science, transforms science education and student learning with innovative probeware, software, and curriculum. Because our products support the science and engineering practices, students gain a deeper understanding of science. PASCO products can be used with any tablet, computer, or smartphone.

PCG Education  
148 State St.  
Boston, MA 02109-12  
Phone: 617-426-2026  
E-mail: rwineyard@pcgus.com  
Website: https://pcgeducation.com

Our education team offers consulting services and technology solutions to help schools, school districts, and state education agencies/ministries of education promote student success, improve programs and processes, and optimize financial resources.

PCS Edventures  
11915 W. Executive Dr., Suite 101  
Boise, ID 83713  
Phone: 208-343-3110  
E-mail: sales@edventures.com  
Website: https://edventures.com

PCS Edventures has spent almost 30 years inspiring students to develop a passion and understanding in science, technology, engineering, the arts, and mathematics. With exciting hands-on activities and curriculum coupled with drones, Cubelets, fischertechnik, and more we focus on making learning fun and interactive for preK to grade 12 students!

Pitsco Education  
915 E. Jefferson St.  
Pittsburg, KS 66762  
Phone: 800-835-0686  
E-mail: orders@pitsco.com  
Website: www.pitsco.com

Pitsco is your STEM resource. Every product we engineer, every activity we write, every curriculum we develop, and every solution we design is provided for the purpose of helping students around the world use their hands to engage their minds to learn and succeed—in the classroom and in life.

Redbird Flight Simulations, Inc.  
2301 E. St. Elmo Rd., Suite 100  
Austin, TX 78744  
Phone: 512-301-0718  
E-mail: jeffleenan@redbirdflight.com  
Website: www.redbirdflight.com

Redbird Flight offers classroom-friendly flight simulators with integrated STEM curricula. Redbird is dedicated to supporting STEM programs, delivering high-quality simulators, software, and aviation education content to grades 6–12 programs, colleges and universities, and flight schools worldwide. With over 2,000 devices in service, Austin-Texas-based Redbird sets the standard.

SAE International  
400 Commonwealth Dr.  
Warrendale, PA 15096  
Phone: 724-772-8569  
E-mail: andrea.demello@sae.org  
Website: www.sae.org/learn/education

SAE International’s A World In Motion is a teacher-administered, industry volunteer-assisted program that brings STEM education to life in the classroom for students in grades K–8. Benchmarking to national standards, the AWIM program incorporates integrated STEM learning experiences through hands-on activities that reinforce classroom learning.

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Savannah, GA 31402  
Phone: 912-525-5162  
E-mail: aylisto@sca.edu  
Website: www.sca.edu

Offering more degree programs and specializations than any other art and design university, the Savannah College of Art and Design (SCAD) is uniquely qualified to prepare talented students for professional, creative careers. SCAD supports educators by providing opportunities for professional development in an inspiring community of artists, designers, and talented faculty members.

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Phone: 202-465-4798  
E-mail: dia@sciencenaturally.com  
Website: www.sciencenaturally.com

Southern Science Supply  
2914 Oakleaf Dr.  
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Arlington, VT 05252  
E-mail: info@steamedu.com  
Website: www.steamedu.com

STEAM Education offers professional development for networking educators to use and co-create curriculum. Virtual courses, downloadable plans, and supplies for customizing integrative programs with support for STEM programs that are contextualized in the liberal arts, including language, social, physical, fine and musical arts. Private consulting is also available. FUNctional literacy for All!

The STEAM Train  
1803 Glen Oaks Place  
Chattanooga, TN 37412  
E-mail: aram.perez@thesteamtrain.cc  
Website: http://thesteamtrain.cc

The STEAM Train wants to encourage young people to study Science, Technology, Engineering, Art, and Math fields. Our first product, the STEAMbot Robot Kit, only $49.99—can be remotely controlled with a free mobile app or programmed with either Blockly or the Arduino IDE.
Exhibitors

**STEM Jobs**  #844
420 Rouser Rd.  M, HS
Bldg. 3, Suite 101
Coraopolis, PA 15108
Phone: 412-329-7828
E-mail: ellen.pomerantz@stemjobs.com
Website: www.stemjobs.com

STEM Jobs connects “Classrooms-to-Careers” in an engaging and dynamic format. Our industry-leading platform includes a print magazine, website, and educational tools designed to aid teachers and inspire middle school and high school students to pursue STEM education and careers. www.stemjobs.com or info@stemjobs.com

**STEM Lessons Based on GPS**  #545
1401 Constitution Ave. NW  M, HS
Herbert C. Hoover Bldg., Rm. 2518
Washington, DC 20230
Phone: 412-608-2654
E-mail: john.johnson@softekenterprises.com
Website: www.gps.gov/students

The U.S. government has released a new curriculum that uses GPS concepts and activities to stimulate student interest in science, technology, engineering, and mathematics (STEM). This free curriculum is designed for the middle school/high school level and tied to the Next Generation Science Standards.

**STEMfinity**  #1031
504 S. 11th St.  E, M, HS, C
Boise, ID 83702
Phone: 800-985-7836
E-mail: bill@stemfinity.com
Website: www.stemfinity.com

STEMfinity is a one-stop-STEM-shop that includes the latest, vetted STEM products and services. Our hands-on resources are targeted to preK–college students learning STEM, robotics, 3D printing, drone technology, alternative energy, computer science, rock- etry, and beyond. STEMfinity implements its resources into classrooms, makerspaces, after-school and summer programs. STEMu- late Your Mind! www.stemfinity.com

**STEMscopes**  #827
5177 Richmond Ave., Suite 1025  E, M, HS
Houston, TX 77056
Phone: 281-833-4503
E-mail: david@acceleratelearning.com
Website: www.acceleratelearning.com

STEMscopes ™, created by Accelerate Learning Inc., is an award-winning, research-based national leader in preK–12 STEM curricula. Used by over 3.5 million students across all 50 states, STEMscopes provides comprehensive digital resources, supplemental print materials, and hands-on exploration kits that drive engagement and academic growth.

**SussmanEducation.com**  #1036
150 E. 52nd St.  E, M, HS
Suite 32002
New York, NY 10022
E-mail: fblack@sussmaneducation.com
Website: www.sussmaneducation.com

SussmanEducation.com is a one-stop-shop for science, technology, engineering, and math resources. Our comprehensive curriculum and materials are designed to engage and challenge students at every level. Whether you’re looking for standards-aligned lesson plans, interactive virtual labs, or hands-on project-based learning, we’ve got you covered. Visit us online to explore our full range of offerings and discover how we can help your students succeed.

**TeacherGeek Inc.**  #926
16551 Ridge Rd.  E, M, HS
Holley, NY 14470
Phone: 888-433-5345
E-mail: dcoon@teachergeek.com
Website: www.teachergeek.com

We offer Rockstar Maker/STEM/science supplies, free amazing curricula, and ultra-engaging activities. Our products are incredibly affordable, NGSS focused, as well as made in the United States. Stop by to learn how to make real working contraptions, incorporate recycling bin materials, and get kits that innovate and reach higher cognitive domains.

**Teknikio**  #738
630 Flushing Ave.  E, M, HS, C
Suite 704
Brooklyn, NY 11206
Phone: 617-697-3539
E-mail: deren@teknikio.com
Website: www.teknikio.com

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121 New York Ave.
Trenton, NJ 08638
Phone: 609-391-4252, x3117
E-mail: victoria.slater@terracycle.com
Website: www.terracycle.com

TerraCycle is the world’s leader in the collection and repurposing of complex waste streams, ranging from ocean plastic to oral and beauty care products and packaging. Stop by our booth to learn about two opportunities for your students to become involved in recycling and to earn rewards for your school!

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Cambridge, MA 02139
Phone: 800-774-5646
E-mail: bill@terrapinlogo.com
Website: www.terrapinlogo.com

Terrapin offers tools for thinking that motivate students to learn, including Bee-Bot, Blue-Bot, Pro-Bot, and InO-Bot robots and the EasyScope digital microscope along with a wide range of supporting materials that help integrate them into the curriculum.

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Dallas, TX 75243
Phone: 800-TICARES (842-2737)
E-mail: ti-cares@ti.com
Website: education.ti.com

Texas Instruments provides free classroom activities that enhance math, science, and STEM curricula; technology that encourages students to develop a deeper understanding of concepts; and professional development that maximizes your investment in TI technology. TI offers handhelds, software, apps for iPad, and data collection technology—all designed to promote conceptual understanding, as well as formative assessment tools that gauge student progress. Visit education.ti.com.

Toshiba/NSTA ExploraVision
1840 Wilson Blvd.
Arlington, VA 22201
Phone: 703-312-9258
E-mail: amckenna@nsta.org
Website: www.exploravision.org

ExploraVision is a free, K–12 science competition sponsored by Toshiba and the National Science Teachers Association. ExploraVision encourages students to brainstorm any STEM technology that could be a reality 20 years in the future.

Tyhope
5801 Roswell Rd., #A
Atlanta, GA 30328
Phone: 404-229-6330
E-mail: mas30328@yahoo.com
Website: www.tyhope.com

U.S. Environmental Protection Agency (EPA)
1200 Pennsylvania Ave. NW
(ORD Mail Code 8101R)
Washington, DC 20004
Phone: 202-564-5179
E-mail: askanepascientist@epa.gov
Website: www.epa.gov/research

Science at EPA provides the foundation for credible decision-making to safeguard human health and the environment. EPA has free STEM-focused educational resources available for all grade levels. With your teaching and their curiosity, your students can become the next great scientific explorers—and EPA can help you along the way!

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Phone: 405-635-4784
E-mail: denise_wagner@fws.gov
Website: www.fws.gov

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Millington, TN 38050
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Website: www.ubtrobot.com

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University of the Sciences
in Philadelphia
600 S. 43rd St.
Philadelphia, PA 19104-4495
Phone: 215-895-3129
E-mail: admit@usciences.edu
Website: www.usciences.edu

University of the Sciences has prepared students to be leaders and practitioners in the health care and science fields through hands-on research and experiential learning for nearly 200 years. Since its founding, USciences has grown to more than 30 degree-granting programs from bachelor’s through doctoral degrees. Learn more at usciences.edu.
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Website: www.vernier.com

Vernier Software & Technology is a leading innovator of scientific data-collection technology. Focused on STEM, Vernier is dedicated to developing creative ways to teach and learn using hands-on science. Vernier creates easy-to-use science interfaces, sensors, and graphing/analysis software. Vernier’s technology-based solutions enhance STEM education, increase learning, and build students’ critical-thinking skills.

Virginia Tech, College of Natural Resources and Environment
138 Cheatham Hall, Blacksburg, VA 24061
Phone: 540-231-4909
E-mail: jghokie@vt.edu
Website: https://cnre.vt.edu/

Virginia Tech is the #1 ranked university in the country for natural resources and environmental conservation (USA Today). Come learn about our world-renowned, unique programs that prepare students for STEM careers in natural resources, biology, chemistry, physics, engineering, business, and technology—in an environment that emphasizes sustainability and hands-on learning.

Virginia Tech
I-STEM Education Program
370 Drillfield Dr., Blacksburg, VA 24061
Phone: 540-231-2040
E-mail: jvernst@vt.edu
Website: www.vt.edu

Those looking to grow as 21st-century K–16 STEM educators, leaders, scholars, and researchers come to Virginia Tech’s Integrative STEM Education graduate program. Offering educational opportunities at various levels, we focus on implementation and investigation of new integrative technological/engineering design-based teaching and learning practices for STEM education.
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| Thursday, July 12 11:00 AM–12 Noon 112 A/B, Conv. Center | Claim-Evidence-Reasoning: Scientific Explanation Ideas for ESL and Bilingual Science (p. 40) |
| Thursday, July 12 1:30–2:30 PM 112 A/B, Conv. Center | STEM Teacher–Science Teacher: What’s the Difference? (p. 46) |

| **Teknikio (Booth #738)** |
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<td>Engineering Design in Middle School Chemistry (p. 48)</td>
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#### Friday

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<td>120C, Conv. Center</td>
<td>Building Underwater Robots (ROVs) in the Classroom (p. 53)</td>
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<tr>
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<td>119B, Conv. Center</td>
<td>STEM Projects for the Science Classroom (p. 53)</td>
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<td>121A, Conv. Center  Engineering, Thinking, and Doing! Activities that Work! (p. 54)</td>
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<tr>
<td>9:30–10:30 AM</td>
<td>6–8</td>
<td>121C, Conv. Center  Strengthening Science Reasoning and Language for All Students Through Active 3-D Learning (p. 55)</td>
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<tr>
<td>9:30–10:30 AM</td>
<td>9–12</td>
<td>119A, Conv. Center  NABT Presents: Giant Replica Animals—A Capstone Biology Project That Integrates STEM (p. 53)</td>
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<tr>
<td>9:30–10:30 AM</td>
<td>1–9</td>
<td>123, Conv. Center  AACT Session: Elementary and Middle School Chemistry: Demonstrations and Lab Activities on a Shoestring Budget (p. 55)</td>
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<tr>
<td>11:00 AM–12 Noon</td>
<td>6–12</td>
<td>121A, Conv. Center  STEM for All: Self-Contained, General Education and Beyond (p. 58)</td>
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<tr>
<td>11:00 AM–12 Noon</td>
<td>6–8</td>
<td>119B, Conv. Center  Solve a One Health Mystery! (p. 58)</td>
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<tr>
<td>11:00 AM–12 Noon</td>
<td>6–9</td>
<td>120C, Conv. Center  Mentoring the Next Generation of Technologists (p. 58)</td>
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<td>11:00 AM–12 Noon</td>
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<td>309/310, Marriott  Measure It! Student-Friendly Climate Change Data Investigations (p. 61)</td>
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<tr>
<td>11:00 AM–12 Noon</td>
<td>5–9</td>
<td>122A, Conv. Center  Moving Toward 3-D Assessment: Hands-On Performance Assessment Tasks in Grades 6–8 (p. 61)</td>
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<tr>
<td>11:00 AM–12 Noon</td>
<td>6–8</td>
<td>120B, Conv. Center  Design Challenges Versus 3-D Design Investigations: Where’s the Rigor? (p. 61)</td>
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<td>1:30–2:30 PM</td>
<td>K–C</td>
<td>119B, Conv. Center  Make Your Job Easier: Teach Students to Ask Better Questions (p. 63)</td>
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<td>1:30–2:30 PM</td>
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<td>121A, Conv. Center  Designing, Building, and Growing a Middle School Garden (p. 64)</td>
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<td>1:30–2:30 PM</td>
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<td>122A, Conv. Center  Read and Write Like an Engineer with NASA’s New BEST Educator Guides (p. 65)</td>
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<td>309/310, Marriott  Analyze and Interpret Weather and Climate Data with a Web-Based Graphing Tool (p. 68)</td>
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<td>121C, Conv. Center  Employ Design Thinking with 3D Printing while Learning to Code (p. 69)</td>
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<td>120B, Conv. Center  Get Creative! Develop Students Science and Engineering Practices, Inspired by Birds (p. 69)</td>
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<td>103C, Conv. Center  Art and Science Collide! Engaging Students Through STEM-Based Comics (p. 67)</td>
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<td>AACT Session: Incorporating Simulations, Animations, and Videos into Your Chemistry Curriculum</td>
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<td>1:30–2:30 PM</td>
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<td>1:30–2:30 PM</td>
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<td>126B, Conv. Center</td>
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<td>3:00–4:00 PM</td>
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<td>Ebola Virus: Biology and the Epidemiology of a Virus to Be Used as a Teaching Guide</td>
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<tr>
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<td>9–C</td>
<td>118C, Conv. Center</td>
<td>NCTM Session: Catalyzing Change in High School Mathematics: Initiating Critical Conversations</td>
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<td>Teach Engineering Practices on the Cheap with Concrete</td>
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<tr>
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<td>307, Conv. Center</td>
<td>Discover the Interconnectedness of Human Sustainability and Earth’s Ecosystems with One Health!</td>
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<tr>
<td>9:30–10:30 AM</td>
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<td>304/VIP, Conv. Center</td>
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<td>8–12</td>
<td>126A, Conv. Center</td>
<td>Hands-On Curriculum: Embedding a Free STEM Video Game</td>
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<td>9:30–10:30 AM</td>
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<td>124, Conv. Center</td>
<td>Finding STEM’s Interdisciplinary Nexus: Big Ideas as Portals to Cross-Disciplinary Learning</td>
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<td>103C, Conv. Center</td>
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<td>K–12</td>
<td>126B, Conv. Center</td>
<td>Do You Need A Science Lab? Win a Shell Science Lab Makeover ($20,000 Value) for Your School</td>
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<td>Inquiring Minds Want to Know: Overcoming Barriers to Inquiry-Based Learning in the Traditional and Virtual Classrooms</td>
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<td>126A, Conv. Center</td>
<td>Data Analysis Made Easy: Connecting Math and Science Through Technology</td>
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<tr>
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<td>103C, Conv. Center</td>
<td>Engage! Inquiry-Based STEM Learning Through Hands-On Experimentation</td>
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<td>11:00 AM–12 Noon</td>
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<td>AACT Session: Building a Periodic Table Unit Plan Using American Association of Chemistry Teachers (AACT) Resources</td>
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<td>Green Machines</td>
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3:00–4:00 PM  8–9  304/VIP, Conv. Center  Physical Science and Technology: A New Course (p. 68)

Partnerships Strand

Wednesday

12 Noon–1:00 PM  1–12  117, Conv. Center  STEMx Session: The Power of Place-Based Education: Helping Rural Educators Leverage Local Assets (p. 26)

Thursday

8:00–9:00 AM  G  118B, Conv. Center  Recruiting and Retaining Minorities and Women in Engineering (p. 29)
8:00–9:00 AM  G  119B, Conv. Center  Leveraging Partnerships to Ensure a Future-Ready Workforce (p. 29)
9:30–10:30 AM  G  118B, Conv. Center  STEM in Philadelphia: Combining Efforts to Tackle the STEM Education Gap in Philadelphia (p. 31)
9:30–10:30 AM  5–7, C  102A, Conv. Center  STEM Ambassadors in Rural Maine: Leveraging Partnerships (p. 31)
9:30–10:30 AM  P–12  124, Conv. Center  How a Teacher Can Fund STEM Programs (p. 33)
11:00 AM–12 Noon  3–12  118C, Conv. Center  Using National Science Olympiad STEM Classroom Materials to Address NGSS Crosscutting Concepts and Content (p. 37)
11:00 AM–12 Noon  9–C  102A, Conv. Center  The Involvement of Modern Business in Educational STEAM Projects with Students (p. 37)
1:30–2:30 PM  K–C  118C, Conv. Center  Developing a STEM Ecosystem to Prepare All Students for Career Readiness (p. 63)
1:30–2:30 PM  K–6  102B, Conv. Center  Scaling Up STEM: A Countywide Approach (p. 41)
1:30–2:30 PM  10–12  124, Conv. Center  NABT and BSCS Present: Identify and Interpret—a Strategy to Help Students Make Sense of Difficult Information (p. 44)
1:30–2:30 PM  G  125, Conv. Center  Yes, You Can! Tips and Tricks for Presenting at an NSTA Conference (p. 42)
3:00–4:00 PM  1–12  124, Conv. Center  WIDA Session: Engaging Language Learners in Science and Engineering (p. 48)
3:00–4:00 PM  G  102A, Conv. Center  May the Force Be with You: A STEM Wars Night to Remember! (p. 46)

Friday

8:00–9:00 AM  G  118B, Conv. Center  Recruiting and Retaining Minorities and Women in Engineering (p. 51)
8:00–9:00 AM  G  119B, Conv. Center  Leveraging Partnerships to Ensure a Future-Ready Workforce (p. 51)
9:30–10:30 AM  P–12  102A, Conv. Center  NSTA Press® Session: Need Money? Write a Grant! (p. 52)
11:00 AM–12 Noon  P–12  117, Conv. Center  What’s Happening with STEM in Libraries? (p. 58)
11:00 AM–12 Noon  7–12  102A, Conv. Center  Surf & Turf Programming: Connected Learning Through Collaborative Partnerships (p. 57)
11:00 AM–12 Noon  2–C  125, Conv. Center  Bringing Active STEM Learning Through an Experiment-Based Game Challenge (p. 61)
1:30–2:30 PM  C  102B, Conv. Center  Engaging Undergraduate Students in Experiential Learning Opportunities (p. 63)
1:30–2:30 PM  5–6, C  125, Conv. Center  Increase Students’ Interest in Coding with a STEM Partnership (p. 64)
3:00–4:00 PM  K–8  118B, Conv. Center  Enhancing Program Quality in Out-of-School-Time: Effects of Professional Development on STEM Knowledge and Skills (p. 67)
3:00–4:00 PM  1–5, C  102A, Conv. Center  Charles E. Smith Jewish Day School and George Washington University’s Project for Integrated STEM Education (p. 67)
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### Upper Elementary Strand

- **3:00–4:00 PM 3–6 113B, Conv. Center**
  - Connecting the School Community Through a Halloween-Themed Hands-On STEM Night (p. 68)

- **3:00–4:00 PM 6–9 121A, Conv. Center**
  - Authentic Purpose and Audience: Using Aquaponics to Create a Dynamic Grade 8 Science Curriculum (p. 68)

### Administrators Strand

#### Wednesday

- **10:30–11:30 AM P–12 116, Conv. Center**
  - STEMx Session: WOW! So That’s a STE(A)M Classroom (p. 25)

- **12 Noon–1:00 PM K–12 116, Conv. Center**
  - STEMx Session: Retooling Leader Growth for STEM Learning (p. 25)

#### Thursday

- **11:00 AM–12 Noon K–12 118A, Conv. Center**
  - How to Grow STEAM/STEM in Your School and Community (p. 39)

- **11:00 AM–12 Noon K–8 102B, Conv. Center**
  - PULSE 2.0: A Partnership to Understand and Lead STEM Education (p. 37)

- **3:00–4:00 PM K–8 118B, Conv. Center**
  - NGSS Transition Boot Camp (p. 47)

#### Friday

- **9:30–10:30 AM 6–12 102B, Conv. Center**
  - The Role of Visionary Leadership in the Integration of Making into One School District: A Case Study (p. 52)

- **11:00 AM–12 Noon K–12 118C, Conv. Center**
  - Moving from Pockets of Innovation to a Comprehensive and Cohesive STEAM Program (p. 58)

- **11:00 AM–12 Noon K–8 119A, Conv. Center**
  - NGSS Implementation Boot Camp (p. 58)

- **3:00–4:00 PM P–C 117, Conv. Center**
  - Safer Makerspaces and STEM Labs: A Collaborative Approach! (p. 67)
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