

NSTA's 2015

STEM

SCIENCE

TECHNOLOGY

ENGINEERING

MATHEMATICS

— Forum & Expo —

Minneapolis, MN
May 20–23, 2015

#NSTA15 #STEMforum



www.nsta.org/stemforum

NSTA National
Science
Teachers
Association

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in the classroom, lab and field



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NSTA 2015 STEM Forum & Expo

Minneapolis, Minnesota • May 20–23, 2015

Wednesday Kick-off: Evening Exhibit Preview & Welcome Reception followed by Keynote speaker: Barrington Irving, Founder and President, Experience Aviation, Inc. and the Flying Classroom

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National Science Teachers Association

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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)

Sponsors and Contributors to the 2015 STEM Forum & Expo

NSTA and the 2015 STEM Forum Steering Committee are extremely grateful to the following companies and organizations for their generous support and contributions to the 2015 STEM Forum & Expo.

Sponsors

Boston Scientific

Foundation for Family Science & Engineering

Contributors

The Bakken

International Technology and Engineering
Educators Association (ITEEA)

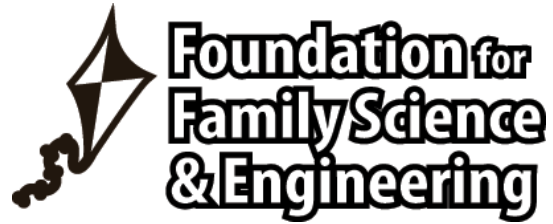
National Council of Teachers of Mathematics (NCTM)

Science Museum of Minnesota

The Works Museum



Boston
Scientific



Foundation for
Family Science
& Engineering



Welcome to the 2015 STEM Forum & Expo



Adrienne Gifford



Juliana Texley

Soar with STEM

To a young learner, the world around presents endless opportunities for exploration. It's the same with a rich STEM curriculum—an environment without disciplinary boundaries, where the practices of science and engineering become the tools for discovery. In the context of authentic and culturally relevant investigations, students not only learn basic skills more efficiently but develop the knowledge, skills, and attitudes that enable them to tackle problems in life. STEM experiences help learners soar!

At this STEM Forum and Expo, you'll join educators from all over the nation and beyond to explore how integrated three-dimensional learning can empower tomorrow's citizens. Like the synergy between the STEM subjects and the practices, the spark that occurs among professionals at a meeting like this results in a special energy boost. This NSTA forum has become a great environment for teams of educators, including teachers, administrators, and other thought-leaders, who take this time to work together to build a framework for educational innovation.

We invite you to use all of the resources this meeting offers: keynote presentations, sessions, informal networking, and the resources of exhibitors to build your own path to future success for your students and your community. We invite you to soar!

Adrienne Gifford, NSTA 2015 STEM Forum Steering Committee Chairperson

Juliana Texley, 2014–2015 NSTA President



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NSTA Conferences and STEM Forum & Expo Go Green!

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 2015 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/Personal Scheduler. 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 conference experience.

Recycled Paper and Sustainable Print Services

Forum programs are printed on recycled paper whenever possible. In addition, McDonald & Eudy Printers, Inc., the printer for our STEM Forum & Expo materials, is in strict compliance with all environmental laws and exceeds these standards in many areas. Wherever possible, McDonald & Eudy works to reduce and recycle waste, use reduced or low-VOC chemicals, increase the recycled content of raw materials, and use soy- and/or vegetable-based inks. McDonald & Eudy has also obtained chain-of-custody certification for paper products to ensure they 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 wastebaskets. 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.

Green Initiatives at the Minneapolis Convention Center

The Minneapolis Convention Center is committed to sustainability and recently achieved level one certification to the ASTM standard pertaining to the evaluation and selection of venues for environmentally sustainable meetings, events, trade shows, and conferences. Current green initiatives include:

- **Solar.** The Convention Center now receives 15% of its electrical energy from renewable sources. The solar array on the rooftop, made up of 2,613 panels, is connected directly to the facility's internal electrical system, producing 750,000 kWh of renewable electricity per year—the equivalent of powering 85 homes. The array offsets 539 metric tons of carbon dioxide emissions annually.
- **Recycling.** In 2013, their annual recycling rate increased to 49%, which adds up to a total of 467 tons recycled.
- **Energy Efficiency.** Through a series of LED lighting upgrades, the Convention Center is expected to reduce the energy needed for lighting all areas by 40–60% when complete.
- **Water.** The Convention Center has saved 3.7 million gallons of water through conservation efforts since 2009. Reduction in water usage has focused on three major areas: restrooms, kitchens, and landscaping irrigation.
- **Cleaning Products and Equipment.** 95% of cleaning products are Green Seal certified. Floor care equipment utilizes FaST (foam scrubbing technology) to reduce chemical application by using 87% less chemicals than traditional floor scrubbers.

"Go Green" at the 2015 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 conference.
- Bring your own refillable water bottle to the forum.
- In advance of the forum, presenters are encouraged to post their presentations and handouts online on the Session Browser/Personal Scheduler.
- Evaluate sessions attended online.



Meeting Location and Times

STEM Forum & Expo hotels are Hilton Minneapolis—Conv. Center (*headquarters*), Hilton Garden Inn Minneapolis Downtown, and Holiday Inn Express Hotel & Suites Minneapolis Downtown Conv. Center. STEM Forum registration, the exhibits, the NSTA Store, and sessions will be located at the Convention Center. The STEM Forum & Expo will begin on Wednesday, May 20, with an Evening Exhibit Preview and Welcome Reception, 4:00–6:30 PM, followed by the opening keynote presentation, 6:30–7:45 PM, by Barrington Irving, Founder and President, Experience Aviation, Inc. and the Flying Classroom. The Friday evening keynote presentation will be given by Freeman Hrabowski, President of the University of Maryland, Baltimore County followed by a book signing.

The STEM Forum & Expo will end on Saturday with a Closing Session, 8:00–10:00 AM, from strand leaders followed by a student panel discussion.

Registration

Registration is required for participation in all forum activities and the exhibits. The lapel badge mailed to you with your confirmation, or issued to you at registration

on-site, is your “ticket of admission” to the Exhibit Hall and all forum activities.

NSTA Registration and the NSTA Store are both located in Exhibit Hall A of the Convention Center. NSTA Registration will be open the following hours:

Wed., May 20	3:00–6:30 PM
Thu., May 21	7:00 AM–5:30 PM
Fri., May 22	7:00 AM–5:30 PM

The NSTA Store will be open the following hours:

Wed., May 20	3:00–7:00 PM
Thu., May 21	8:00 AM–6:00 PM
Fri., May 22	8:00 AM–6:00 PM

If you misplace your badge or tickets, present your personal ID at the Badge Reprint Counter in the Registration Area and you will be issued replacements. Only one replacement badge will be issued.

Ground Transportation to/from Airport

Minneapolis—St. Paul International Airport (MSP) is approximately 16 miles from downtown Minneapolis. You’ll find two terminals at the airport: Lindbergh and Humphrey. Ground transportation at the Lindbergh Terminal is accessible via the Tram Level. Ground transportation

at the Humphrey Terminal is available at the Humphrey Ground Transport Center, located on the ground level of the Purple parking ramp directly across from the terminal building. For information on ground transportation options, visit the Minneapolis-St. Paul International Airport website: www.mspairport.com. Taxi service is available at both terminals, and fares average \$39–\$49 to downtown Minneapolis.

Getting Around Town

Minneapolis is compact and easy to get around, no matter what mode of transportation you choose. Experience the history, culture, and energy of Minneapolis by traveling by foot. Minneapolis is home to a unique system of glass “tunnels” located one story above ground. These skyways will get you almost anywhere in climate-controlled bliss. Metro Transit operates one of the largest public transportation systems in the country. Or you can take the Hiawatha Light Rail, which connects downtown Minneapolis with the airport and Mall of America and 17 other stations. For a wealth of information on navigating the Minneapolis area, visit bit.ly/1H73STJ.

Parking

Parking is easy to find at the Convention Center. Right across the street is an underground parking ramp that is connected by a climate-controlled skyway system to the Convention Center and several downtown accommodations and attractions. There are a dozen parking ramps within easy walking distance, most connected to the Convention Center by skyway. For directions to the Convention Center as well as parking rates and maps, visit bit.ly/1JqSbbl.

Discounted Rental Cars

The toll-free number to contact an NSTA-designated car rental company is:

Enterprise 800-593-0505 16AH230

* go to www.enterprise.com and use “16AH230” in the “Optional: Coupon, Customer, or Corporate Number” box. Click on “search” and enter PIN “NST.”

Registration, Travel, and Hotels



**1. Hilton Minneapolis-Conv. Center
(Headquarters)**

1001 Marquette Ave. S.

2. Hilton Garden Inn Minneapolis Downtown

1101 4th Ave. S.

**3. Holiday Inn Express Hotel & Suites
Minneapolis Downtown Conv. Center**

225 S. 11th St.

Housing Questions or Concerns?

If you have any questions or concerns about your housing, please contact Orchid Event Solutions toll-free at 877-352-6710.



Don't forget to visit the NSTA Store for a selection of STEM titles as well as hundreds of teaching resources for STEM educators.

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.

The lapel badge mailed to you with your confirmation, or issued to you at registration on-site, is your "ticket of admission" to the Exhibit Hall and all forum activities. A map display of the Exhibit Hall will be on-site and accessible via our Conference app. A complete list of exhibitors and contact information starts on page 72.

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

Evening Exhibit Preview and Welcome Reception

Wed., May 20 4:00–6:30 PM

Exhibits

Thu., May 21 12:30–3:30 PM

Fri., May 22 12:30–3:30 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 83 for a complete listing of exhibitor workshops.

Presenters and Presiders Check-In

If you are presenting or presiding at a session, please check in and pick up your ribbon at the Presenters/Presiders booth in the Registration Area after you have registered for the forum and received your name badge.

Wi-Fi at the Convention Center

The Minneapolis Convention Center offers free Wi-Fi (wireless Internet service) in all first level lobbies, making the visitors experience easier by enabling attendees to stay connected.

NSTA Store

You are invited to browse the NSTA Store, where you're sure to find hundreds of the very best teaching resources for STEM educators. NSTA Press® books uniquely blend accurate scientific content with sound teaching strategies, and they appeal to STEM educators of all grade bands and disciplines. Examine some of our latest books—including *Exemplary STEM Programs: Designs for Success*; *The Case for STEM Education: Challenges and Opportunities*; *Exemplary Science for Building Interest in STEM Careers*; *The BSCS 5E Instructional Model: Creating Teachable Moments*; *Teaching for Conceptual*

Understanding in Science; *NGSS For All Students*; *Reimagining the Science Department*; *Earth Science Success, 2nd Edition: 55 Tablet-Ready, Notebook-Based Lessons*; and our brand-new *Argument-Driven Inquiry* series with two best-seller titles: *Argument-Driven Inquiry in Chemistry: Lab Investigations for Grades 9–12* and *Argument-Driven Inquiry in Biology: Lab Investigations for Grades 9–12*; as well as our *Powerful Practices* series: *The Power of Questioning: Guiding Student Investigations*. Also, be sure to check out our first-ever line of children's books—from NSTA Kids.

In addition, we carry dozens of wonderful NSTA Gear items—such as T-shirts, mugs, and pencils—as reminders of your forum experience or as gifts for your family, colleagues, and students. Show your love of science and pride in teaching with items from our "Science Matters" and "I Love Science" NSTA Gear product lines.

The NSTA Store is located in Exhibit Hall A of the Convention Center. All members receive discounts of 20% on NSTA Press and Gear items and 10% on books from other publishers. Perhaps best of all—enjoy free shipping when you place your order online in the on-site store for both books and Gear.

Restaurant Reservations/Concierge Desk

Looking for restaurant recommendations or help making reservations? Located in the registration area of Exhibit Hall A, the dining specialists can assist you. Stop by to also find out more about Minneapolis shopping, attractions, nightlife, and more.

Graduate Credit Opportunity

STEM Forum & Expo attendees can earn one graduate-level credit in professional development through Framingham State University. For details on the assignment requirements, visit www.framingham.edu/nsta. Questions? E-mail Paula Hogard at phogard@framingham.edu or call 508-626-4034.

Note: Grading will be pass/fail.

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. 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. Scan QR code or visit www.nsta.org/conference_app to download the app. *Note:* Make sure to create a CrowdCompass account when logging in to be able to export any notes taken with the app.

MnSTA Booth

The Minnesota Science Teachers Association is offering a special invite to join MnSTA as they celebrate 50 years of fostering excellence in science education in Minnesota for all. The MnSTA booth is located in the registration area of Exhibit Hall A. Stop by to learn about the benefits of becoming a member of MnSTA as well as pick up membership forms and information on association activities.

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 (an LCD projector and screen). 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 in the following room:

- 201 A/B, Convention Center

Business Services

Located on the main floor across from the auditorium of the Minneapolis Convention Center, the UPS Store offers a variety of services, including photocopying, scanning, faxing, use of computer work stations, and same-day shipping. During the week of the forum, hours will be

Monday–Friday 8:00 AM–5:00 PM
Saturday 10:00 AM–3:00 PM

For more information, please call 612-335-6295 or e-mail store6479@theupsstore.com.

First Aid Services/Emergency

The First Aid room is located in lobby C of the Minneapolis Convention Center next to Dunn Brothers (look for the red cross). Should you require or know of a medical emergency, contact security at 612-335-6040 or on any house phone by dialing 2013.

Lost and Found

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

Forum Evaluation

All forum attendees are invited to complete a forum evaluation online at www.surveymonkey.com/s/HBPG9YC

Interested in Joining NSTA?

The NSTA Membership Booth is located in the NSTA Store in Exhibit Hall A of the Convention Center. Stop by to learn 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 6-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 online May 20–23, 2015, while the session is fresh in your mind! To evaluate a session, attendees should follow these steps:

- Visit the STEM Forum session browser and search for part of the session title or presenter's name using the **Find Keyword** search option. *Note:* Our session evaluation system is designed to work from a computer and while it may work on smartphones/tablets, it is not really designed for them.
- Once you find the session you wish to evaluate, simply click the **Evaluate Session** button.
- Enter badge number (if you don't remember your badge number, click "help me find my badge number").
- When finished evaluating the session, click the **Submit Evaluation** 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 page 16 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.

Beginning June 15, 2015, an attendee can view his or her transcript at the NSTA Learning Center (learningcenter.nsta.org) by clicking on "My PD Record and Certificates." Attendees can also document credit for activities that are not being evaluated (e.g., Exhibit Hall visits). Each attendee is responsible for tracking his or her own attendance at such events. The transcript can be printed here and presented to an administrator who requires documentation of participation in the forum. All information in these transcripts will be maintained (and can be accessed) indefinitely as part of an attendee's individual profile.

The following venues have extended special offers for STEM Forum & Expo attendees. During the days of the STEM Forum & Expo, attendees need only show their badge to take advantage of these offers to The Bakken Museum, Science Museum of Minnesota, and the Works Museum.



The Bakken Museum www.thebakken.org

Located on the west shore of Lake Calhoun in a Tudor-Gothic style mansion, The Bakken Museum is offering free admission to STEM Forum & Expo attendees (must show badge at visitor services desk) available Wednesday–Saturday, May 20–23. The Bakken Museum features unique interactive exhibits, a renowned collection of historical artifacts and books, and STEM education programs that inspire learners of all ages to explore science as a creative, social endeavor through experiences with and stories of electricity and magnetism. The museum is open on Wednesday, Friday, and Saturday from 10:00 AM to 5:00 PM; and Thursdays from 10:00 AM to 8:00 PM. The museum is located at 3537 Zenith Ave S., Minneapolis.



Science Museum of Minnesota www.smm.org

The Science Museum of Minnesota is offering a 50% discount off admission to STEM Forum & Expo attendees (must show badge for discount) available Wednesday–Sunday, May 20–24. Located in beautiful downtown St. Paul and overlooking the Mississippi River, the museum's 70,000 square feet of exhibition space includes hands-on and interactive exhibits for all ages. Their current special exhibition is *Space: An Out-of-Gravity Experience*, complimented by the *Journey to Space* Omnitheater film. The museum is open on Wednesday and Sunday from 9:30 AM to 5:00 PM; and Thursday through Saturday from 9:30 AM to 9:00 PM. The museum is located at 120 W. Kellogg Blvd., St. Paul.

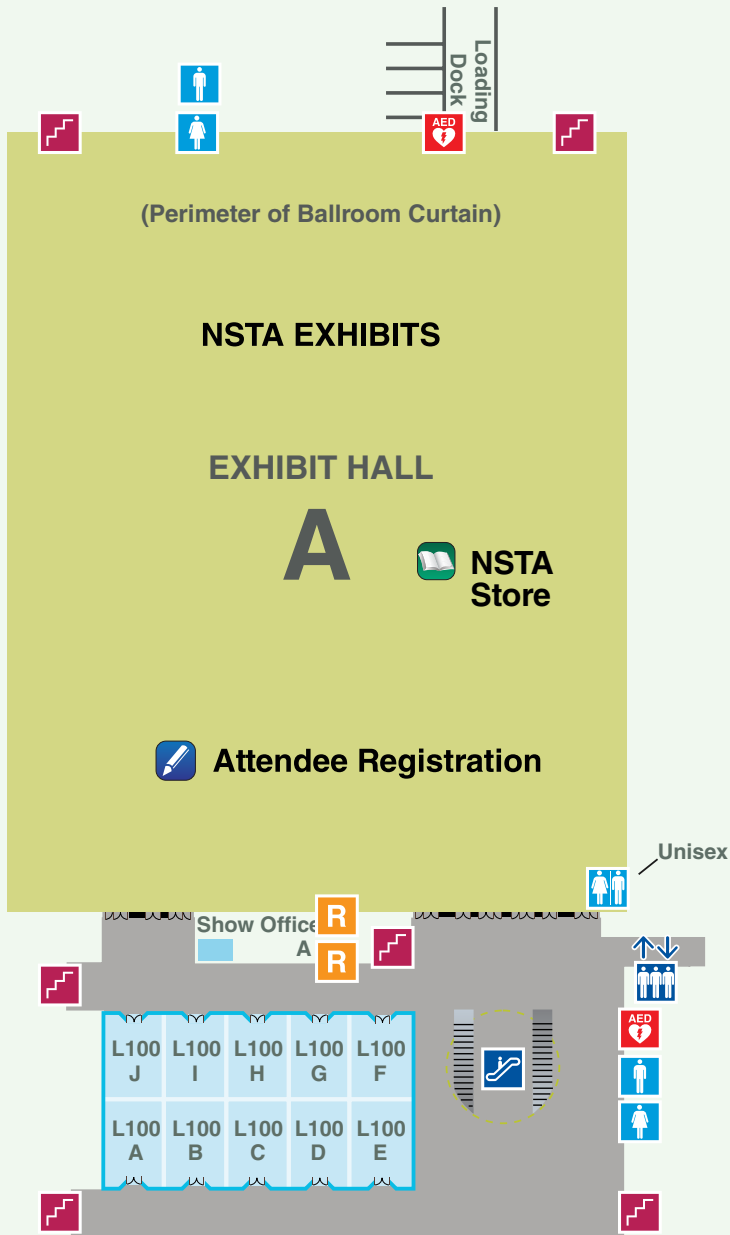


The Works Museum www.theworks.org

The Works Museum located at 9740 Grand Avenue South in Bloomington is offering \$4 (half-price) admission for STEM Forum & Expo attendees who show their badge at the ticket counter Wednesday–Saturday. The Works Museum is a hands-on museum where kids explore engineering through design-and-build challenges and interactive exhibits. The Works Museum's hours are Thursday and Friday from 9:00 AM to 3:00 PM, and Saturday from 10:00 AM to 5:00 PM.

Minneapolis Convention Center

Lower Level

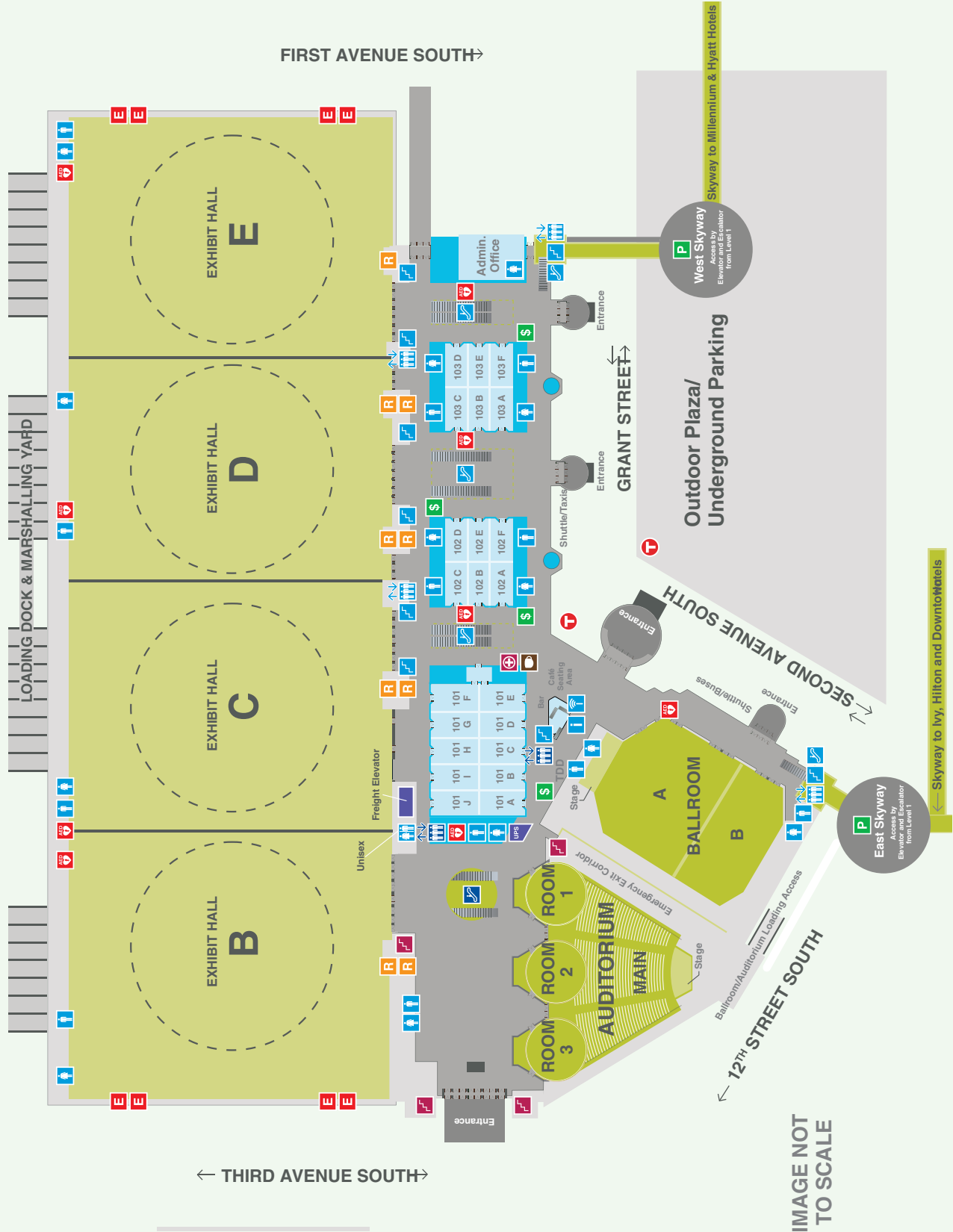


LEGEND

- Restrooms
- Escalators (All Levels)
- Elevators (All Levels)
- Stairs (Levels 1 & 2)
- Emergency Stairs
- Automated External Defibrillator
- Refreshments

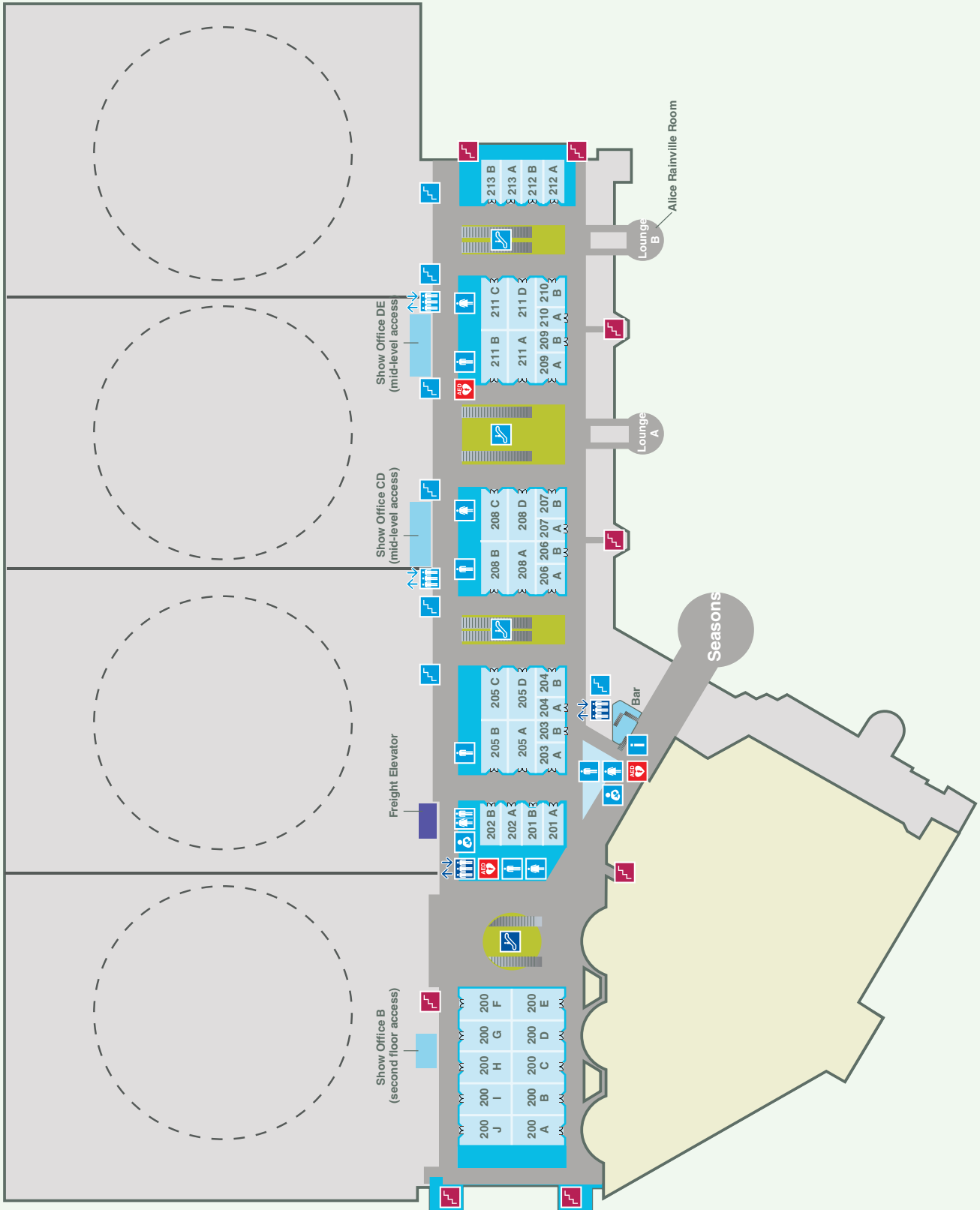
Minneapolis Convention Center

Level One



Minneapolis Convention Center

Level Two



Biotechnology Explorer™



Fish DNA Barcoding Kit

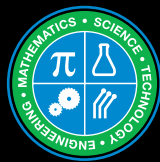
Are you passionate about STEM education?

NGSS in the High School Classroom

Workshops in Room L100I

- Thursday
• 10:15–11:15 AM
- Friday
• 10:15–11:15 AM

We share your passion and make it easy to bring STEM and inquiry into your classroom. Science in the 21st century is driven by the integration of science, technology, engineering, and mathematics (STEM). Citizens and scientists alike are required to understand these fundamentals in order to make decisions from personal healthcare solutions to global energy challenges.



Come visit us at **booth 211** and attend our free hands-on workshops. Join us to better understand STEM in the high school classroom through the application of the three dimensions from NGSS. This interactive learning opportunity includes modeling, explanation and argumentation, and engineering practices.



Visit us on the Web at explorer.bio-rad.com
Call toll free at 1-800-424-6723;
outside the U.S., contact your local sales office.



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Marcelo Nunez, Exhibit Services Coordinator

LEARNING CENTER/SciLINKS

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All cities are subject to change pending final negotiation.

National Conferences on Science Education

Nashville, Tennessee
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Area Conferences on Science Education

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Reno, Nevada—October 22–24
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2017 Area Conferences

Baltimore, Maryland—October 5–7
Milwaukee, Wisconsin—November 9–11
New Orleans, Louisiana—November 30–December 2



Friday, May 22 8:00 AM–6:30 PM

Start Time	End Time	Activity/Event Title
_____	_____	_____
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Saturday, May 23 8:00–10:00 AM

Start Time	End Time	Activity/Event Title
_____	_____	_____
_____	_____	_____

Keynote Speakers

Wednesday, May 20, 6:30–7:45 PM



Barrington Irving
 Founder and President,
 Experience Aviation and
 the Flying Classroom

**The Flying Classroom:
 Inviting Students to Soar**

Barrington will share
 exclusive moments, vid-

eos, and images from his Flying Classroom
 experience and discuss how this innovative
 project brought STEM+ into the lives of the
 students who followed its science curriculum
 online. He will also talk about the resources
 and activities his team provided to teachers
 that enhanced the learning experience.

(See page 23 for details.)

Friday, May 22, 5:30–6:30 PM

followed by a book signing from 6:30 to 7:30 PM



Freeman Hrabowski
 President, University
 of Maryland, Baltimore
 County

**Education for the 21st
 Century: Creating a
 Climate of Success for
 All Students**

Join Freeman as he discusses innovative
 approaches to STEM teaching and learning,
 STEM teacher preparation, support for the
 growing population of diverse students who
 must participate and succeed in these fields,
 and the importance of partnerships between
 schools, universities, philanthropy, govern-
 ment agencies, and business.

*NSTA is grateful to Boston Scientific for sponsoring
 this speaker (see page 69 for details).*

Wednesday, May 20

4:00–6:30 PM Evening Exhibit Preview and Welcome Reception 23
 6:30–7:45 PM Opening Keynote: Barrington Irving 23

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Friday, May 22

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 6:30–7:30 PM Book Signing for Freeman Hrabowski 69

Saturday, May 23

8:00–10:00 AM Closing Session: Strand Leader Reports and Student Panel
 Discussion 71



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An index of all strand sessions starts on page 86.

Primary (Early Childhood)

Pr How do we get students prepared to think and work in a global world? Let's begin with effective preK–2 STEM instruction. Providing students with inquiry-based experiences in Science, Technology, Engineering, and Mathematics is the key to unlocking their emerging world. The foundational skills learned and mastered through STEM integration during the early years lead to citizens who enter adulthood proficient and prepared.

Upper Elementary

E 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, align to 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

M Equipping students with the 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, and collaborate on 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

HS As we move forward in the 21st century and begin preparing high school students to enter the workforce and college, STEM careers should be optimal goals for all students. Traditionally, high school content would be taught in isolation of other areas of study. Now, Science, Technology, Engineering, and Mathematics must be effectively integrated and delivered in impactful and meaningful ways. Using an integrated approach that includes real-world connections and hands-on experiences will establish a solid STEM education for students in grades 9–12. The sessions in this strand will highlight strategies and curriculum design both for formal and informal learning environments that best facilitate effective STEM integration and STEM Career Awareness.

Partnerships

Pa As the Nation recognizes the importance of STEM education to our economic future, we are beginning to see collaborations in STEM education between preK–middle schools, high schools, higher education, and business and cultural communities, with varying degrees of success and impact. The sessions in this strand highlight select initiatives that have demonstrated an impact and have been successfully implemented.

Administrators

A U.S. schools are working to ensure that all American students receive the skills and knowledge required for success in the 21st-century workforce. The STEM fields are collectively considered the core technological underpinnings of an advanced society, and the strength of the STEM workforce is viewed as an indicator of a nation's ability to sustain itself. Maintaining a citizenry that is well versed in the STEM fields is a key segment of the U.S. public education agenda.

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 for elementary, middle school, and high school students. The new standards in mathematics and ELA and, specifically, the Standards for Mathematical Practice and the *Next Generation Science Standards* help to connect all areas of STEM. The integration of STEM content to answer complex questions, to investigate global issues, and to develop solutions for challenges and real-world problems requires the use of practices such as making sense of problems and persevering in solving them; reasoning abstractly and quantitatively; constructing viable arguments and critiquing the work of others; modeling with mathematics; using appropriate tools strategically; attending to precision; looking for and making use of structure; and looking for and expressing regularity in repeated reasoning. The sessions in this strand are intended to highlight exemplary efforts that are being made by schools to create a STEM culture.



—Photo of Spoonbridge and Cherry courtesy of Claes Oldenburg and Coosje van Bruggen / ©Meet Minneapolis



STEM NIGHT EVENT

DON'T MISS OUT ON THE FUN!

Thursday, May 21
7:00–8:30 PM, Ballroom B, Conv. Center
(Doors open at 6:30 PM)
Ticket: T-1; \$5 per person

Sponsored by Foundation for Family Science & Engineering

Discover the excitement of the Family STEM Night event with colleagues and friends. Experience a range of hands-on activities designed specifically to actively engage elementary-age youth and their parents in exploring science and engineering concepts and careers together.

Learn how to plan and host successful STEM Family events in your school and/or community. Light snacks, take-home materials, and prizes! Be sure to register now (T-1); seats are limited!

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Exhibit Hall A

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Wednesday	3:00 PM–7:00 PM
Thursday	8:00 AM–6:00 PM
Friday	8:00 AM–6:00 PM

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Photo of 2013 STEM Forum & Expo Strand Leader Report

Closing Session

How Can We Better Prepare Our Students for STEM-related Careers?

*Saturday, May 23, 8:00–10:00 AM
101C, Convention Center*

The closing session (page 71) will provide an opportunity to hear highlights from the two-day experience. Each of the six strand leaders will provide brief reports and summaries.

This session will conclude with a panel of outstanding high school students sharing their interests, visions, and hopes of entering STEM-related careers. The students will discuss the educational opportunities they have had and programs they have experienced.

They will examine the encouragement they have received to this point and consider the support they will need to move successfully into their future studies and occupations.

Part I: Strand Leaders' Reports

Part II: Food for Thought: A Student Panel Discussion



—Photo courtesy of the Science Museum of Minnesota

Located in downtown St. Paul and overlooking the Mississippi River, the Science Museum of Minnesota has 70,000 square feet of exhibition space that includes hands-on and interactive exhibits for all ages. See page 9 for details about their special offer and as well as other special offers for forum attendees.







4:00–6:30 PM Evening Exhibit Preview and Welcome Reception

Exhibit Hall A, Convention Center

The STEM Forum & Expo kicks off with this exclusive sneak preview of the Exhibit Hall and reception. 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.

Strands

The STEM Form & Expo Steering Committee has planned the forum around six strands, enabling you to focus on a specific area of interest or need. Strand events are identified by icons throughout the daily program. For strand descriptions, see page 19. On page 86, you will find the sessions grouped according to their strand.

-  **Primary (Early Childhood)**
-  **Upper Elementary**
-  **Middle Level**
-  **High School**
-  **Partnerships**
-  **Administrators**

The ideas and opinions expressed in the forum sessions, and in any handout materials provided, are those of the presenter. They are not those of the National Science Teachers Association nor can any endorsement by NSTA be claimed.

6:30–7:45 PM Opening Keynote Presentation The Flying Classroom: Inviting Students to Soar

(General)

Ballroom A, Convention Center



Barrington Irving (@CaptainIrving; victoriad@flyingclassroom.com), Founder and President, Experience Aviation and the Flying Classroom, Miami, Fla.

Welcome and Introduction of Speaker: Juliana Texley, NSTA President, Boca Raton, Fla.

Platform Guests: Barrington Irving; Juliana Texley; Adrienne Gifford, Chairperson, STEM Forum Steering Committee, and Open Window School, Bellevue, Wash.; Jennifer Williams, Primary Strand Leader, STEM Forum Steering Committee, and Isidore Newman School, New Orleans, La.; Dedric McGhee, Upper Elementary Strand Leader, STEM Forum Steering Committee, and Shelby County Schools, Memphis, Tenn.; Sue Evans, Middle Level Strand Leader, STEM Forum Steering Committee, and Ridgely Middle School, Lutherville, Md.; Kavita Gupta, High School Strand Leader, STEM Forum Steering Committee, and Monta Vista High School, Cupertino, Calif.; Reo Pruiett, Partnerships Strand Leader, STEM Forum Steering Committee, and Educate Texas, Texas STEM Program Officer, Dallas; Tom Evans, Administrators Strand Leader, STEM Forum Steering Committee, and Eastern Technical High School, Essex, Md.; Doug Paulson, Honorary Member, STEM Forum Steering Committee, and Minnesota Dept. of Education, Roseville

How can we fuse the passion to explore, the skill to fly around the world, and the ability to make science, technology, engineering, and math real and engaging for students? Better yet, how can we make STEM+—which includes history, geography, and humanities, too—relevant in the classroom? Answering these questions led Barrington Irving to create the Flying Classroom, an interactive learning adventure that took him to Asia, Indonesia, and Australia, where he carried out 16 powerful ground, air, and sea expeditions exploring real-life applications of STEM+. Barrington will share exclusive moments, videos, and images from this experience and discuss how this innovative project brought STEM+ into the lives of the students who followed its science curriculum online.

In 2007, Barrington Irving became the youngest person, at 23, and first black pilot to fly solo around the globe. On his 97-day journey, he flew 30,000 miles in a single-engine plane called Inspiration. In 2003, Barrington founded the nonprofit Experience Aviation and set up the Experience Aviation Learning Center that continues to offer STEM-based programs and career guidance to middle level and high school students in the Miami area.



—Photo courtesy of The Bakken Museum

The Bakken Museum is a one-of-a-kind museum exploring the mysteries of our electrical world. Bakken educators inspire a passion for science and its potential for social good by helping people explore the history and nature of electricity and magnetism. See page 9 for details about a special offer to the museum along with other special offers for forum attendees.

8:00–9:00 AM Invited Panels

Pa The Why, What, and How of STEM Partnerships That Support Students and Teachers

(General) *101 A/B, Convention Center*
Sponsored by GE Foundation

Facilitator/Organizer: **Kelli Wells**, Executive Director, Education and Skills, GE Foundation, Fairfield, Conn.

Panelists:

Linda Curtis-Bey, Executive Director, STEM Office of Curriculum, Instruction, and Professional Development, New York City (N.Y.) Dept. of Education

Mike Cohen, President, Achieve, Inc., Washington, D.C.

Arnel W. Cosey, Vice Chancellor for Student Affairs and Executive Dean, City Park Campus, Delgado Community College, New Orleans, La.

More than 2.4 million STEM-related jobs go unfilled in the United States each year. In order to prepare students for STEM jobs of the future, STEM partnerships that support students and teachers are critical to bridging the skills gap. This panel will provide context and case studies regarding successful partnering around STEM.

How Do We Measure Success for K–12 STEM Schools? STEM Metrics and Benchmarks

(General) *101 D/E, Convention Center*

Facilitator/Organizer: **Jerry D. Valadez**, NSTA Director, Multicultural/Equity, and Director, Central Valley Science Project, California State University, Fresno

Panelists:

Paul Keidel, STEM Coordinator, Bismarck (N.Dak.) Public Schools

Max McGee, Superintendent, Palo Alto (Calif.) Unified School District

Maureen Griffin, School Improvement Leader and STEM Academy Administrator, Hoover High School, Des Moines, Iowa

This panel of national experts will share a range of perspectives on how teachers, school leaders, community members, and policy makers evaluate and monitor STEM school practices, programs, improvement, and access and equity. Panelists will discuss research findings about the core components of various types of STEM schools and programs across the nation, as well as personal, national, and local efforts to create and use metrics that define and measure successful STEM education. In addition, panelists will conduct a breakout during the symposium where they will facilitate in small groups further study of their programs, research, or personal experiences with the improvement of K–12 STEM education.



9:15–10:15 AM Invited Panel

A Success Stories from Administrators

(General) *101C, Convention Center*

Organizer/Facilitator: **Thomas (Tom) Evans**, Administrators Strand Leader, STEM Forum Steering Committee; and Principal, Eastern Technical High School*, Essex, Md.

Panelists:

Kim Burton-Regulski, Maryland Presidential Award Winner in Mathematics, and Mathematics Dept. Chair, Eastern Technical High School, Essex, Md.

Douglas H. Handy, Coordinator, Office of Career and Technology Education, Baltimore County Public Schools, Towson, Md.

Dedric McGhee, Upper Elementary Strand Leader, STEM Forum Steering Committee; Supervisor of the Year West Tennessee Finalist; American Chemical Society Government Affairs Committee Member; and STEM Manager, Shelby County Schools, Memphis, Tenn.

Jennifer Williams, Primary Strand Leader, STEM Forum Steering Committee; PAEMST 2006; and Lower School Science Dept. Chair, Isidore Newman School, New Orleans, La. The Administrative Panel will include leaders from across the country. If you're an administrator who is interested in either developing and/or improving the STEM program in your school or district, this hour of time will be well spent.

**Eastern Technical High School is a State and National Blue Ribbon magnet school of choice recognized by Newsweek Magazine, U.S. News & World Report, and The Washington Post for the last eight years as being one of "America's Best High Schools."*

9:15–10:15 AM Presentations

M **STEM Projects for the Middle School Classroom**
(Grades 4–12) 101 A/B, Convention Center
DJ West (@djwest78; djwest78@gmail.com), McGraw-Hill Education, Livonia, Mich.
Find out what makes a true STEM project. I'll share examples of projects and resources that you can use to develop projects for your classroom. While aimed at middle school, the principles and resources apply to all levels.

HS **Forensic DNA Analysis in the Classroom**
(Grades 9–College) 101 D/E, Convention Center
Ryan Olson (ryan.olson@btci.org), BioPharmaceutical Technology Center Institute, Madison, Wis.
Learn how human DNA identity testing is really done! Participants will learn to analyze an electropherogram to solve a human identity puzzle.

M **STEM and the NGSS**
(Grades 6–9) 102E, Convention Center
Matthew Hartman (@ecybermission; mhartman@nsta.org), eCYBERMISSION Content Manager, NSTA, Arlington, Va.
Everyone knows that the *Next Generation Science Standards* include science and engineering, but in this session we will discuss how the NGSS fit together with the CCSS. Also, learn about eCYBERMISSION, a free online STEM competition and discover how you and your students can get involved.

M **A Cross-National Comparison of Middle School Science Teachers**
(Grades 4–10) 102F, Convention Center
Carla Stevens, Houston (Tex.) ISD
Review findings from a study investigating and comparing science teachers' 14 professional factors across 14 countries.

M **Valley Middle School of STEM: A Team Approach to Building a STEM Magnet School**
(Grades 6–8) 103A, Convention Center
Sarah Trudeau, Ryan Roseen (ryan.roseen@district196.org), **Michelle Carruthers, Daniel Dudley, and Shaun Lindquist** (shaun.lindquist@district196.org), Valley Middle School of STEM, St. Paul, Minn.
Hear how Valley Middle School of STEM transformed into a thriving magnet using a team approach. The team has also created Minnesota's first middle school fabrication laboratory.

Pa **STEM Collaborations: Integrating Students and Teachers into EPSCoR Research**
(Grades 6–College) 103B, Convention Center
Lindsay Wieland (@VT_EPSCor_CWDD; lwieland@smcvt.edu), Vermont EPSCoR, Colchester
EPSCoR stands for Experimental Program to Stimulate Competitive Research. Hear how Vermont EPSCoR inspires students to pursue STEM education by connecting K–12 schools with institutions of higher education, integrating students and teachers into active research, and supporting underrepresented groups in STEM.

HS **Full STEAM Ahead: Engaging Engineering Activities**
(Grades 6–12) 103D, Convention Center
Lauren Rentfro (@DrLRentfro; rentflla@lewisu.edu), Lewis University, Romeoville, Ill.
Leave with a template for designing engineering activities to address student skills in the STEAM fields and low-cost, low-prep engineering activities for grades K–12.

HS **Free STEM Integration Using InquirySpace Software**
(Grades 7–12) 103E, Convention Center
Chad Dorsey (@chaddorsey; cdorsey@concord.org), The Concord Consortium, Concord, Mass.
Bring STEM practices to life with engaging and free web-based software and activities that weave simulations, data collection, and data analysis into powerful STEM learning experiences.

HS **NCTM Session: When the “M” in STEM Is “MS”**
(Grades 7–College) 103F, Convention Center
Rose Mary Zbiek (@RZbiek; rmz101@psu.edu), Penn State, University Park, Pa.
Read “M” in STEM as mathematics and statistics to readily modify assessment tasks and help students strengthen and integrate mathematics with science and engineering practices.

HS **Solids: The Neglected “State” of Chemistry**
 (Grades 8–12) 208D, Convention Center
Debbie Goodwin (*nywin@hotmail.com*), Retired High School Science Teacher, Chillicothe, Mo.
Andrew Nydam (*andrewnydam@hotmail.com*), ASM International, Materials Park, Ohio
Sherri Rukes (*sherri.rukes@d128.org*), Libertyville High School, Libertyville, Ill.
 Use solids to make chemistry more relevant for students. Hands-on activities using solid materials (metals/polymers/ceramics) make concepts easier to teach/learn. We’ll share NGSS correlations, and you can take home a CD of information.

HS **The Eight Elements of STEM High Schools**
 (Grades 7–12) 210 A/B, Convention Center
Elizabeth Noble (@OutlierUChicago; *enoble@uchicago.edu*), **Heather King** (@outlierrand; *hking@uchicago.edu*), **Sandra Holt** (@sandraholt_msw; *holtsand@uchicago.edu*), and **Melanie LaForce** (@melanielaforce; *laforce@uchicago.edu*), Outlier Research & Evaluation, Chicago, Ill.
 Join us for an in-depth look at the eight elements common to inclusive STEM high schools across the country as identified by researchers at the University of Chicago.

Pa **Bridging the Attraction Gap: An Event-based STEM Partnership That Gets Results**
 (General) 211A, Convention Center
Cynthia Drake (*cynthiadrake@delta.edu*), Delta College, University Center, Mich.
Cody Kangas (*ckangas@mtu.edu*), Michigan Technological University, Houghton
 Discover how to provide an engaging, collaborative, hands-on STEM exploration event that measurably excites and impacts youth, families, and educators in your community.

INCORPORATE STEM INTO YOUR CLASSROOM THROUGH eCYBERMISSION!



ECYBERMISSION IS A WEB-BASED STEM COMPETITION, FREE FOR STUDENTS IN GRADES 6-9.

COMPETE FOR AWARDS UP TO \$9,000 IN U.S. SAVINGS BONDS.

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Pa **Carnegie STEM Excellence Pathway: A Journey to STEM Success**

(Grades P–12) 211B, Convention Center

Alana Kulesa (@AlanaKulesa1; kulesaa@carnegiesciencecenter.org), Carnegie Science Center, Pittsburgh, Pa.

Join staff from the Carnegie Science Center as they share an initiative built upon the belief that schools and educators can improve their STEM education practices through a positive and collaborative approach.

Pa **Dakota’s K–12 STEM Series**

(Grades K–12) 211C, Convention Center

David DeMuth (@ndstem; david.demuth@vcsu.edu), Valley City State University, Valley City, N.Dak.

Come learn how a Dakota’s higher education partnership connects K–12 classrooms simultaneously using dedicated high-bandwidth networks to facilitate hands-on STEM learning and professional development for teachers.

9:15–10:15 AM Hands-On Workshops

E **STEM on a Shoestring: Using Repurposed Materials for Engineering Activities**

(Grades K–12) 101F, Convention Center

Jack Samuelson (jsamuelson@wi.rr.com), Dr. STEM Express, Wauwatosa, Wis.

Let’s repurpose common materials such as paper, cardboard, and plastic containers for classroom engineering activities.

M **STEM Astronomy: Decoding Starlight—From Pixels to Images**

(Grades 7–9) 101J, Convention Center

Donna Young (donna@aavso.org), AAVSO, Cambridge, Mass.

Use image analysis and photon intensity data from NASA’s Chandra mission to produce images suitable for detailed scientific study and artistic images for public release.

HS **Explore Building Mousetrap Vehicles to Integrate Science, Technology, Engineering, and Mathematics**

(Grades 5–College) 101H, Convention Center

Karen Ostlund (@karen_ostlund; klostlund@utexas.edu), 2012–2013 NSTA President, and The University of Texas at Austin

Alden Balmer (alden_balmer@roundrockisd.org), McNeil High School, Austin, Tex.

Build a mousetrap vehicle and find out how to integrate science, technology, engineering, and mathematics by modifying your mousetrap vehicle to improve speed and distance traveled. Handouts!

HS **Using Direct Measurement Videos to Teach Science Practices**

(Grades 8–College) 102A, Convention Center

Peter Bohacek (@bohacekp; peter.bohacek@isd197.org), Henry Sibley High School, St. Paul, Minn.

Come learn why instructors—from junior high classrooms through MIT’s online physics courses—are adopting this innovative and engaging method to teach science practices.

M **“Skunk Works”: A Middle School and High School Engineering Project: Flying Airplanes in the Classroom**

(Grades 8–12) 101I, Convention Center

Art Ellis and **Rebecca Kaplan**, Bedford Middle School, Westport, Conn.

Erin Dobbins (edobbins@westport.ct.k12.us) and **David Oestreicher** (doestreicher@westport.k12.ct.us), Coleytown Middle School, Westport, Conn.

Alfred Scheetz, Staples High School, Westport, Conn.

Assail the boundaries of aircraft performance using rubber band–powered balsa models flying around a pole in the classroom.

M **A Tale of Two Great Oceans: Pressure and Wind-driven Ocean Circulation**

(Grades 5–8) 102B, Convention Center

Donna Barton (dmbarton@oneclay.net), Argyle Elementary School, Orange Park, Fla.

These American Meteorological Society modules on pressure and wind-driven ocean circulation link the two great oceans, atmosphere, and hydrosphere. Find out how atmospheric circulation produces gyres, and how these gyres affect the environment. Free module guides.

M Curiosity as a Tool for STEM Education*(Grades K–12)* 102C, Convention Center**Tim Barrett** (tbarrett@mhta.org), Minnesota High Tech Association, Minneapolis**Brenda Barrett**, Frassati Catholic Academy, St. Paul, Minn.**Cheryl Moeller** (@STEMAhead; cheryl@hightechkids.org), High Tech Kids, Minneapolis, Minn.

Research indicates that curiosity enhances overall learning and memory. Find out how to creatively use games and activities to spur curiosity with students.

M Discovering the Periodic Table*(Grades 5–College)* 102D, Convention Center**Natasha Yates** (nlyates@stkate.edu) and **Annalisa Jordan** (amjordan@stkate.edu), St. Catherine University, St. Paul, Minn.

Take away a multidisciplinary discovery learning activity on atomic structure and learn how students can assemble their own periodic table.

Pr Engineering the Primary Curriculum*(Grades P–2)* 204 A/B, Convention Center**Mijana Lockard**, Lincoln Avenue Academy, Lakeland, Fla. Learn how to develop standards-based STEM units of study using engineering as an integrating concept to promote critical thinking and development of math, science, and literacy skills for young learners. Join me for hands-on explorations and examples of units of study for K–2 students.**Give Your Sound Waves Lessons an Integrated STEM****Pr** Makeover*(Grades P–2)* 206 A/B, Convention Center**Elizabeth Gajdzik** (egajdzik@purdue.edu), INSPIRE, West Lafayette, Ind.

Do your sound waves and material properties lessons need a STEM makeover? Transform them into integrated, authentic, and hands-on engineering design projects that can engage your students.

Developing STEM Literacy Through the Practices**E** *(Grades 3–6)* 208A, Convention Center**Jo Anne Vasquez** (jvasquez@stemlessonessentials.com), 1996–1997 NSTA President, and Rocks to Rainbows, LLC, Gilbert, Ariz.**Jen Gutierrez**, Arizona Dept. of Education, Phoenix

What are the connections between the STEM disciplines? This hands-on workshop will provide relevant experiences that demonstrate how the practices hold STEM together.

E STEM Clubhouse in Your Classroom*(Grades 3–5)* 208B, Convention Center**Melanie Peters** (mpeters@starbasemn.org) and **Ben Sonquist**, STARBASE Minnesota, St. Paul

Use a classroom-based STEM clubhouse to excite students about STEM and related careers, reinforce academic concepts, and promote STEM during and beyond the school day.

E Are Your Students Getting NOSI?*(Grades 3–5)* 208C, Convention Center**Andrew Petto** (ajpetto@uwm.edu), University of Wisconsin–Milwaukee

Practice a grades 3–5 classroom activity—On the Shoulders of Giants—using a graphic organizer to visualize the collaborative and integrative nature of scientific inquiry.



10:15–11:15 AM Exhibitor Workshops

Engineering the JetToy

(Grades 4–6) L100 A, Convention Center

Sponsor: SAE International

Claudia Lee, SAE International, Warrendale, Pa.

What at first appears to be a simple construction of a balloon-powered car, proves to provide an interesting set of challenges in maximizing its performance! Come experience the award-winning A World In Motion JetToy program for yourself—be the engineer behind the car and have some fun!

Zombie Apocalypse!

(Grades 6–12) L100 B, Convention Center

Sponsor: Texas Instruments

Jeffrey Lukens, Sioux Falls (S.Dak.) School District

Become part of a zombie apocalypse as brains will be served (while supplies last). Learn about disease-spread modeling using simulations and fun storylines about a zombie outbreak. Middle and high school students will learn about the STEM careers necessary to stop the zombies! Find out how exciting Hollywood themes can be used to teach science and math concepts.

The “E” in STEM: STEM Engineering

(Grades 5–College) L100 C, Convention Center

Sponsor: WhiteBox Learning

Graham Baughman (graham@whiteboxlearning.com), Whitebox Learning, Louisville, Ky.

Engage your students in the complete engineering design process. WhiteBox Learning provides standards-, web-, and project-based applied STEM learning applications. Gliders2.0, Rover2.0, Structures2.0, Prosthetics2.0, MousetrapCar2.0, GreenCar2.0, Rockets2.0, Dragster2.0, and SurvivalShelter2.0 allow students to build, analyze, and simulate their designs, and compete “virtually,” 24/7, all around the world...how cool is that?!

Case of the Missing Records

(Grades 8–College) L100 D, Convention Center

Sponsor: Edvotek Inc.

Brian Ell (info@edvotek.com), Edvotek Inc., Washington, D.C.

Explore genetic diversity using forensic science! Your students become crime scene investigators as they analyze biological evidence using DNA fingerprinting, a technique that identifies people via genetic differences. Colorful dyes are used to simulate DNA fingerprints from crime scene and suspect samples. A match between samples suggests which suspect committed the crime. Receive a free flash drive/T-shirt drawing entry.

Constructing and Crossing the Cell Membrane

(Grades 6–College) L100 E, Convention Center

Sponsor: 3D Molecular Designs

Gina Vogt (vogt@msoe.edu) and **Margaret Franzen** (franzen@msoe.edu), MSOE Center for BioMolecular Modeling, Milwaukee, Wis.

Find out how to hook high school biology and chemistry students by using models to understand water’s chemical and physical properties and the membranes that separate cells from the surrounding environment. Hands-on tools can help students explore diffusion, osmosis, and the specialized transmembrane proteins that facilitate the active and passive transport of ions across the cell membrane. Handouts!

Mutations, the Cell Cycle, and Cancer

(Grades 9–College) L100 F, Convention Center

Sponsor: HHMI BioInteractive

Megan Stine, Howard Hughes Medical Institute, Chevy Chase, Md.

Learn how to use cancer as a hook to teach core cell biology and genetics concepts, including genetic mutations, gene regulation, the cell cycle, and cell signaling pathways. Receive HHMI’s free classroom-ready resources for high school and college courses.

Flinn Activities to Integrate STEM Education

(Grades 6–12) L100 G, Convention Center

Sponsor: Flinn Scientific, Inc.

Janet Hoekenga, Flinn Scientific, Inc., Batavia, Ill.

This hands-on workshop can help you integrate STEM inquiry and design principles into your science curriculum. Join Flinn Scientific in a “build-it-yourself” lab project that can actively engage your students and increase their understanding of concepts that cut across scientific disciplines. Interactive demonstrations highlight inquiry skills and reasoning based on the evidence. Handouts for all activities!

Empowered Students Thinking Like Engineers!

(Grades 3–5) L100 H, Convention Center

Sponsor: National Geographic Learning

Tom Hinojosa, National Geographic Learning, Littleton, Colo.

Learn about an innovative project-based approach to teaching that empowers students to think like engineers and scientists! We’ll explore new shifts in the way science has been traditionally taught. Through hands-on demonstration, you’ll leave this session with new ideas, resources, and methods to engage your classrooms.

NGSS in the High School Classroom

(Grades 8–College)

L100 I, Convention Center

Sponsor: Bio-Rad Laboratories

Leigh Brown (leigh_brown@bio-rad.com), Bio-Rad Laboratories, Hercules, Calif.

Engage with curriculum training specialist Leigh Brown on how to implement the NGSS in the science classroom. Developed by Kirk Brown—a master teacher, curriculum expert, and lead writer of the revised California science framework—this process includes modeling, explanation and argumentation, and engineering practices. Hear best practices and lessons learned on integrating the NGSS into your classroom.

10:15 AM–12:15 PM Exhibitor Workshop

The Secrets to PBL Success for STEM

(Grades 4–College)

L100 J, Convention Center

Sponsor: Accelerate Learning–STEMscopes

Terry Talley (ttalley@acceleratelearning.com), Accelerate Learning–STEMscopes, Houston, Tex.

Project Based Learning can be challenging the first time you implement it. Come experience an engaging hands-on PBL that reveals the strategies for seamless facilitation.

Special Offer for NSTA STEM Forum & Expo Registrants
 Attention STEM Forum & Expo-goers—enjoy half-price admission to:



Photo courtesy of The Works Museum

The Works Museum

www.theworks.org

on the following days:

- **From Thursday, May 21 through Saturday, May 23**

Show your STEM Forum & Expo badge and receive \$4 (half-price) admission to The Works Museum, a hands-on museum where kids explore engineering through design and build challenges and interactive exhibits. The Works Museum’s hours are Thursday and Friday from 9:00 AM to 3:00 PM, and Saturday from 10:00 AM to 5:00 PM.

The Works Museum is located at 9740 Grand Avenue South in Bloomington. *Transit from the Convention Center: From 12th Street South and 2nd Avenue, take bus 465 SB/Burnsville to the South Bloomington Transit Center and Gate B. Trip is estimated to take 15 minutes. Walk about three blocks to the museum.*



10:30–11:30 AM Presentations

HS **Psychological Science as a Gateway to STEM**
(Grades 9–12) 101 A/B, Convention Center
Virginia Welle (@Welle_APpsych; wellevk@chipfalls.org), Chippewa Falls Senior High School, Chippewa Falls, Wis. Harness the power of psychological science to facilitate interdisciplinary learning in STEM in your high school.

HS **Girls and STEM**
(Grades 7–College) 101 D/E, Convention Center
Mariel Kolker (@MarielKolker; mariel.kolker@morristown-highschool.org), Morristown High School, Morristown, N.J. How do science educators get girls interested in STEM? Discover strategies to help close the gender gap in science, engineering, and technology.

M **Integrating PBL STEM in a Middle School Core Team**
(Grades 6–8) 102E, Convention Center
Jacqueline Adkins (jadkins@jeffco.k12.co.us), **Reid Auger**, **Christopher Wright**, and **Jaime Kugler**, Deer Creek Middle School, Littleton, Colo.
Attention will be paid to integration of 21st-century skills, habits of mind, and Project Based Learning STEM in a middle school core team.

M **Driven to Discover: Citizen Science Inspires Classroom Investigations**
(Grades 5–12) 103A, Convention Center
Sarah Weaver (weave048@umn.edu) and **Katie-Lyn Bunney** (@MLMPCitSci), University of Minnesota Monarch Lab, St. Paul
Use citizen science projects as a springboard for authentic investigations! Connect critical STEM content with real-world science for you and your students.

HS **Developing a 3-Dimensional NGSS Classroom Emphasizing the Crosscutting Concept of Energy and Matter: Flows, Cycles, and Conservation**
(Grades 7–12) 103D, Convention Center
Linda Rost (rostl@baker.k12.mt.us), Baker High School, Baker, Mont.
John Graves (@cjmogan; graves@montana.edu), Montana State University, Bozeman
Stacy Hansen (sandshansen@hotmail.com), Washington Middle School, Miles City, Mont.
Emphasis will be placed on integrating the crosscutting concept of energy and matter with science and engineering practices via disciplinary core ideas.

HS **Design Thinking: Engineering Student-centered Solutions Using Medical Biology**
(Grades 9–12) 103E, Convention Center
Judy Barcelon (jbarcelon@srcs.k12.ca.us), Piner High School, Santa Rosa, Calif.
Using the design-thinking process, students seek to identify health/medical issues that might interfere with success at Piner High School.

HS **NCTM Session: Teaching Matters! Effective Teaching Practices to Turn High-quality Standards into Successful STEM Learning**
(Grades 3–College) 103F, Convention Center
Diane Briars (djbmath@comcast.net), NCTM President, Pittsburgh, Pa.
Learn research-based teaching practices that most effectively promote students' conceptual understanding, procedural fluency, problem solving, and reasoning as called for in the *Common Core State Standards, Mathematics* and *NGSS*.

HS **Corrosion: Chemistry Made Simple, Relevant, and Fun**
(Grades 8–12) 208D, Convention Center
Debbie Goodwin (nywin@hotmail.com), Retired High School Science Teacher, Chillicothe, Mo.
Andrew Nydam (andrewnydam@hotmail.com), ASM International, Materials Park, Ohio
Sherri Rukes (sherri.rukes@d128.org), Libertyville High School, Libertyville, Ill.
Join us for labs, demonstrations, and examples that make reactivity, oxidation/reduction, and corrosion engineering exciting, practical, and easy to teach and learn. Take home STEM connections and a CD of information.

Pa **Iowa's STEM Council Drives Business-Education Partnerships**
(General) 211A, Convention Center
Jeff Weld (@IowaSTEM; jeff.weld@uni.edu) and **Kristine Bullock** (@STEM_SE_Iowa; kristine-bullock@uiowa.edu), Iowa Governor's STEM Advisory Council, Coralville
Built as a public-private partnership, Iowa's statewide STEM program features collaborations across the business/K–12/nonprofit/higher education spectrum aimed at producing world-ready graduates and careerists.

Pa **A Model K–12 STEM Project: The High Hopes Project**
(General) 211B, Convention Center

Brian Crosby (@bcrosby; bcrosby@washoeschools.net), Nevada’s Northwestern RPDP, Reno

Hear about a global K–12 STEM project to near space (33,000 meters) involving a high-altitude balloon that integrates the STEM subjects together with language arts, social studies, art, and more.

Pa **Creating School and University Partnerships That Work**

(Grades 9–College) 211C, Convention Center

Dewayne Morgan (@USMAsker; dmorgan@usmd.edu), University System of Maryland, Adelphi

Engage in this interactive session that will offer insights into the opportunities for greater relevant STEM learning through collaborative partnerships between schools and universities.

10:30–11:30 AM Hands-On Workshops

E **Launching an Elementary STEM Program**

(Grades P–6) 101F, Convention Center

Kimberly Stilwell (@k16resources; kimstilwell@k-16resources.com), Professional Development, Blue Springs, Mo.

Need ideas of where to start with building an Elementary STEM program or enhancing your current program? The initial steps in building an elementary STEM program can be an overwhelming thought. I’ll share success stories and how using *Picture-Perfect Science* resources became part of the foundation to a successful implementation. Resources used to enhance teacher enthusiasm and content knowledge will be shared. Walk away with links to helpful resources and ideas on how to start an Elementary STEM program.

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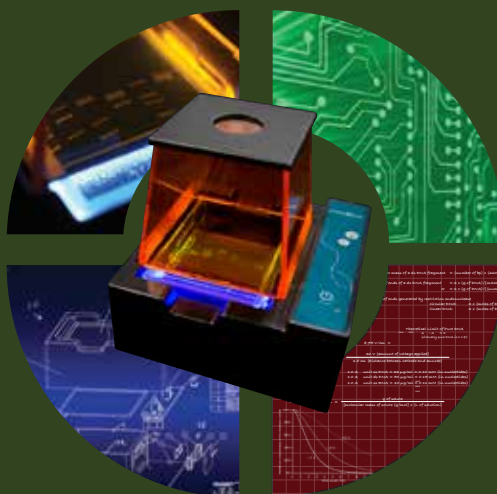
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HS **How Much CO₂ Is Stored in That Forest? A STEM Activity for Middle School and High School Teachers**

(Grades 6–College) 101G, Convention Center

Joshua Dumas (jdumas@stanthony.k12.mn.us), St. Anthony Village High School, Minneapolis, Minn.

Investigate ecology with a unit that incorporates the carbon cycle, mathematics, engineering, lab work, world events, climate change, and much more.

HS **Monday Morning Units and Activities for Your High School Classroom**

(Grades 9–College) 101H, Convention Center

Alan Gomez (alangomez@stem101.org), The STEM Academy®, Peoria, Ariz.

This hands-on workshop has classroom units and activities ready to go that support the NGSS practices and CCSS. Plus, free access to hundreds of hours of content to all who attend!

M **Incorporating STEM Challenges into Everyday Curricula**

(Grades 6–8) 101I, Convention Center

Jennifer Wilson (jwilson9@bcps.org) and **Amy Kephart** (akephart@bcps.org), Ridgely Middle School, Timonium, Md.

Conduct a STEM challenge and learn how to incorporate challenges into your curriculum. See how to merge the scientific explanation and the STEM challenge into a final product for a STEM fair presentation.

M **Engineering Design Inspired by Nature**

(Grades 6–8) 101J, Convention Center

Karen Saur (@Karen_Saur; ksaur@nyscience.org) and **Grace Andrews** (gandrews@nysci.org), New York Hall of Science, Queens

Christine DeMauro, New York Aquarium, Brooklyn
Andrea Bonosoro (abonosoro@schools.nyc.gov), J.H.S. 185 Edward Bleeker, Flushing, N.Y.

Learn how teachers are constructing simple submersibles with their students using an engineering design process that begins by drawing inspiration from aquarium animals.

E **Our Student-led iPad NGSS Classroom!**

(Grades P–8) 102A, Convention Center

Shelley Lee (leeshe@uwstout.edu), 1995–1996 NSTA President, and University of Wisconsin–Stout, Menomonie

Loretta Wilbur (lwilbur@stbparish.com), St. Bridget Parish School, River Falls, Wis.

Join us as we lead you through our student-led app-driven classroom and demonstrate how students use apps that reflect the NGSS while having fun learning!

M **The Global Conveyor Belt: Density-driven Ocean Circulation**

(Grades 5–8) 102B, Convention Center

Donna Barton (dmbarton@oneclay.net), Argyle Elementary School, Orange Park, Fla.

This American Meteorological Society module on density-driven ocean circulation looks at how temperature and salinity affect deep ocean circulation patterns. Find out how thermohaline circulation affects Earth’s weather and climate. Free module guides.

M **Energize Your STEM Classroom!**

(Grades 4–8) 102C, Convention Center

Jeffery Townsend (scott.townsend@eku.edu), Eastern Kentucky University, Richmond

Jeffrey Peake, Indiana University, Bloomington

Energy is a common thread among all levels of the NGSS. Join us as we model how the concept of energy can manifest throughout the STEM-based classroom.

M **Operation Rescue: A Project Approach to STEM Education**

(Grades 5–8) 102D, Convention Center

Greg Vogt (vogt@bcm.edu) and **Barbara Tharp** (btharp@bcm.edu), Baylor College of Medicine, Houston, Tex.

Super typhoon Haiyan caused massive destruction to the Philippine city of Tacloban. Survivors were in desperate need of relief supplies. In this STEM project activity, student teams organize and conduct a simulated emergency relief supplies rescue mission.

A **A Path to Success: Transforming Your School Through STEM**

(Grades K–6) *103B, Convention Center*
Mijana Lockard, Lincoln Avenue Academy, Lakeland, Fla.
 How can we use the STEM approach to provide all students with academic success? Walk away with samples of STEM units, assessment tools, implementation plans, and a variety of strategies to transform your school into a successful STEM school.

CANCELED

Pr **Creating Problem-based Instruction with the Next Generation Science Standards**

(Grades K–2) *204 A/B, Convention Center*
Ginger Teague (GingerTeague; gteague@pltw.org), **Vanessa Stratton** (@Vanessa_PLTW; vstratton@pltw.org), and **Kenneth Kessenich** (kkessenich@pltw.org), Project Lead The Way, Inc., Indianapolis, Ind.
 Come to this hands-on workshop to learn how to create standards-focused problem-based units, and walk away with the beginnings of one of your own.

E **Workshops On Deck**

(Grades 4–8) *208B, Convention Center*
Kenya Wilson (kenyawilson@lancasterisd.org), Lancaster (Tex.) ISD
 Leverage content instruction and development of 21st-century skills with Workshops On Deck. Take home a deck of Project Based Learning workshop planning cards.

E **Engineering/Science Is for Somebody Else: How to Overcome Common Stereotypes of Engineering Through NGSS**

(Grades P–12) *208C, Convention Center*
Johannes Strobel (jstrobel@tamu.edu), Texas A&M University, College Station
 Engineering and science carry strong stereotypes. Join me as I synthesize existing stereotypes and show how the NGSS can help in overcoming them.

11:45 AM–12:45 PM Presentations

Pa **Nature of Science Understanding and Integrated Lab Models**

(Grades 9–College) *102E, Convention Center*
Margery Gardner (magard01@syr.edu) and **John Tillotson** (@johnwtillotson; jwtillot@syr.edu), Syracuse University, Syracuse, N.Y.
 Explore the influence of an integrated lab instruction model on fostering nature of science understanding among first-year undergraduate science major students.

M **Moving from STEM for Some to STEM for All**

(Grades 6–8) *102F, Convention Center*
Josephine Corder (josephine.corder@sdhc.k12.fl.us), Stewart Middle Magnet School, Tampa, Fla.
 Hear how to transform your school from “STEM for Some” to “STEM for All” while increasing teacher collaboration and community involvement.

M **The James Webb STEM Innovation Project: Bringing Interdisciplinary STEM Learning Experiences to the Classroom**

(Grades 4–9) *103A, Convention Center*
Frank Summers (@drfranksummers), Space Telescope Science Institute, Baltimore, Md.
 Examine engineering and science through the lens of the James Webb Space Telescope. Hear about the James Webb STEM Innovation Project that uses a NASA mission to incorporate design challenges and hands-on learning in the classroom.

A **A STEM Model of Instruction**

(Grades P–12) *103B, Convention Center*
Juan-Carlos Aguilar (jaquilar@doe.k12.ga.us), Georgia Dept. of Education, Atlanta
 STEM education requires a rethinking of the school’s operations, from scheduling to collaboration and teacher support. I’ll introduce a model of STEM instruction that naturally integrates science and engineering practices and the mathematics and language skills identified in the CCSS into daily school routines.



HS **Making Waves: Building Simple Radio Systems**
(Grades 8–12) 103E, Convention Center

Vincent Urbanowski (vurbanowski@aitestamford.org), Academy of Information Technology & Engineering, Stamford, Conn.

Generate new learning in your classroom by having your students build radio transmitters and receivers from first principles and simple parts, and model real-world wireless technology by transmitting and receiving pictures and data.

M **NCTM Session: Learning to Drive the Bus: Strategies for Ensuring That the Journey of Class Discussion Leads to the Target Destination**

(Grades 4–12) 103F, Convention Center

Jennifer Cartier (jcartier@unity.edu), Unity College, Unity, Maine

Danielle Ross (@drdross; danielle.ross@nau.edu), Northern Arizona University, Flagstaff

We will share the five practices discussion framework that emerged in mathematics education and describe how it has been adapted for science classrooms.

Pr **Demonstrating STEM Through Art**
(Grades K–5) 206 A/B, Convention Center

Jill Jensen (jill.jensen@district196.org), Glacier Hills Elementary School of Arts & Science, Eagan, Minn.

Cathy Kindem (cathy.kindem@district196.org), Rosemount-Apple Valley-Eagan Public Schools, Rosemount, Minn.

Open doors to creativity as you draw out your students' knowledge of science in an artistic way. Example K–5 projects will be shown—accomplished by coordinating the efforts of classroom teachers, a science specialist, and art specialists.

E **The Building Blocks of an Elementary STEM Program**
(Grades K–5) 207 A/B, Convention Center

Kelly Van Meter ([@KellyVanMeter2](https://twitter.com/KellyVanMeter2); kvanmeter@eanesisd.net), **Lesley Ryan** ([@ee_ap_lryan](https://twitter.com/ee_ap_lryan); lryan@eanesisd.net), and **Debbie Smith** ([@dsmitheisd](https://twitter.com/dsmitheisd); dsmith@eanesisd.net), Eanes Elementary School, Austin, Tex.

Join us as we detail the steps taken by our campus to implement a school-wide STEM program that makes STEM learning feel like play.

HS **Bioplastic—Going from Plants to Plastics**
(Grades 7–12) 208D, Convention Center

Andrew Nydam (andrewnydam@hotmail.com), ASM International, Materials Park, Ohio

Debbie Goodwin (nywin@hotmail.com), Retired High School Science Teacher, Chillicothe, Mo.

Sherri Rukes (sherri.rukes@d128.org), Libertyville High School, Libertyville, Ill.

Many of the items that we use today are becoming more Earth friendly. Learn how a bioplastic is made and what plant materials are used. Take home a CD with information and activities.

A **Building a STEM Culture Through Family/School Partnerships**

(Grades P–5) 210 A/B, Convention Center

Julie Brenegan ([@molliemae57](https://twitter.com/molliemae57); julie.brenegan@gcisd.net), Grapevine-Colleyville ISD, Grapevine, Tex.

Tona Blizzard ([@tonablizzard](https://twitter.com/tonablizzard); tona.blizzard@gcisd.net), Cannon Elementary School, Grapevine, Tex.

Discover how a preK–5 campus communicates to parents, increases involvement, bolsters support, and designs family STEM events that strengthen the home-school connection.

Pa **STEM Networks in North Dakota and Minnesota**
(General) 211A, Convention Center

David DeMuth ([@ndstem](https://twitter.com/ndstem); david.demuth@vcu.edu), Valley City State University, Valley City, N.Dak.

Anne Hornickel (ahornick@umn.edu), University of Minnesota, Minneapolis

STEM Networks in two states work together to enhance 21st-century student learning. Join us for an overview of the organizations, education focus, and workforce development involved.

Pa The Greater Southern Tier of New York STEM Education Project*(Grades K–12)**211B, Convention Center*

Jeremy Wheeler (jwheeler@gstboces.org) and **Brande Flaitz** (bflaitz@gstboces.org), The Great Southern Tier BOCES, Bush Campus, Elmira, N.Y.

Join us to learn how the GST STEM Education Initiative has made a positive impact on STEM education in New York State. Discussion centers on the project plan, critical partnerships, and current activities.

Pa Understanding Car Crashes: Engineering Truly Impactful STEM Lessons*(Grades 4–12)**211C, Convention Center*

Griff Jones (gjones@coe.ufl.edu), University of Florida, Gainesville

Use free web-based crash-testing videos, classroom STEM activities, and behind-the-scenes tours of a crash research center to integrate STEM practices and promote career awareness.

11:45 AM–12:45 PM Hands-On Workshops**HS** English Language Learners: Integrating STEM with *Freak the Mighty**(Grades 5–12)**101G, Convention Center*

Michael Giamellaro (michael.giamellaro@osucascades.edu) and **Margaret Prevenas** (prevenam@onid.oregonstate.edu), Oregon State University–Cascades, Bend

Heather VanAlstyne (hvanalstyne@culver.k12.or.us), Culver High School, Culver, Ore.

Using the young adult novel *Freak the Mighty* leads ESOL students to meaningful learning of vocabulary, communicating, and 21st-century skills as they develop suggestions for building an ornithopter.

The following venue has extended a special offer for STEM Forum & Expo attendees.



Science Museum of Minnesota www.smm.org
120 W. Kellogg Blvd., St. Paul

The Science Museum of Minnesota is offering a 50% discount off admission to STEM Forum & Expo attendees (must show badge for discount) available Wednesday–Sunday, May 20–24. Located in beautiful downtown St. Paul and overlooking the Mississippi River, the museum's 70,000 square feet of exhibition space includes hands-on and interactive exhibits for all ages. Their current special exhibition is *Space: An Out-of-Gravity Experience*, complimented by the *Journey to Space* Omnitheater film. The museum is open on Wednesday and Sunday from 9:30 AM to 5:00 PM; and Thursday through Saturday from 9:30 AM to 9:00 PM.

HS **STEM Astronomy: X-Ray Spectroscopy of Supernova Remnants**

(Grades 11–College) 101H, Convention Center
Donna Young (donna@aavso.org), AAVSO, Cambridge, Mass.

Analyze emission spectra from supernovas to identify elements and determine if the remnants are core collapses of massive stars or thermonuclear explosions of white dwarfs.

M **Rockets to the Rescue! Engineering Designs to Solve Food Security Issues**

(Grades 5–8) 101J, Convention Center
Kirk Astroth ([@kirkastrorh](mailto:kirkastroth@kirkastrorh.com); kastroth@u.arizona.edu) and **Eric Larsen** (ericl@cals.arizona.edu), Arizona 4-H Youth Development, Tucson

In this fast-paced aerospace engineering workshop, participants build a rocket and payload capsule to accurately deliver food to a storm-devastated island inhabited by starving people.

M **Marine Science, Robotics, and Engineering Thematic Units: The C.A.S.E. Way—From Vision to Sustainability**

(Grades 5–12) 102B, Convention Center
Scott Frakes (scottfrakes1@gmail.com), **Christopher Canning** (ccc.canning@outlook.com), and **Alison Ready** (aready122@gmail.com), Crystal Academy of Science & Engineering, Lakeland, Fla.

Join us as we explain our process, from vision to sustainability, of creating thematic STEM units designed to engage all learners.

M **“Animate ‘em Particles”—From Hands On to Animation, CCSS, and NGSS Through C-STEM**

(Grade 8) 102C, Convention Center
Maria Aguilar (mva72033@gmail.com), California Middle School, Sacramento

Transform visual representations of the particles of matter by integrating computing in the science classroom. Explore how you can use computer modeling in an inquiry-based activity on the arrangement of particles in solids, liquids, and gases. Laptop is recommended for session, but not required. Visit bit.ly/1HJWmkl to download the software ahead of time.

M **A Conceptual Approach to CAD and STEM Integration**

(Grades 5–8) 102D, Convention Center
Melanie Peters (mpeters@starbasemn.org) and **Ben Sonquist**, STARBASE Minnesota, St. Paul

Join us for a conceptual approach to teaching and learning CAD and the opportunities CAD presents for diverse and integrated STEM projects.

Pr **Integrating STEM into the Elementary Curriculum**

(Grades P–3) 204 A/B, Convention Center
Mandy Colwell (mandy.colwell@gscs.org), **Karen Stanfield** (karen.stanfield@gscs.org), and **Kim Carden** (kim.carden@gscs.org), Cowan Road Elementary School, Griffin, Ga.

Discover exciting ways to implement STEM into reading, writing, and social studies, as well as science and mathematics! Learn how LEGO® bricks can inspire and engage students in STEM implementation. Take home the design process, lesson plan template, and lesson plans ready for use in the classroom.

E **Citizen Science: Projects and Activities to Engage Students in Authentic Science Research**

(Grades 3–8) 208A, Convention Center
Sarah Carter (@SciGirls; scarter@tpt.org), Twin Cities Public Television, St. Paul, Minn.

Barbara Jacobs-Smith (bjv2@cornell.edu), The Cornell Lab of Ornithology, Ithaca, Minn.

Explore a few of the many citizen science projects that can engage your students in authentic science data collection and investigation. Participants will receive a free window bird feeder for their classrooms.

E **Engineering for Elementary Schoolers in Out-of-School Time**

(Grades 3–5) 208B, Convention Center
Tania Tauer (@EiE_org; ttauer@mos.org), Museum of Science, Boston, Mass.

Experience a hands-on design challenge from the Engineering Adventures curriculum and learn how to engage students in the engineering design process.

11:45 AM–12:45 PM Exhibitor Workshops

3D Printing's Role in Shaping the Future of STEM Education

(Grades 1–12)

L100 D, Convention Center

Sponsor: NVBOTS

Chris Haid, NVBOTS, Boston, Mass.

3D printing is having a radical impact on STEM learning and innovation cycles. However, beyond supplying a printer, 3D printable lesson plans need to be put in place, allowing students to put 3D printing into practice. Learn how to effectively integrate 3D printing into current learning environments.

The Many Jobs of Proteins: Modeling Proteins and Enzymes

(Grades 8–College)

L100 E, Convention Center

Sponsor: 3D Molecular Designs

Gina Vogt (vogt@msoe.edu) and **Margaret Franzen** (franzen@msoe.edu), and MSOE Center for BioMolecular Modeling, Milwaukee, Wis.

By folding their own proteins following basic principles of chemistry with the engaging Amino Acid Starter Kit, your students will understand the core structure-function concept. Then they will be ready to explore enzymes with the new Enzymes in Action Kit, leading to a new appreciation of the biomolecular world.

Death Finds the Mesozoic: NGSS Practices in Physical/Earth Science Class with HHMI BioInteractive Resources

(Grades 6–12)

L100 F, Convention Center

Sponsor: HHMI BioInteractive

Nicoline Chambers, West High School, Torrance, Calif. Learn how to use rich, robust, and free multimedia resources from HHMI BioInteractive to help your students understand physical/Earth science disciplinary core ideas and demonstrate competency in NGSS science and engineering practices. Join us for cross-curricular connections to *CCSS Mathematics and ELA* for middle/high school Earth/space science, physics, and chemistry classrooms. Take home free classroom resources.

12:30–3:30 PM Exhibits

Exhibit Hall A, Convention Center

Take advantage of this dedicated time to stroll through the exposition picking up tips, product samples, and ideas to spark your imagination.

1:15–2:15 PM Exhibitor Workshops

Diving for Science: Enhancing STEM with Real-World Underwater Archaeology

(Grades 6–College)

L100 A, Convention Center

Sponsor: U.S. Bureau of Ocean Energy Management

Lori Trent, PAST Foundation, Columbus, Ohio

Caryl Fagot, U.S. Bureau of Ocean Energy Management Gulf of Mexico Region, New Orleans, La.

Real-world science application is a great way to enhance STEM education. Learn how the U.S. Bureau of Ocean Energy Management and the PAST Foundation teamed up to connect students with marine archaeology and the use of technology in studying shipwrecks off our nation's coasts.

STEM Behind Health—Math, Science, Diseases, and Careers!

(Grades 6–12)

L100 B, Convention Center

Sponsor: Texas Instruments

Jeffrey Lukens, Sioux Falls (S.Dak.) School District

Elizabeth McMillan, Sanford Research, Sioux Falls, S.Dak.

Learn about Chelcie's story with a middle school/high school lesson dedicated to the understanding of STEM careers in a medical setting through the story of a girl diagnosed with Type 1 diabetes. Free at STEMbehindHealth.com, this interactive lesson created by Texas Instruments and Sanford Health looks at the mechanism, treatment, and diagnosis of Type 1 diabetes.

Leap into the 21st-Century Science Class

(General)

L100 C, Convention Center

Sponsor: Animalearn

Nicole Green (ngreen@animalearn.org), Animalearn, Jenkintown, Pa.

Join us as we examine the use of animals to teach anatomy and explore how we can conserve resources, eliminate harmful chemicals, and promote habitat protection by using innovative technologies. Participants will try the latest dissection alternatives, including iPad apps, online programs, and realistic models! One attendee will win dissection software!



Science of Speed: The Fusion of Competition, Creativity, and STEM Learning

(Grades 6–9)

L100 D, Convention Center

Sponsor: Pitsco Education

Brad Blue (bradbbblue@gmail.com), Design & Innovation Lab, Minneapolis, Minn.

Science of Speed takes STEM education and fires it down a track as fast as your students can make it go. Students design, build, test, and race CO₂ cars. Along the way, they learn physical science and engineering skills at lightning speed. Learn about it in this hour-long workshop.

Deepening and Demonstrating Science Understanding with Augmented Reality

(Grades 6–12)

L100 F, Convention Center

Sponsor: HHMI BioInteractive

James Serach, Lawrence Academy, Greens Farms, Conn. Augmented Reality, which provides an engaging way for students to teach and learn, can be used to demonstrate critical thinking, improve presentation skills, and get students to collaborate. Learn how student-created digital content attached to an HHMI BioInteractive poster about the Anthropocene fostered engagement in the classroom.

Engineering Design vs. Science Practices: A Closer Look at NGSS Practices

(Grades 6–9)

L100 G, Convention Center

Sponsor: eCYBERMISSION

Matthew Hartman, eCYBERMISSION Content Manager, NSTA, Arlington, Va.

Explore the differences between science and engineering with hands-on activities. Also, learn about eCYBERMISSION, a free STEM competition, and discover how you and your students can get involved.

Bake for Good: Kids Learn-Bake-Share Program

(Grades 4–7)

L100 H, Convention Center

Sponsor: King Arthur Flour

Nathan Sandel (nate.sandel@kingarthurfLOUR.com), King Arthur Flour Bake for Good: Kids Learn-Bake-Share Program, White River Junction, Vt.

The FREE Bake for Good: Kids Learn-Bake-Share Program visits schools to teach kids how to bake yeast bread from scratch. Kids take ingredients home to bake two delicious loaves; they donate one and enjoy the other. We'll share how the program uses science and math, provides an opportunity for service learning, and teaches baking skills. Door prizes!

Nanotechnology: Hands-On Activities for All Disciplines

(Grades 6–College)

L100 I, Convention Center

Sponsor: Nano-Link: Center for Nanotechnology Education

Deb Newberry (dmnewberry2001@yahoo.com), Nano-Link, Rosemount, Minn.

Taking advantage of the multidisciplinary nature and students' interest in nanotechnology, Nano-Link has created a set of more than 20 hands-on activities. These activities include nanoscience concepts and concepts from traditional sciences as well as biotech, photonics, and material science. Find out how to use these activities in myriad ways and how to register to get free classroom materials.

Demystifying the NGSS with STEMscopes

(General)

L100 J, Convention Center

Sponsor: Accelerate Learning–STEMscopes

Terry Talley (ttalley@acceleratelearning.com), Accelerate Learning–STEMscopes, Houston, Tex.

There's no doubt the NGSS are very rigorous and complex. But with an understanding of how the NGSS are aligned, implemented, and assessed, teachers will be successful in changing aspects of their instructional practices. STEMscopes lessons can guide students to achievement based on the standards and effective instructional strategies.

2:45–3:45 PM Exhibitor Workshops

STEM in the Primary Classroom

(Grades K–3) *L100 A, Convention Center*

Sponsor: SAE International

Julie MacIntyre, SAE International, Warrendale, Pa.

Didn't think that primary-aged students were ready for STEM? Think again! With the award-winning A World In Motion program, come see how a developmentally appropriate curriculum not only introduces the basics of STEM, but does it in a fun, hands-on, and innovative way!

Hypothesis Testing Using HHMI BioInteractive's Lizard Evolution Virtual Lab

(Grades 8–12) *L100 F, Convention Center*

Sponsor: HHMI BioInteractive

Kim Parfitt, Central High School, Cheyenne, Wyo.

Using HHMI BioInteractive's Lizard Evolution Virtual Lab, discover how students can use authentic evidence to test a hypothesis regarding speciation, natural selection, and resource partitioning in anoles of the Caribbean. Diagram analysis using the I-squared strategy from BSCS extends student interpretation of phylogenetic trees. Take home free classroom resources.

DNA Electrophoresis at the Speed of Education: Come Watch the DNA Move for Near Instant Results

(Grades 7–College) *L100 H, Convention Center*

Sponsor: The MiniOne Electrophoresis

Richard Chan (info@theminione.com), The MiniOne Electrophoresis, San Diego, Calif.

The MiniOne is a safe, affordable electrophoresis system that allows you to watch electrophoresis as it happens and take a picture for analysis within a single class period. Eliminate pre- and post-lab prep time and offer students the opportunity to pour gels with the prestained Green Gel-in-a-Cup or the MiniLabs.

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STEMify Your Science Activity—From the Science to STEM of Light and Lasers

(Grades 6–College) 1100 I, Convention Center

Sponsor: LASER Classroom™

Colette DeHarpporte (colette@laserclassroom.com), LASER Classroom, Minneapolis, Minn.

Yvonne Ng (yvonne@engineersplayground.com), Engineer's Playground, St. Paul, Minn.

Start with a standard science lesson on fluorescence, and end up with deeper understanding and wider engagement using STEMify!

Building the Skills of Argumentation and Collaboration in STEM

(Grades 5–College)

1100 J, Convention Center

Sponsor: Accelerate Learning–STEMscopes

Sharry Whitney (swhitney@acceleratelearning.com), Accelerate Learning–STEMscopes, Houston, Tex.

Skillful argumentation and discourse are practices that provide a pathway for success in the future workforce. During this fun and interactive workshop, participants will determine the solution to a problem through collaboration among team members. Clear explanations are needed to solve the problem and to reach consensus about their solution.

3:00–4:00 PM Presentations

HS **Molecular Modeling and Design Using 3D Printing**
(Grades 10–College) 101 D/E, Convention Center

Jim Lane, Mahtomedi High School, St. Paul, Minn.

Find out how 3D printing can create meaningful understandings of complex molecular interactions and stories by combining biology, engineering, and art. We will use the molecular story of cystic fibrosis to discuss how this new technology can be implemented, using Project Based Learning, within the context of a high school engineering course.

M **Engage Elementary Students in STEAM by Planning a Trip to Mars**

(Grades 5–8) 102E, Convention Center

Laura Grimm (dltm_grimm@tccsa.net), Dalton Intermediate School, Dalton, Ohio

Your students will have a blast engaging in several engineering design challenges as they plan a trip to Mars. Pick up instructions for each project/challenge presented.

M **Kinesthetic Learning—From a STEM Viewpoint**
(Grades 4–12) 102F, Convention Center

Darrell Walker (@dwalker_1; d.l.walker.1975@gmail.com), Bertie Middle School, Windsor, N.C.

Get your students in tune with STEM concepts through team-created body movements by using selected music and lyrics to help boost student achievement.

M **Powerful and Free Simulations for STEM Teaching**
(Grades 6–12) 103A, Convention Center

Chad Dorsey (@chaddorsey; cdorsey@concord.org), The Concord Consortium, Concord, Mass.

Come discover how free NSF-funded simulations and curricula from The Concord Consortium can add a new dimension to your STEM teaching. Bring your tablet/laptop and take home free software and resources.

A **Strategic Catalysis of STEM Culture: Scenario-based Inquiry with Social Collaboration**

(General) 103B, Convention Center

Jewel Reuter, Episcopal High School, Baton Rouge, La.

Learn how to use experiential learning experiences that integrate embodied learning with the sharing of ideas to solve problems to advance STEM cultural cognition.

E **Physical Structures, Plants, and Everyday Tools: Helping Children Understand the Impact of STEM and the Essential Integration of All STEM Disciplines**

(Grades 3–6) 103D, Convention Center

Donna Knoell (dknoell@sbcglobal.net), Educational Consultant, Overland Park, Kans.

Hear about strategies and activities to actively engage elementary students in STEM applications, such as constructing physical structures, growing plants, and other examples from a vast array of everyday objects and tools involving all aspects of STEM. Integration of the STEM disciplines in classroom explorations, investigations, and activities will be modeled.

HS **STEM Certificates Build STEM Capacity on Campus**
(Grades 9–12) 103E, Convention Center

Judy Barcelon (jbarcelon@srcs.k12.ca.us), Piner High School, Santa Rosa, Calif.

Join me as I share how creating a three-tiered STEM certificate has increased student involvement on my campus and provided opportunities for community involvement and STEM pipeline to Sonoma State University.



3:00–4:00 PM Hands-On Workshops

Pr Supporting English Language Learners in STEM Education Through Engagement in Engineering

(Grades 1–5) *101F, Convention Center*
Elissa Jordan (ejordan@mos.org), Museum of Science, Boston, Mass.

Attention will be paid to supporting English language learners in elementary classrooms as we engage in background building around a science concept connected with a hands-on engineering activity.

HS Infect Your Biology Classroom with Math!

(Grades 6–12) *101H, Convention Center*
Peggy Welch ([@peggywelch851](https://twitter.com/peggywelch851); peggywelch851@gmail.com), Consultant, Lexington, Ky.

Integrating biology and mathematics shouldn't just be a good idea, it should be the law! Come learn how easy, important, and fun it is to collect and analyze data as a part of good, solid, and responsible science education.

E Habitat Connections: Action Through Citizen Science and Creating Bird-friendly Schoolyards

(Grades 3–8) *208D, Convention Center*
Barbara Jacobs-Smith (bj2@cornell.edu), The Cornell Lab of Ornithology, Ithaca, Minn.

Involve students in citizen science, habitat improvements, and exciting investigations. Connecting students to school habitats builds scientific and environmental literacy. Materials and free resources provided. Participants will receive a free window bird feeder for their classrooms.

Pa SFAz STEM Network and Online Community: Connecting STEM Programming Across the Nation

(General) *211B, Convention Center*
Linda Coyle (lcoyle@sfaz.org), **Stephaine Frimer** (sfrimer@sfaz.org), and **Eric Savage** (esavage@sfaz.org), Science Foundation Arizona, Phoenix

Looking for “all things STEM”? Come learn about the Arizona STEM Network. This network boasts one of the most comprehensive STEM resources in the nation!

Pa Win-Win: Creating Mutually Beneficial Partnerships Between School and Local Businesses

(Grades 9–College) *211C, Convention Center*
James Lynch ([@AVHS_STEM](https://twitter.com/AVHS_STEM); james.lynch@district196.org), Apple Valley High School, Apple Valley, Minn.

Come learn about a STEM program that has developed a format for establishing and maintaining contact with corporate partners...and it's invigorating for students, teachers, and other stakeholders.

HS NCTM Session: Using Modeling to Explore the Spread of Disease

(Grade 9) *101I, Convention Center*
Johnny Lott (jlott@mso.umt.edu), Professor Emeritus, University of Montana, Oxford, Miss.

Use modeling with boxes and candies to explore exponential growth involving the mathematics and science of the spread of disease. The mathematics involved could be used in algebra classes or sciences classes where exponential growth (or decay) is involved.

M Traffic Lights in the Classroom (TLC)

(Grades 5–7) *102B, Convention Center*
David Johnson (djohnson@marshallschool.org), Marshall School, Duluth, Minn.

TLC starts with the basics of circuits and then allows learning and creativity to soar as students design, build, and test a rotary switch traffic light controller.

M Human +

(Grades 5–8) *102D, Convention Center*
Jeanne McDermott (jeanne.mcdermott@shs.org) and **Tracy Polte** (tracy.polte@shs.org), Shady Hill School, Cambridge, Mass.

How can you engineer a better you? Learn how our grade 7 students tackled this biology design challenge using everyday materials, littleBits®, and LEGO®s.

Pr **STEMenizing Parents: Moving the STEM Conversation Home**

(Grades K–2) 204 A/B, Convention Center

Peter Mastrogiovanni (peter.mastrogiovanni@rcsdk12.org), **Tina Rodger** (tina.rodger@rcsdk12.org), and **Vici Patanella** (vici.patanella@rcsdk12.org), Nathaniel Rochester Community School, Rochester, N.Y.

The building of a STEM program often focuses on training in the early school years, but completing the task requires engaging the parents in the STEM discussion.

E **Next Steps: Ramp Up Your Engineering with Mathematics**

(Grades K–8) 208A, Convention Center

Cathy Kindem (cathy.kindem@district196.org) and **Paul Olson** (paul.olson@district196.org), Rosemount-Apple Valley-Eagan Public Schools, Rosemount, Minn.

Review ways engineers use math and explore K–8 project examples to step up instruction. Leave with a plan for incorporating more math with engineering challenges.

E **NGSS Performance Expectations in Action**

(Grades K–5) 208C, Convention Center

Michelle DiIeso and **Tania Tauer** (@EiE_org; ttauer@mos.org), Museum of Science, Boston, Mass.

Make sense of NGSS performance expectations through a hands-on engineering activity. Learn to identify and support the NGSS performance expectations in your classroom.

4:15–5:15 PM Presentations

M **Engineering a Prosthetic**

(Grades 4–8) 102E, Convention Center

Kim O'Brien (johanskm@milwaukee.k12.wi.us), Milwaukee (Wis.) Public Schools

Crystal Malone (malonecc@milwaukee.k12.wi.us) and **Michelle Hucke**, Victory School for the Gifted and Talented and Italian Immersion, Milwaukee, Wis.

Excite your students by engaging them in a real-world engineering design challenge. Walk away with a STEM unit outline focusing on NGSS life science and engineering core ideas involving making a prosthetic hand/leg.

A **Practices That Support STEM Education**

(General) 103B, Convention Center

Doug Paulson (@DPaulsonSTEM; doug.paulson@state.mn.us) and **John Olson** (@JohnCasperOlson; john.c.olson@state.mn.us), Minnesota Dept. of Education, Roseville

What do administrators need to know to support successful implementation of the practices called for in the CCSS and NGSS? Receive information on a strategy that can help you examine your instructional approaches to orchestrate the practices.

M **Energy House**

(Grades 6–8) 102F, Convention Center

Adam Scribner (@JAScribner; jscribne@stevens.edu), Stevens Institute of Technology, Hoboken, N.J.

Hear about Energy House, an NGSS-focused activity that challenges students to design, build, and test a model house that minimizes thermal energy transfer.

HS **Developing 21st-Century Reasoning Skills Through an Authentic STEM Research Experience**

(Grades 6–12) 103D, Convention Center

Deborah Walker (dwalker@georgiasouthern.edu) and **Robert Mayes** (rmayes@georgiasouthern.edu), Georgia Southern University, Statesboro

Hear how a Real STEM grant enabled a partnership of education institutions and industry to develop interdisciplinary STEM scientific research experiences for students. Lessons involving authentic, real-world experiences were developed using place-based education, Problem-Based Learning, and Understanding by Design pedagogy.

M **Make Student-centered Learning Visible Through Invisible Teaching Strategies**

(Grades 1–12) 103A, Convention Center

Gina Tesoriero (@STEMsuccessedu; ginateesoriero@gmail.com) and **Amanda Solarsh** (@StemSuccessEdu; stemsuccesedu@gmail.com), Simon Baruch MS104, New York, N.Y.

To prepare students for the future, it's pertinent that we encourage self-monitored learning. Become invisible in your classroom so student-centered learning can be visible.

HS **NCTM Session: It Takes Several Villages**
(Grades 9–College) 103F, Convention Center

Daniel Teague (teague@ncssm.edu) and **Maria Hernandez** (hernandez@ncssm.edu), North Carolina School of Science and Mathematics, Durham

Learn how collaborative communities of teachers working together and collaborative communities of students engaged with each other’s ideas. These two villages are fundamental to the success of our program, but they must be created and actively maintained.

E **The First Year of a Lower School STEM Lab**
(Grades K–6) 207 A/B, Convention Center

P. Matthew Dillon (@IolaniLSFabLab; pmdillon@iolani.org), 'Iolani School, Honolulu, Hawaii

I’ll share the creation and first year of the K–6 STEM Lab at 'Iolani, a private K–12 school in Honolulu. Plenty of time for Q&A.

Pr **3D Printing—Not Just for High School: Primary Edition**

(Grades K–3) 208D, Convention Center

Kimberly Sandefur (sandefurk@comstockps.org), Comstock STEM Academy, Kalamazoo, Mich.

Mark Peeters (peetersm@comstockps.org), Comstock Public Schools, Kalamazoo, Mich.

See how K–2 students learned basic software skills to create their own 3D printed objects, leading to deeper STEM discussions and engagement.

A **What’s in the Middle of STEM? Teacher Engagement!**
(Grades P–12) 210 A/B, Convention Center

Allison Webster (allison.webster@shs.org), **Kirk Goetchius** (kirk.goetchius@shs.org), **Josh Horwitz** (josh.horwitz@shs.org), and **Susanna Paterson** (susanna.paterson@shs.org), Shady Hill School, Cambridge, Mass.

Hear about the work of one school’s STEAM Council, an interdisciplinary team of teachers who are shaping a program, inspiring students, and leading a school in its STEM efforts. Find out about the tools used to facilitate their work and consider ways to build teacher engagement for STEM efforts at your school.

Pa **Addressing the Underrepresented in STEM**
(Grades 6–9, College) 211A, Convention Center

Carol Mitchell (cmitchell@unomaha.edu) and **Amelia Squires** (@UNO_OSTEM; asquires@unomaha.edu), University of Nebraska–Omaha

Hear about the EUREKA-STEM program at the University of Nebraska–Omaha in partnership with Girls, Inc., in which girls in grades 7 and 8 (the majority are girls of color) engage in STEM activities for a month.

Pa **Branching Out: Developing Partnerships to Enhance PreK–8 STEM Education**

(Grades P–8, College) 211C, Convention Center

Lori Maxfield (lmaxfield@carlow.edu) and **Suzanne Ament** (srament@carlow.edu), Carlow University, Pittsburgh, Pa.

How might we create innovative partnerships to enhance STEM learning? The Campus School of Carlow University shares strategies and activities as a CREATE Lab Satellite.



4:15–5:15 PM Hands-On Workshops

E **Google Classroom and STEM—Making It Work**
(Grades 2–5) 101F, Convention Center
Dawn Getzandanner (@dawngetzandanne), Spring Ridge Elementary School, Frederick, Md.
Attention will be paid to how the use of Google Classroom can enhance student understanding of STEM lessons. Participants will experience hands-on activities through the use of technology.

HS **Mathematical Models in Science and Technology**
(Grades 9–College) 101G, Convention Center
Peggy Welch (@peggywelch851; peggywelch851@gmail.com), Consultant, Lexington, Ky.
Explore strengths and limitations of modeling exponential functions using data from the recent Ebola virus outbreak.

HS **A Battery-powered Coffee Warmer: Designing, Building, Testing, Evaluating, and Refining**
(Grades 8–College) 101H, Convention Center
Fred Fotsch (@FredFotsch; ffotsch@spsmail.org), Glendale High School, Springfield, Mo.
Brew up new learning in your classroom with a hands-on STEM project. After completion, we'll discuss pedagogy and management of a STEM classroom and Project Based Learning.

A **Developing an Effective STEM Rubric**
(Grades P–12) 101I, Convention Center
Melanie LaForce (@melanielaforce; laforce@uchicago.edu) and **Elizabeth Noble** (enoble@uchicago.edu), Outlier Research & Evaluation, Chicago, Ill.
Rukiya Curvey Johnson, Chicago (Ill.) Public Schools
Learn the process for developing a STEM education rubric. Hear how Chicago Public Schools worked with the University of Chicago to develop a district-level STEM school rubric, as well as measures for assessing schools' progress on the rubric.

M **Dough Creatures and Circuit Sculpting to Engage Girls (and All Kids) in STEM**
(Grades 4–10) 101J, Convention Center
Gina Higby (@ginahigby; gina.higby@utexas.edu), The University of Texas at Austin
Get creative and explore best practices and the standards-focused SciGirls curriculum, which is designed to engage girls in STEM. Use conductive and insulating dough to sculpt circuits and light up creatures.

Pr **Engineering a Great STEM Lesson**
(Grades K–2) 204 A/B, Convention Center
Clair Durkes (durkesc@glencoeschools.org), South School, Glencoe, Ill.
By working as engineers, applying STEM practices to the classroom, and collaborating with colleagues, participants will learn how to create STEM lessons that support the standards.

Pr **The First “E” Is Engage: Safe and Inexpensive Experiments That Bubble, Wriggle, and Change Color**
(Grades P–6) 206 A/B, Convention Center
Liz Heinecke (kitchenpantryscientist@earthlink.net), KitchenPantryScientist.com, Edina, Minn.
KitchenPantryScientist.com's Liz Heinecke makes science engaging for learners of all types and abilities. She'll show you educational hands-on experiments that can get kids excited about science.

E **Three Strategies to Support the Transition from the State Standards to STEM**
(Grades 3–6) 208B, Convention Center
Pamela Sanford (@sanfordsaid; pam.sanford@comcast.net), River Eves Elementary School, Roswell, Ga.
Layla Cantlebury (@CantleburysCubs; cantlebury@ful-tonschools.org), Woodland Elementary School, Atlanta, Ga.
As our school made the transition from state science standards to STEM education, we adopted three key initiatives to promote student engagement and spark interest in STEM careers: Science Olympiad, Sea Perch Robotics, and hands-on activities. Join us as we walk through the steps.

Pa **Growing the STEM Seed into a Network of Sustainability**
(Grades 1–8) 208C, Convention Center
Jo Anne Vasquez (jvasquez@stemlessonessentials.com), 1996–1997 NSTA President, and Rocks to Rainbows, LLC, Gilbert, Ariz.
Joel Villegas (@PinalCountyESA; jvillegas@pinalesa.org), Pinal County School Office Education Service Agency, Florence, Ariz.
Learn about successful strategies that were used to develop and sustain a STEM network of partnerships that include teachers, administrators, higher education, and business/industry.

4:15–5:15 PM Exhibitor Workshops

Let's Get Helical: Exploring DNA Structure/Function with Interactive Physical Models

(Grades 8–College) L100 E, Convention Center

Sponsor: 3D Molecular Designs

Margaret Franzen (franzen@msoe.edu) and **Gina Vogt** (vogt@msoe.edu), MSOE Center for BioMolecular Modeling, Milwaukee, Wis.

Explore DNA as a macromolecule and as a source of genetic information with interactive DNA models and a paper bioinformatics exercise on the beta subunit of hemoglobin. Identify the point mutation that leads to sickle cell disease and explore the regulation of expression of fetal/adult hemoglobin—allowing students to learn concepts and terminology in an approach that really sticks!

Using Statistics, Mathematical Modeling, and Bioinformatics to Teach Human Evolution

(Grades 9–12)

L100 F, Convention Center

Sponsor: HHMI BioInteractive

Dawn Norton, Minnetonka High School, Minnetonka, Minn.

Explore HHMI BioInteractive's activities and resources that use statistics, mathematical modeling, and bioinformatics to teach human evolution. Human adaptations for bitter taste, salivary amylase production, sickle cell anemia, and lactose intolerance will be highlighted. Take home free classroom-ready resources.

7:00–8:30 PM STEM Night Event

(Ticket Required; \$5) #T-1 Ballroom B, Conv. Center

Sponsored by Foundation for Family Science & Engineering

Discover the excitement of the Family STEM Night event with colleagues and friends. Experience a range of hands-on activities designed specifically to actively engage elementary-age youth and their parents in exploring science and engineering concepts and careers together. Learn how to plan and host successful STEM Family events in your school and/or community.

Light snacks, take-home materials, and prizes!

Tickets, if still available, may be purchased at the Registration Area before 12 Noon on Thursday.





—Photo courtesy of Science Museum of Minnesota

The Science Museum of Minnesota constantly explores and implements new technologies to educate their audience about science, such as their Learning Labs designed to stimulate children’s curiosity and desire to learn. See page 9 for details about a special offer to the museum along with other special offers for forum attendees.

8:00–9:00 AM Invited Panels

Pa **The Why, What, and How of STEM Partnerships That Support Students and Teachers**

(General) *101 A/B, Convention Center*
Sponsored by GE Foundation

Facilitator/Organizer: **Kelli Wells**, Executive Director, Education and Skills, GE Foundation, Fairfield, Conn.

Panelists:

Linda Curtis-Bey, Executive Director, STEM Office of Curriculum, Instruction, and Professional Development, New York City (N.Y.) Dept. of Education

Stephen Pruitt, Senior Vice President for Content, Research, and Development, Achieve, Inc., Washington, D.C.

Arnel W. Cosey, Vice Chancellor for Student Affairs and Executive Dean, City Park Campus, Delgado Community College, New Orleans, La.

More than 2.4 million STEM-related jobs go unfilled in the United States each year. In order to prepare students for STEM jobs of the future, STEM partnerships that support students and teachers are critical to bridging the skills gap. This panel will provide context and case studies regarding successful partnering around STEM.

How Do We Measure Success for K–12 STEM Schools? STEM Metrics and Benchmarks

(General) *101 D/E, Convention Center*

Facilitator/Organizer: **Jerry D. Valadez**, NSTA Director, Multicultural/Equity, and Director, Central Valley Science Project, California State University, Fresno

Panelists:

Paul Keidel, STEM Coordinator, Bismarck (N.Dak.) Public Schools

Max McGee, Superintendent, Palo Alto (Calif.) Unified School District

Maureen Griffin, School Improvement Leader and STEM Academy Administrator, Hoover High School, Des Moines, Iowa

This panel of national experts will share a range of perspectives on how teachers, school leaders, community members, and policy makers evaluate and monitor STEM school practices, programs, improvement, and access and equity. Panelists will discuss research findings about the core components of various types of STEM schools and programs across the nation, as well as personal, national, and local efforts to create and use metrics that define and measure successful STEM education. In addition, panelists will conduct a breakout during the symposium where they will facilitate in small groups further study of their programs, research, or personal experiences with the improvement of K–12 STEM education.

9:15–10:15 AM Panel Workshops

Pa **STEM Integration into Rural Education Cooperative Schools**

(General) *101F, Convention Center*

Paul Keidel, STEM Coordinator, Bismarck (N.Dak.) Public Schools

Let's discuss the process of integrating STEM teaching strategies into rural schools by a rural education association. Strategies discussed will include the integration of technology, use of the engineering design process, professional development for teachers, forming partnerships, and the in-kind donation of mentoring/time by industry partners.

Pa **Let's Evaluate the Structure of Your STEM Program and Consider Ways to Support Better Partner Interactions**

(General) *101G, Convention Center*

Maureen Griffin, School Improvement Leader and STEM Academy Administrator, Hoover High School, Des Moines, Iowa

Eric Hall, International Baccalaureate Coordinator, Hoover High School, Des Moines, Iowa

Preliminary research on successful STEM schools indicates that cultivating partnerships with industry, higher education, nonprofits, museums, and research centers is important for engaging students in STEM learning through internships, mentorships, interdisciplinary Project Based Learning, and early college experiences (Means, 2008; National Research Council, 2011). Come learn how Hoover High STEM has approached partnerships and building relationships outside the school system. Be prepared to roll up your sleeves and explore ways your school can do the same.

Equity in STEM Education: English Learner Success Through Out-of-School STEM-rich Programs

(General) *101H, Convention Center*

Jerry D. Valadez, NSTA Director, Multicultural/Equity, and Director, Central Valley Science Project, California State University, Fresno

With STEM being expanded to out-of-school programs, many more English Language Learners have the opportunity to participate in high-quality STEM programs. There is a strong need for strategic implementation of successful programs in both urban and rural settings where most students have little access. How we provide access and measure success of STEM in out-of-school settings is an important component of a comprehensive STEM school and community strategy.

Pa **Building New York City’s STEM Initiative**

(General)

1011, Convention Center

Linda Curtis-Bey, Executive Director, STEM Office of Curriculum, Instruction, and Professional Development, New York City (N.Y.) Dept. of Education

As part of the chancellor’s strategic plan to improve student achievement and opportunities for all New York City students as well as prepare them for challenges of the 21st century, New York City has begun to develop an innovative STEM support structure that includes resources, professional development, and guidance in partnership with General Electric. Let’s discuss some of the resources and plans of the STEM support structure.



10:15–11:15 AM Exhibitor Workshops

The STEM Design Challenge

(Grades 4–10)

L100 A, Convention Center

Sponsor: Fisher Science Education

Robert Marshall (robert.marshall@thermofisher.com), Fisher Science Education, Pittsburgh, Pa.

Using creativity, teamwork, and problem-solving skills, you and fellow workshop attendees will compete for prizes as you learn about this project-based, competitive STEM event. Your students will thank you! *Note:* Workshop limited to the first 50 attendees.

Decomposing Corpses and STEM Careers!

(Grades 6–12)

L100 B, Convention Center

Sponsor: Texas Instruments

Jeffrey Lukens, Sioux Falls (S.Dak.) School District

What can we learn from decomposing corpses? A lot! Join us for a hands-on lesson developed by Texas Instruments and the National Academy of Sciences with help from forensic anthropologist Diane France. This lesson combines science, Hollywood, and STEM careers into one easy-to-follow lesson and is part of the STEM Behind Hollywood program—free at www.stemhollywood.com.

MacGyver Windmills

(Grades 4–18)

L100 C, Convention Center

Sponsor: REcharge Labs

Asia Ward (asia@kidwind.org), KidWind Project, Minneapolis, Minn.

This hands-on workshop is for grades 4–8 educators seeking training and educational tools in order to teach renewable energy concepts with confidence. Use common household materials to design and engineer a functioning windmill that can do work. Learn about curricula, student design challenges, and web tools to make your classroom come alive with wind-powered science.

Teaching STEM Using Agarose Gel Electrophoresis

(Grades 8–College)

L100 D, Convention Center

Sponsor: Edvotek Inc.

Brian Ell (info@edvotek.com), Edvotek Inc., Washington, D.C.

Explore four hot topics in biotechnology using gel electrophoresis: DNA fingerprinting, paternity testing, medical diagnostics, and GM organisms. Brightly colored dyes simulate DNA fragments, eliminating post-electrophoresis staining and saving valuable classroom time! Results are analyzed using a semi-logarithmic plot, which fosters critical-thinking skills and STEM learning techniques. Free flash drive/T-shirt drawing entry.

Focus On Photosynthesis

(Grades 6–College)

L100 E, Convention Center

Sponsor: MSOE Center for BioMolecular Modeling

Margaret Franzen (franzen@msoe.edu) and **Gina Vogt** (vogt@msoe.edu), MSOE Center for BioMolecular Modeling, Milwaukee, Wis.

We need your help! Provide input in a focus group about important concepts in discussing energy metabolism (photosynthesis and cellular respiration) at the middle and high school levels. Information shared will help shape creation of hands-on materials and professional development workshops that center around this important topic. *Note:* Workshop limited to the first 25 attendees.



A STEM Approach to Optics, Light, and Color

(Grades 6–12) *L100 F, Convention Center*

Sponsor: Frey Scientific/CPO Science

Kathleen Mills, Rosharon, Tex.

CPO's Link™ Optics with Light & Color learning module uses proven STEM and NGSS methods to teach reflection, refraction, convex and concave lenses, magnification, geometric optics, color mixing, and polarization. By using high-quality optical instruments and devices, student learn by doing and designing experiments themselves.

Project-Based Inquiry Science™ (PBIS): Creating “Coherence and Science Storylines” for Middle School Science

(Grades 6–8) *L100 G, Convention Center*

Sponsor: It's About Time

Mary Starr, Michigan Mathematics and Science Centers Network, Plymouth

STEM learning requires integration! Powerful questions and coherent storylines help solve the integration challenge. PBIS is built around interesting and meaningful Big Questions and Big Challenges, supporting the integration of science and engineering, engaging ALL students in high-quality STEM learning, and embracing the vision of the *Framework* and NGSS.

Investigating Renewable Energy with KidWind and Vernier

(Grades 6–12) *L100 H, Convention Center*

Sponsor: Vernier Software & Technology

David Carter (info@vernier.com), Vernier Software & Technology, Beaverton, Ore.

Learn how you can incorporate engineering design principles into lessons focusing on renewable energy using KidWind Wind Experiment Kits and Vernier data-collection technology, including the new Vernier Energy Sensor. These hands-on activities from our new *Renewable Energy with Vernier* lab book, appropriate for middle school and high school students, embody the spirit of STEM education through this highly relevant topic.

NGSS in the High School Classroom

(Grades 8–College) *L100 I, Convention Center*

Sponsor: Bio-Rad Laboratories

Leigh Brown (leigh_brown@bio-rad.com), Bio-Rad Laboratories, Hercules, Calif.

Engage with curriculum training specialist Leigh Brown on how to implement the NGSS in the science classroom. Developed by Kirk Brown—a master teacher, curriculum expert, and lead writer of the revised California science framework—this process includes modeling, explanation and argumentation, and engineering practices. Hear best practices and lessons learned on integrating the NGSS into your classroom.

Demystifying the NGSS with STEMscopes

(General) *L100 J, Convention Center*

Sponsor: Accelerate Learning–STEMscopes

Terry Talley (ttalley@acceleratelearning.com), Accelerate Learning–STEMscopes, Houston, Tex.

There's no doubt the NGSS are very rigorous and complex. But with an understanding of how the NGSS are aligned, implemented, and assessed, teachers will be successful in changing aspects of their instructional practices. STEMscopes lessons can guide students to achievement based on the standards and effective instructional strategies.

10:30–11:30 AM Invited Panel

A **Success Stories from Administrators**

(General) 101C, Convention Center
 Organizer/Facilitator: **Thomas (Tom) Evans**, Administrators Strand Leader, STEM Forum Steering Committee; and Principal, Eastern Technical High School*, Essex, Md.

Panelists:

Kim Burton-Regulski, Maryland Presidential Award Winner in Mathematics, and Mathematics Dept. Chair, Eastern Technical High School, Essex, Md.

Douglas H. Handy, Coordinator, Office of Career and Technology Education, Baltimore County Public Schools, Towson, Md.

Dedric McGhee, Upper Elementary Strand Leader, STEM Forum Steering Committee; Supervisor of the Year West Tennessee Finalist; American Chemical Society Government Affairs Committee Member; and STEM Manager, Shelby County Schools, Memphis, Tenn.

Jennifer Williams, Primary Strand Leader, STEM Forum Steering Committee; PAEMST 2006; and Lower School Science Dept. Chair, Isidore Newman School, New Orleans, La. The Administrative Panel will include leaders from across the country. If you're an administrator who is interested in either developing and/or improving the STEM program in your school or district, this hour of time will be well spent.

**Eastern Technical High School is a State and National Blue Ribbon magnet school of choice recognized by Newsweek Magazine, U.S. News & World Report, and The Washington Post for the last eight years as being one of "America's Best High Schools."*



10:30–11:30 AM Presentations

M **Connecting Physical Science, Design, and Engineering Through Underwater Robotics**

(Grades 6–9) 101 D/E, Convention Center
Adam Scribner (@JAScribner; jscribne@stevens.edu), Stevens Institute of Technology, Hoboken, N.J.

We'll delve into using underwater robotics projects as vehicles for teaching and connecting physical science and engineering design principles, along with the unique challenges involved.

M **Creation and Evaluation: Sharing STEM Tasks and Student Work**

(Grades 6–8) 101I, Convention Center
Laura Campion (lcampion@m322.org), **Whitney Reizner** (wreizner@gmail.com), **Erica Zigelman** (ezigelman@schools.nyc.gov), and **Emebet Bryan** (ebryan@m322.org), Middle School 322, New York, N.Y.

Join us for a closer look at the development of quality STEM projects. We will focus on planning integrated lessons, differentiating assignments for ALL students (students with disabilities and English language learners), and creating rubrics for assessment.

HS **Using Direct Measurement Video to Teach Science Practices**

(Grades 8–College) 102A, Convention Center
Peter Bohacek (@bohacekp; peter.bohacek@isd197.org), Henry Sibley High School, St. Paul, Minn.

Come learn why instructors—from junior high classrooms through MIT's online physics courses—are adopting this innovative and engaging method to teach science practices.

M **Create Future Engineers: Defining and Delimiting Engineering Problems**

(Grades 1–12) 102E, Convention Center
Gina Tesoriero (ginatesoriero@gmail.com) and **Amanda Solarsh** (@StemSuccessEdu; stemsuccessedu@gmail.com), Simon Baruch MS104, New York, N.Y.

Explore how to bring NGSS ETS1.A into your classroom from elementary to high school to encourage student-centered STEM learning.

M **Minding Your P's and E's: Fostering Creativity in the Science Classroom***(Grades K–12)* 102F, Convention Center**Timothy Goodale** (*tagoodal@ncsu.edu*), North Carolina State University, Raleigh

Learn how to utilize the blended models of the 5E's of Inquiry (Engage, Explore, Explain, Elaborate, and Evaluate) and the 4P's of Creativity (Person, Product, Process, and Press) to structure science classrooms that foster creativity.

M **Close Reading and Technical Writing in Science: Support the CCSS and NGSS with a Hunger Games Theme (Middle Level)***(Grades 6–12)* 103A, Convention Center**Leslie Sutera** (*lsutera@tntech.edu*) and **Kristen Trent** (*kpennycuff@tntech.edu*), Tennessee Tech University, Cookeville**Garry Pennycuff** (*@gpennycuff*; *gpennycuff@pstcc.edu*), Pellissippi State Community College, Knoxville, Tenn.

Odds are in your favor that you'll leave with STEM activities designed for middle school and high school that support the standards.

HS **An Alternative to the Written Lab Report***(Grades 9–College)* 103D, Convention Center**Walter O'Brien** (*walter.obrien@wuhsd.org*), Santa Fe High School, Santa Fe Springs, Calif.

Want a refreshing idea on lab reports? Media-based lab reports offer an innovative strategy that engages students to critically reflect upon their lab investigations.

HS **Increasing Very Long-Term Academic Retention via Positive Student-Teacher Relationships: Building Self-Efficacy and Teaching Techniques***(Grades 7–College)* 103E, Convention Center**Michael Bechtel** (*michael.becht@wartburg.edu*), Wartburg College, Waverly, Iowa

Review interesting findings from a dissertation study on 92 students within a Midwestern high school chemistry course.

HS **NCTM Session: Will the Fastest Women Marathoners Ever Beat the Fastest Men?***(Grades 6–12)* 103F, Convention Center**Paul Kelley** (*paulkelley@comcast.net*), Anoka High School, Anoka, Minn.

We'll explore "world best" marathon times for men and for women over the years, and discuss the possibilities for the future, including a sub-two-hour marathon.

E **Secret Agent Engineering***(Grades 4–5)* 207 A/B, Convention Center**Kathy Kennedy** (*kkenned3@stevens.edu*), Stevens Institute of Technology, Hoboken, N.J.

Add a real asset to your teaching of wave behavior and patterns. Come find out how a design exploration that engages elementary students in wave understanding of light and sound to transmit information can save the day!

HS **Basic Polymer Science for the Science Classroom***(Grades 7–12)* 208D, Convention Center**Debbie Goodwin** (*nywin@hotmail.com*), Retired High School Science Teacher, Chillicothe, Mo.**Andrew Nydam** (*andrewnydam@hotmail.com*), ASM International, Materials Park, Ohio**Sherri Rukes** (*sherri.rukes@d128.org*), Libertyville High School, Libertyville, Ill.

Simple demonstrations, labs, and activities bring polymers into your curriculum that are STEM relevant. Concepts include formation, classification, structure, and properties. NGSS correlations. Take home a CD of activities/information.

Pr **Exploring the Everyday STEM Connections Encountered in a Young Child's World***(Grades P–3)* 210 A/B, Convention Center**Donna Knoell** (*dknoell@sbcglobal.net*), Educational Consultant, Overland Park, Kans.

Get preK–3 children nurturing, observing, questioning, investigating, thinking, and talking about science and engineering. Find out how to use integrated STEM activities to help young children see the interconnectedness of the STEM disciplines, helping them recognize the importance of STEM in their everyday world. Leave with examples and ways to incorporate the CCSS.

Pa **Taking Advantage of Urban Settings: Leveraging Science Institutions to Enhance Student Learning***(Grades 4–10)* 211A, Convention Center**Alicia Lamfers** (*alampf@denverzoo.org*), Denver Zoo, Denver, Colo.**Melissa Botteicher** (*mbotteicher@aps.k12.co.us*), Aurora (Colo.) Public Schools

Join the partners of Urban Advantage Denver, which targets urban middle schools and addresses bridging the opportunity gap through inquiry learning and STEM content.

Pa **STEM Research and Design: A Mentoring “Data Experience”**

(Grades 9–College) 211C, Convention Center
Doug Baltz (dbaltz@birmingham.k12.mi.us), Seaholm High School, Birmingham, Mich.

The STEM Research and Design course provides a unique academic conduit for students to develop a STEM-related project while embedding authentic data collections and analysis with a number of professional mentors.

A **Blueprint for Designing a Successful K–5 STEM Program**

(Grades K–5) 212 A/B, Convention Center
Tona Blizzard (@tonablizzard; tona.blizzard@gcisd.net), Cannon Elementary School, Grapevine, Tex.

Julie Brenegan (@molliemae57; julie.brenegan@gcisd.net), Grapevine-Colleyville ISD, Grapevine, Tex.
Walk through the steps used by district and campus administrators in designing and implementing a successful K–5 STEM program in a neighborhood Title I public school setting. STEM curriculum documents will be shared.

10:30–11:30 AM Hands-On Workshops

M **Innovative Technology in Science Inquiry Using Free Models**

(Grades 6–9) 101J, Convention Center
Carolyn Staudt (@cjstaudt; cstaudt@concord.org) and **Chad Dorsey** (@chaddorsey; cdorsey@concord.org), The Concord Consortium, Concord, Mass.

Discover how to customize online middle school STEM activities using free open-source models through a simple web-based authoring portal.

M **STEAM Journals: Adding Art to Our Data**

(Grades 4–8) 102B, Convention Center
Erick McGinley (mcginlej@milwaukee.k12.wi.us), 53rd Street School, Milwaukee, Wis.

Use common classroom materials to create a project journal that can be used to help students increase their visual understanding of STEM activities.

M **Marble Down: An Intense Middle School Engineering Project**

(Grades 6–8) 102C, Convention Center
Art Ellis and **Rebecca Kaplan**, Bedford Middle School, Westport, Conn.
Alfred Scheetz, Staples High School, Westport, Conn.
Erin Dobbins (edobbins@westport.ct.k12.us) and **David Oestreicher** (doestreicher@westport.k12.ct.us), Coleytown Middle School, Westport, Conn.

Get new learning rolling in your classroom with a pegboard, dowels, rubber bands, and a marble. Challenge—how slowly can you get the marble to the bottom without stopping?

M **The NGSS Science and Engineering Practice of Analyzing and Interpreting Data: A Conceptual Examination**

(Grades 4–College) 102D, Convention Center
John Graves (@cjmogan; graves@montana.edu), Montana State University, Bozeman

Linda Rost (rostl@baker.k12.mt.us), Baker High School, Baker, Mont.

Stacy Hansen (sandshansen@hotmail.com), Washington Middle School, Miles City, Mont.

The NGSS science and engineering practice of analyzing and interpreting data will be explored through inquiry activities, focusing on teacher conceptual change of the practice.

Pa **Integrative STEM for Teachers: An Innovative Approach**

(Grades 6–College) 103B, Convention Center
Patricia Simmons (pesimmon@ncsu.edu), 2011–2012 NSTA President, and North Carolina State University, Raleigh

Because our team represents at least one member from each of the four STEM discipline areas, we will share our perspectives on the challenges about coming together and designing an integrated STEM model. Join us for signature pedagogical activities focusing on your local available resources.

Pr **Engineering in Kindergarten? It’s a Natural Fit**

(Grades P–2) 204 A/B, Convention Center

Cynthia Gardner (cgardner@lander.edu) and **Chris Sacerdote** (csacerdote@lander.edu), Lander University, Greenwood, S.C.

Can kindergarten students solve problems through the engineering process? Absolutely! Come experience two activities that can inspire your students to design and build.

Pr **Ramps and Pathways: An Integrated STEM Activity**
(Grades P–2) 206 A/B, Convention Center

Beth Van Meeteren (*beth.vanmeeteren@uni.edu*), University of Northern Iowa, Cedar Falls

Learn how teachers provide core molding and unit blocks to support students in designing and building marble runs, simultaneously engaging in physics and spatial thinking.

E **STEM Challenge Night: An Innovative Approach to Get Families Actively and Meaningfully Engaged**

(Grades K–5) 208A, Convention Center

Monica Ibanez (@AliefScience; *monica.ibanez@aliefisd.net*), **Betty George** (@AliefScience; *betty.george@aliefisd.net*), and **Sarah Milianta-Laffin** (@AliefScience; @MiliLaff; @ALX_Adventurers; *s.milianta@gmail.com*), Alief ISD, Houston, Tex.

Bolster parent support, build excitement, and strengthen home-school connections through innovative and meaningful STEM challenges.

E **Water: Using a STEM Approach to Teaching About This Most Valuable Resource**

(Grades 3–8) 208B, Convention Center

Natasha Yates (*nlyates@stkate.edu*), St. Catherine University, St. Paul, Minn.

Dive into an interactive, participatory journey downstream with learning about human contributions to water pollution. Leave with tools to develop a unit teaching basic facts about fresh water.

E **Integrating Literacy and STEM: “Who Took Mr. G.’s Cookies?”**

(Grades 4–6) 208C, Convention Center

Marsha Traynor (*marsha.traynor@mnsu.edu*), Minnesota State University, Mankato, Eden Prairie

Solve a nonviolent crime by analyzing white powders, chromatograms, and fingerprints. Nonfiction and fiction literacy are integrated to support/enhance the STEM activities.



**APPLICATION
DEADLINE
August 15, 2015**

Comprehensive Professional Learning Fellowships for New Science Teachers

The NSTA New Science Teacher Academy is a yearlong program focused on encouraging and supporting second-through fifth-year middle and high school science teachers.

Emphasizing quality science teaching, enhanced teacher confidence, classroom excellence, and solid content knowledge, the academy provides participants with top-notch face-to-face and online support and access to comprehensive educational resources.



Apply online at www.nsta.org/academy.



11:45 AM–12:45 PM Panel Workshops

A Building a Cohesive STEM Program: Focus On Eastern Technical High’s Mathematics, Engineering, and Computer Science Program

(General) *101F, Convention Center*

Kim Burton-Regulski, Maryland Presidential Award Winner in Mathematics, and Mathematics Dept. Chair, Eastern Technical High School, Essex, Md.

Thomas (Tom) Evans, Administrators Strand Leader, STEM Forum Steering Committee; and Principal, Eastern Technical High School, Essex, Md.

How can administrators and educators build programs that foster collaboration and connections between the STEM areas? At Eastern Technical High School, one department encompasses mathematics, engineering, and information technology. By joining these departments, teachers are able to collaborate and share resources in order to build a stronger STEM program. In this discussion, participants will examine and brainstorm strategies for fostering collaboration and for building programs that make connections between a variety of areas of STEM.

A Using INSPIRES to Support Integration of Engineering Design in Science and Technology Education

(General) *101G, Convention Center*

Douglas H. Handy, Coordinator, Office of Career and Technology Education, Baltimore County Public Schools, Towson, Md.

Baltimore County Public Schools (BCPS) and the University of Maryland, Baltimore County have partnered to implement and assess an NSF-funded professional development model to enhance teacher pedagogical practice by integrating engineering design elements into high school biology and technology education classrooms. The goals of the program are to strengthen teachers’ ability to integrate engineering design concepts and practices with science learning, to support the BCPS teaching and learning framework, and to prepare globally competitive students. In this workshop, participants will preview the INSPIRES curriculum, which features research-based pedagogy for engaging and improving learning for all students in the diverse classroom, as well as strategies that support student-centered learning through problem solving, analytical reasoning, communication, and collaboration.

A Supporting a Pathway for STEM Education

(General) *101H, Convention Center*

Dedric McGhee, Upper Elementary Strand Leader, STEM Forum Steering Committee; Supervisor of the Year West Tennessee Finalist; American Chemical Society Government Affairs Committee Member; and STEM Manager, Shelby County Schools, Memphis, Tenn.

Supporting district STEM/STEAM programs while exploring the essential elements of high-quality preK–12 STEM education (inquiry-based science and math education, integrated curricula, project-based group learning, and career awareness) requires strategies with a collaborative approach with community, teachers, administrators, and students. Participants will receive a road map to strengthen preK–12 STEM education programs that includes a self-assessment rubric to determine where on the STEM education continuum a school is currently functioning. Once this starting point is identified, the pathways for success provide a common vision to assist schools in setting goals, as well as strategies toward achieving them. This discussion will be enhanced by your participation and feedback.

A Building STEM Partnerships for Elementary Science Classrooms

(General) *101I, Convention Center*

Jennifer Williams, Primary Strand Leader, STEM Forum Steering Committee; PAEMST 2006; and Lower School Science Dept. Chair, Isidore Newman School, New Orleans, La. How can administrators and educators effectively support STEM in the elementary science classroom? Providing STEM-focused education allows for more student collaboration, communication, critical thinking, and problem solving. Building partnerships with local universities, governmental agencies, and business partners can help to engage young students with real-world engineering design challenges that require students to integrate STEM content into a design project that requires the engineering process. Students as young as kindergarten can be introduced to challenges that begin to prepare them for the critical thinking and collaborative processes needed in the STEM fields. These partnerships provide mentors that expose students to individuals working in STEM fields. In this session, participants will engage in an engineering design challenge centered on solving a real-world problem. They will briefly participate in background-building investigations, allowing them to unpack relevant science concepts.

11:45 AM–12:45 PM Presentations

HS **Nanoscale Science and Engineering**
(Grades 10–12) 101 A/B, Convention Center
Mariel Kolker (@MarielKolker; *mariel.kolker@morristown-highschool.org*), Morristown High School, Morristown, N.J.
 Discover this innovative new course that introduces students to the science and applications of nanotechnology. Come for a course overview and take away nano resources for your chemistry, biology, or physics classroom. We'll cover Problem Based Learning and addressing the NGSS.

M **STEM—Moving Beyond Science**
(Grades 5–College) 101J, Convention Center
Dewayne Morgan (@USMAsker; *dmorgan@usmd.edu*), University System of Maryland, Adelphi
 Join us as we explore how schools and other education institutions can recognize the potential of STEM education for helping learners understand the world around them.

M **Integrated STEM Through Collaboration at the Middle Level**
(Grades 6–9) 103A, Convention Center
Rebecca Monhardt (*rebecca.monhardt@loras.edu*) and **Robert Keller** (*robert.keller@loras.edu*), Loras College, Dubuque, Iowa
Christopher Sindt (*chsindt@dbqschools.org*) and **Karla Digmann** (@kdigmann; *kdigmann@dbqschools.org*), George Washington Middle School, Dubuque, Iowa
 In this session, math/science educators will share their experiences in developing integrated STEM lessons for students and the importance of collaboration in this process.

HS **From Climate and Ocean Literacy to Meaningful Action—The Launching of I2SEA**
(Grades 7–College) 103D, Convention Center
Jason Hodin (@I2Iedu; *seastar@stanford.edu*), Hopkins Marine Station, Pacific Grove, Calif.
 I2SEA (Inquiry to Student Environmental Action) provides hands-on and digital curricular tools and support to secondary school classrooms worldwide on climate change and ocean acidification.

Pa **NCTM Session: Achieving Equity: Partnerships in Urban Districts to Support Implementation of the CCSS Mathematics and NGSS for All Students**
(Grades 6–8, College) 103F, Convention Center
Lynn Narasimhan (*cnarasim@depaul.edu*), DePaul University, Chicago, Ill.
Mary Jo Tavormina (*mjtavormina@gmail.com*), University of Illinois at Chicago
 The *CCSS Mathematics* and the *NGSS* provide our nation with the opportunity to achieve greater educational equity. We'll highlight partnerships between two universities, DePaul University and the University of Illinois at Chicago, and high-needs school districts in the Chicago area to reach all students through districtwide use of specific instructional strategies and high-quality resources. We'll mostly focus on mathematics strategies and tools, but connections will be made to similar approaches being used in the implementation of the *NGSS*.

E **Integrated STEM Curricula at a STEM Elementary School**
(Grades 1–5, College) 207 A/B, Convention Center
Judith Morrison (*jmorrison@tricity.wsu.edu*), Washington State University Tri-Cities, Richland
 Review findings from a study of a STEM elementary school with examples of integrated curricula and lessons incorporating science and engineering practices.

HS **Polymers: New Twists on Old Favorites**
(Grades 6–12) 208D, Convention Center
Debbie Goodwin (*nywin@hotmail.com*), Retired High School Science Teacher, Chillicothe, Mo.
Andrew Nydam (*andrewnydam@hotmail.com*), ASM International, Materials Park, Ohio
Sherri Rukes (*sherri.rukes@d128.org*), Libertyville High School, Libertyville, Ill.
 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.

Pa **Statewide STEM Coalition: Leadership Delivery Through a Design Blueprint**

(Grades 4–12) *211A, Convention Center*
Kenn Heydrick (@kheydrick; kenn.heydrick@sbcglobal.net), The University of Texas at Tyler
 Come learn how the Texas STEM Coalition works directly with schools to transform teaching/learning methods. Learn how to use a design blueprint and improve achievement in STEM education.

M **Fostering Schoolwide STEM Culture Among Staff and Students**

(Grades 6–8) *211B, Convention Center*
Laura Campion (lcampion@m322.org), **Erica Zigelman** (ezigelman@schools.nyc.gov), **Emebet Bryan** (ebryan@m322.org), and **Whitney Reizner** (wreizner@gmail.com), Middle School 322, New York, N.Y.
 Emphasis will be placed on strategies for gaining true staff and student buy-in for establishing a cross-curricular environment conducive to real-world learning beyond the traditional disciplinary boundaries.

Pa **STEM@SSM: STEM Outreach to Area Schools**

(Grades 4–12) *211C, Convention Center*
John Blackmer (jblackmer@s-sm.org), Shattuck-St. Mary’s School, Faribault, Minn.
 Learn how instructors from Shattuck-St. Mary’s, a rural private college prep school, offer their talents to provide STEM enrichment activities for students in non-SSM schools from the surrounding area. STEM@SSM offers programs and opportunities beyond what local schools can accomplish on their own, constantly evolving itself to meet identified needs. See www.ssmstem.org for more information.



11:45 AM–12:45 PM Hands-On Workshops

HS **Simulate Evolution with Technology and Hands-On Tools**

(Grades 9–12) *102A, Convention Center*
Seema Khan (@CLOUDLEARNERS; skhan@raft.net), RAFT San Jose, Calif.
 Leave with a ready-to-implement STEM lesson that uses technology and hands-on learning to simulate evolution and formulate a theory of natural selection. Encouraged to BYOD (tablet/laptop).

M **Using STEAM to Inspire Deep Learning**

(Grades 6–8) *102B, Convention Center*
Jessica Lura (@msjlura; jlura@bullischarter-school.com) and **Kristina Plattner** (@MrsPlattner; kplattner@bullischarter-school.com), Bullis Charter School, Los Altos, Calif.
 Learn about some middle school STEAM projects and get practical advice on how to implement your own real world-based projects at your school.

M **Engineering Design Experiments for Middle School Classrooms**

(Grades 6–8) *102C, Convention Center*
Karen Saur (@Karen_Saur; ksaur@nyscience.org) and **Grace Andrews** (gandrews@nyscience.org), New York Hall of Science, Queens
Andrea Bonosoro (abonosoro@schools.nyc.gov), J.H.S. 185 Edward Bleeker, Flushing, N.Y.
 Find out how to integrate rigorous (but manageable) design experiments into your classroom while following the NGSS engineering design process.

M **Going Beyond “Average”: Graphing and Interpreting Data Using Measures of Center and Spread**

(Grades 6–8) *102D, Convention Center*
Matthew Mirabello (mmirabello@amnh.org), American Museum of Natural History, New York, N.Y.
Mona McNamara (mmcnamara@nybg.org), The New York Botanical Garden, Bronx
Nickoleta Lytras (@nickoleta; nickoleta.lytras@gmail.com), Salk School of Science, New York, N.Y.
 Emphasis will be placed on methods of representing and analyzing measures of center and spread in experimental data.

HS **Reverse Engineering as an Instructional Tool**
 (Grades 6–12) 103B, Convention Center
Rebecca Stanley (@rls0320; rstanley@ncnewschools.org),
 North Carolina New Schools, Raleigh
 Backwards design can apply to more than just lesson planning. Explore using reverse engineering as an instructional tool to promote creativity and inquiry in any discipline.

HS **Science and Math: Data Analysis Made Easy**
 (Grades 7–College) 103C, Convention Center
Karlheinz Haas (kh76356@gmail.com), The Pine School,
 Hobe Sound, Fla.
 Increase student engagement in analysis and evaluation of real data. Enable students of different ability levels to perform experiments with measurements not previously obtainable in the classroom.

Pr **Full STEM Ahead: Measurement as the Intersection of the STEM Disciplines**
 (Grades P–3) 204 A/B, Convention Center
Mary Hynes-Berry (earlymath@erikson.edu), Erikson Institute, Chicago, Ill.
 Huff and Puff, and it still stands! We'll explore how the three Little Pigs needing to build a strong house can become the focus of a rigorous inquiry involving all the STEM disciplines.

Pr **The Engineering Design Process for K–3**
 (Grades K–3) 206 A/B, Convention Center
Margaret Prevenas (prevenam@onid.oregonstate.edu) and
Michael Giamellaro (michael.giamellaro@osucascades.edu),
 Oregon State University–Cascades, Bend
 Using a combined verbal and kinesthetic approach, K–3 students learn hand gestures to use the Engineering Design Process in solving engineering challenges.

OPEN HOUSE: THE BAKKEN MUSEUM • WWW.THEBAKKEN.ORG



NSTA and **The Bakken Museum**
 welcome you to the Twin Cities.

Enjoy complimentary admission to
 The Bakken Museum from
 Wednesday, May 20, to Saturday, May 23.
 Show your STEM Forum & Expo badge at the
 visitor services desk.

The museum is open on
 Wednesday, Friday, and
 Saturday from 10:00 AM
 to 5:00 PM; and Thursday
 from 10:00 AM to 8:00 PM.
 The museum is located at
 3537 Zenith Ave S.,
 Minneapolis.



E **Strange New Planet: Explore New Worlds as a NASA Scientist**

(Grades 3–8) 208A, Convention Center

Caitlin Nolby (@NDSGC; cnolby@space.edu), North Dakota Space Grant Consortium, Grand Forks

Launch your students' imaginations with this hands-on activity that allows students to work in teams with roles like astronomer, spacecraft, and mission control, to discover and record observations on new planets.

E **Engineering the Built Environment**

(Grades 3–12) 208B, Convention Center

Dylan Ryder (@DylanMRyder; dryder@theschool.columbia.edu), The School at Columbia University, New York, N.Y.

Stefanie Smith (@stefmsmith; ssmith@ecfs.org), Ethical Culture Fieldston School, New York, N.Y.

Engineering activities don't require expensive equipment. Common items like paper, cardboard, straws, and tape can get your students thinking like engineers and architects.

E **Assessing Student Achievement in Elementary Engineering**

(Grades 1–5) 208C, Convention Center

Elissa Jordan (ejordan@mos.org), Museum of Science, Boston, Mass.

What is "achievement" in elementary engineering? Explore and identify tools for evaluating engineering knowledge and skills. Leave with assessment tools to use in your classroom.

11:45 AM–12:45 PM Exhibitor Workshops

Environmental Study: A Real-World Investigation

(Grades 7–12) L100 A, Convention Center

Sponsor: Fisher Science Education

Robert Marshall (robert.marshall@thermofisher.com), Fisher Science Education, Pittsburgh, Pa.

How do real environmentalists determine water quality? Use field tools, laboratory equipment, and chemistry to investigate a real-world water quality case study. *Note:* Workshop limited to the first 50 attendees.

Zombie Apocalypse!

(Grades 6–12) L100 B, Convention Center

Sponsor: Texas Instruments

Jeffrey Lukens, Sioux Falls (S.Dak.) School District

Become part of a zombie apocalypse as brains will be served (*while supplies last*). Learn about disease spread modeling using simulations and fun storylines about a zombie outbreak. Middle and high school students will learn about the STEM careers necessary to stop the zombies! Find out how exciting Hollywood themes can be used to teach science and math concepts.

Solar Hack

(Grades 4–8) L100 C, Convention Center

Sponsor: REcharge Labs

Asia Ward (asia@kidwind.org), KidWind Project, Minneapolis, Minn.

Learn how solar circuitry works by hacking apart a dollar store solar lantern. Dismantle the lantern to identify key parts, then put the parts to use again in different ways to

understand how they function in other solar circuits. A great hands-on workshop for grades 4–8 educators and maker spaces searching for inexpensive solar power activities!

Hands-On Building and Circuitry Workshop

(Grades K–5) L100 D, Convention Center

Sponsor: Roominate

Alice Brooks, Roominate, Sunnyvale, Calif.

Come build with Roominate, an open-ended wired building system limited only by your imagination. Build a house with lights, a car with spinning wheels, a skyscraper with an elevator, and more! This system teaches hands-on problem solving, basic circuitry, spatial and fine motor skills, creativity, and even self-confidence!

Telling Molecular Stories with David Goodsell's Molecular Landscapes

(Grades 9–College) L100 E, Convention Center

Sponsor: MSOE Center for BioMolecular Modeling

Margaret Franzen (franzen@msoe.edu) and **Gina Vogt** (vogt@msoe.edu), MSOE Center for BioMolecular Modeling, Milwaukee, Wis.

These amazing landscapes allow you to tell molecular stories. In "Your Flu Shot in Action" story, students trace the expression of an antibody gene from the nucleus to the endoplasmic reticulum where docked ribosomes synthesize it. Then the antibody continues to the cell surface via the Golgi and secretory vesicles.

Solving the Mystery of STEM Using Forensic Science*(Grades 7–12) L100 F, Convention Center*

Sponsor: Frey Scientific/CPO Science

Kathleen Mills, Rosharon, TX

Conduct a number of STEM-focused forensic activities that link scientific investigations with analysis and investigative skills to solve multifaceted “cases” involving fingerprint, trace, DNA, and document evidence. Examine additional STEM-focused assets. See how the program software allows integration of virtual labs, investigative activities, the preparation of web-based content, and individualized assessment.

Incorporating Engineering into Grades 6–12 Classrooms*(Grades 6–12) L100 G, Convention Center*

Sponsor: It’s About Time

Gary Curts, STEM Implementation Specialist, Dublin, Ohio

Participate in an engaging and fun engineering experience. Using the program *Engineering the Future*, you will investigate and improve on the design of a putt putt boat. We will use the process known as “reverse engineering,” iterate on the design, and discover how this curriculum fits with STEM.

Vernier’s Digital Tools for STEM Education*(Grades 3–12) L100 H, Convention Center*

Sponsor: Vernier Software & Technology

David Carter (info@vernier.com), Vernier Software & Technology, Beaverton, Ore.

Taking STEM education from buzzword to classroom implementation is easier than you think. In this workshop, you will participate in STEM activities, appropriate for multiple age groups, which make use of Vernier’s digital tools. The activities will model approaches you can use to implement STEM education into your classroom.

STEM Strategies and Actions for Student Achievement Gains*(General) L100 J, Convention Center*

Sponsor: Accelerate Learning–STEMscopes

Sharry Whitney (sharritney@acceleratelearning.com), Accelerate Learning–STEMscopes, Houston, Tex.

Transformational STEM teaching is leveraged by the instructional strategies used by the teacher as well as the planned-for actions of the students. When STEM coaches/education leaders observe for the use of effective instructional strategies, student engagement, and student actions—the data collected provides rich opportunities for achievement-changing feedback!

12:30–3:30 PM Exhibits*Exhibit Hall A, Convention Center*

Take advantage of this dedicated time to stroll through the exposition picking up tips, product samples, and ideas to spark your imagination.

1:15–2:15 PM Exhibitor Workshops**Teaching Astronomy During the Day***(Grades 4–12) L100 A, Convention Center*

Sponsor: Fisher Science Education

Robert Marshall (robert.marshall@thermofisher.com), Fisher Science Education, Pittsburgh, Pa.

Learn the skills you need to become a master at navigating the night sky and walk away with astronomy-focused STEM demos and activities you can implement in your classroom.

Note: Workshop limited to the first 50 attendees.**STEM Behind Health—Math, Science, Diseases, and Careers!***(Grades 6–12) L100 B, Convention Center*

Sponsor: Texas Instruments

Jeffrey Lukens, Sioux Falls (S.Dak.) School District**Elizabeth McMillan**, Sanford Research, Sioux Falls, S.Dak.

Learn about Chelcie’s story with a middle school/high school lesson dedicated to the understanding of STEM careers in a medical setting through the story of a girl diagnosed with Type 1 diabetes. Created by Texas Instruments and Sanford Health, this interactive lesson looks at the mechanism, treatment, and diagnosis of Type 1 diabetes. Free at STEM-behindHealth.com.

The “E” in STEM: STEM Engineering*(Grades 5–College) L100 C, Convention Center*

Sponsor: WhiteBox Learning

Graham Baughman (graham@whiteboxlearning.com), Whitebox Learning, Louisville, Ky.

Engage your students in the complete engineering design process. WhiteBox Learning provides standards-, web-, and project-based applied STEM learning applications. Gliders2.0, Rover2.0, Structures2.0, Prosthetics2.0, MousetrapCar2.0, GreenCar2.0, Rockets2.0, Dragster2.0, and SurvivalShelter2.0 allow students to build, analyze, and simulate their designs, and compete “virtually,” 24/7, all around the world...how cool is that!?



A New Revolution in STEM Robotics

(Grades 6–10)

L100 D, Convention Center

Sponsor: Pitsco Education

Brad Blue (bradbbblue@gmail.com), Design & Innovation Lab, Minneapolis, Minn.

TETRIX® PRIME is a revolutionary new robotics building system that is designed to teach a variety of STEM concepts through Project Based Learning without the construction complexities inherent to other building systems. TETRIX PRIME is engineered to be simple and intuitive, enabling students to bring their creations to life quickly and easily.

Genes, Genomes, and the New World of Personalized Medicine

(Grades 9–College)

L100 E, Convention Center

Sponsor: MSOE Center for BioMolecular Modeling

Gina Vogt (vogt@msoe.edu) and **Margaret Franzen** (franzen@msoe.edu), MSOE Center for BioMolecular Modeling, Milwaukee, Wis.

Introduce students to the new science of genomics and personalized medicine with interactive tools, such as the DNA Discovery Kit, new Flow of Genetic Information Kit, and gene maps. We will tell a “genomic story” you can use to engage students by personalizing biologic genomic processes.

Engineering Design in the FOSS Next Generation Program

(Grades K–6)

L100 F, Convention Center

Sponsor: Delta Education/School Specialty Science

Kathy Scoggin, Delta Education/School Specialty Science–FOSS, Minneapolis, Minn.

FOSS Next Generation modules provide students with opportunities to engage in engineering experiences to develop solutions to problems, construct models, and use systems thinking. We’ll describe transitioning to the FOSS Next Generation, and display the engineering opportunities in a new module, Motion and Matter.

Incorporating STEM into the Classroom (Middle School Science)

(Grades 5–8)

L100 G, Convention Center

Sponsor: It’s About Time

Mary Starr, Michigan Mathematics and Science Centers Network, Plymouth

Learn how engineering, technology, and mathematics can be seamlessly and readily integrated and embedded into science education. Bring STEM into your classroom by involving students in designing solutions to real-world problems using science and engineering practices, and applying crosscutting concepts and disciplinary core ideas.

Empowered Students Thinking Like Engineers!

(Grades 3–5)

L100 H, Convention Center

Sponsor: National Geographic Learning

Tom Hinojosa, National Geographic Learning, Littleton, Colo.

Learn about an innovative, project-based approach to teaching that empowers students to think like engineers and scientists! We’ll explore new shifts in the way science has been traditionally taught. Through a hands-on demonstration, participants will leave the session with new ideas, resources, and methods to engage their classrooms.

Bringing STEM to Light! Elementary Light and Optics

(Grades K–8)

L100 I, Convention Center

Sponsor: LASER Classroom™

Colette DeHarpporte (colette@laserclassroom.com), LASER Classroom, Minneapolis, Minn.

Yvonne Ng (yvonne@engineersplayground.com), Engineer’s Playground, St. Paul, Minn.

With a free Light Blox kit for each participant, this workshop will leave you confident in teaching the STEM of Light—reflection, refraction, shadows, color, and more!

Building the Skills of Argumentation and Collaboration in STEM

(Grades 5–College)

L100 J, Convention Center

Sponsor: Accelerate Learning–STEMscopes

Sharry Whitney (swhitney@acceleratelearning.com), Accelerate Learning–STEMscopes, Houston, Tex.

Skilful argumentation and discourse are practices that provide a pathway for success in the future workforce. During this fun and interactive workshop, participants will determine the solution to a problem through collaboration among team members. Clear explanations are needed to solve the problem and to reach consensus about their solution.

2:45–3:45 PM Exhibitor Workshops**Chemistry Inquiry***(Grades 7–12)* L100 A, Convention Center

Sponsor: Fisher Science Education

Robert Marshall (*robert.marshall@thermofisher.com*), Fisher Science Education, Pittsburgh, Pa.

Learn about opportunities to introduce inquiry into your chemistry classroom. Flip your labs with innovative chemistry products and data collection that will put the power in your students' hands and excite them with real-world connections. Support these concepts with competition. *Note:* Workshop limited to the first 50 attendees.

Decomposing Corpses and STEM Careers!*(Grades 6–12)* L100 B, Convention Center

Sponsor: Texas Instruments

Jeffrey Lukens, Sioux Falls (S.Dak.) School District

What can we learn from decomposing corpses? A lot! Join us for a hands-on lesson developed by Texas Instruments and the National Academy of Sciences with help from forensic anthropologist Diane France. This lesson combines science, Hollywood, and STEM careers into one easy-to-follow lesson and is part of the STEM Behind Hollywood program—free at *www.stemhollywood.com*.

Incorporating STEM into the Classroom (High School Science)*(Grades 9–12)* L100 G, Convention Center

Sponsor: It's About Time

Amanda Wilson, University of Florida, Gainesville

Bringing STEM into the classroom by involving students in engineering design to solve a real-world problem gives students the opportunity to apply crosscutting concepts and disciplinary core ideas as well as demonstrate the NGSS science and engineering practices. We will share how we have integrated STEM and the engineering design cycle into our courses.

The Value of Inquiry and Scientific Explanations*(General)* L100 J, Convention Center

Sponsor: Accelerate Learning–STEMscopes

Sharry Whitney (*swhitney@acceleratelearning.com*), Accelerate Learning–STEMscopes, Houston, Tex.

Join us as we engage with real-world phenomena followed by discourse about how observations support scientific explanations and provide insight into the need for inquiry in making science meaningful.

3:00–4:00 PM Presentations**HS STEM: Fueling the Future***(Grades 9–12)* 101 A/B, Convention Center**Jerry Ellner** (*jellner@uti.edu*), Universal Technical Institute, Inc., Manchester, N.H.

Are students taking rigorous science, technology, and math? Are they understanding the relevance to future career pathways? Join us at NASCAR as we demonstrate how to add problem solving and critical thinking into academic classes. Learn and apply downdraft/spring rate formulas to diagnose your driver's problem and win the race! Dropbox of STEM resources shared.

M STEM Isn't One Subject at a Time: Lessons That Bridge Content Areas*(Grades 6–8)* 102E, Convention Center**Amity Wyss** (*@amitywyss; wyssa@collierschools.com*), Immokalee Middle School, Immokalee, Fla.

Learn how to write and implement cross-curricular STEM lessons that not only bridge the four STEM content areas but extend into social science and English language arts classes as well!

M Supporting the Intersections Between Computer Science and the NGSS*(Grades 6–8)* 102F, Convention Center**Irene Lee** (*@projectguts; lee@santafe.edu*), Santa Fe Institute, Santa Fe, N.Mex.**Jennifer Childress** (*jchildress@achieve.org*), Achieve, Inc., Washington, D.C.

Josh Caldwell (*josh@code.org*), Code.org, Seattle, Wash. Get concrete examples of how computer modeling and computational thinking can help address both NGSS and computer science standards, including through a new *Code.org* curriculum.

HS Ensuring the “T” and “E” in the STEM Classroom*(Grades 10–12)* 103E, Convention Center**Mark Lobes** (*@VJA_Lobes; mlobes@d230.org*) and **Natacia Campbell** (*@NataciaCampbell; ncampbell@d230.org*), Victor J. Andrew High School, Tinley Park, Ill.

Join teachers from a successful suburban high school engineering program as they demonstrate how keeping technology and engineering in a STEM program is critical for students.

Pr Engaging Students and Families in an Elementary Family STEM Night

(Grades K–4) 207 A/B, Convention Center

Matthew Maurer (maurerm@rmu.edu) and **Sarah MacDonald** (macdonald@rmu.edu), Robert Morris University, Moon Township, Pa.

Discover how you can create an Elementary Family STEM Night program at your school. We'll cover logistics, activities, and planning aspects of the event.

E Innovate, Collaborate, Communicate, Create

(Grades 1–6) 208A, Convention Center

Brian Crosby (@bcrosby; bcrosb@washoeschools.net), Nevada's Northwest RPD, Reno

Experience real examples of global hands-on classroom inquiry projects. Leave with ideas for projects you can implement right away.

E STEM in K–5: Beebots to WeDo!

(Grades K–5) 208B, Convention Center

Karen Wilson (@kwilson_klw; kwilson@lasdschools.org), Los Altos (Calif.) School District

Katie Farley (@katiefarley; kfarley@lasdschools.org), Covington Elementary School, Los Altos, Calif.

Joanie Craddock (@SpringerSTEM; jcraddock@lasdschools.org), Springer Elementary School, Mountain View, Calif.

Computational thinking is essential to STEM. Learn how computer programming in primary grades is used to deliver content that's engaging and relevant to today's learners.

E STEM on a Theme

(Grades K–5) 208C, Convention Center

Carrie McGowan (carrie.mcgowan@shs.org) and **Robin Ostefeld Adams** (robin.ostefeld.adams@gmail.com), Shady Hill School, Cambridge, Mass.

Hear a tale of two courses—integrating STEM with the humanities for a richer and more engaging STEM class. Learn a bit about the topics covered in the humanities, the essential elements of the STEM curriculum, and how we have integrated the two.

HS Teach Engineering Principles on the Cheap with Concrete

(Grades 7–12) 208D, Convention Center

Debbie Goodwin (nywin@hotmail.com), Retired High School Science Teacher, Chillicothe, Mo.

Andrew Nydam (andrewnydam@hotmail.com), ASM International, Materials Park, Ohio

Sherri Rukes (sherri.rukes@d128.org), Libertyville High School, Libertyville, Ill.

Solidify new learning in your classroom by teaching engineering with concrete and other composite materials. Discover inexpensive STEM projects that engage students in using the #1 building material in the world. NGSS correlations.

Pa Developing Valuable Partnerships to Ensure Students' Success in the STEM Fields

(Grades 9–College) 211A, Convention Center

Damien Myers (doc.myers@outlook.com), Western High School, Baltimore, Md.

Join us as we identify strategies for developing a business case for successful internship partnerships that are critical for students' success and that benefit educators and practitioners.

Pa Manufacturing and Education: Understanding the Connection

(Grades P–12) 211B, Convention Center

Roxanne Coronado (roxanne.coronado@esc20.net), ESC Region 20, San Antonio, Tex.

Aaron Smith (aaron@c2gps.net), Alliance for Technology Education in Advanced Manufacturing (ATEAM), San Antonio, Tex.

Hear about a professional development workshop held in San Antonio with a cohort of 17 teachers that culminated in the development of a Project Based Learning lesson about manufacturing.

Pa Partnerships for Project Based Learning in STEM

(General) 211C, Convention Center

Alfred Hall II (alhall@memphis.edu), The University of Memphis, Tenn.

I'll highlight and describe several collaborative efforts that promote Project Based Learning in STEM in urban, suburban, and rural areas of West Tennessee.

Pa **Apple Valley STEM Corridor: Development of a K–12 STEM Program Through Collaboration and Communication**

(Grades K–12) 212 A/B, Convention Center

Margaret Cody (margaret.cody@district196.org) and **James Lynch** (@AVHS_STEM; james.lynch@district196.org), Apple Valley High School, Apple Valley, Minn.

Cathy Kindem (cathy.kindem@district196.org), and **Michael Bolsoni** (michael.bolsoni@district196.org), Rosemount-Apple Valley-Eagan Public Schools, Rosemount, Minn.

Monica Foss (monica.foss@district196.org), Cedar Park Elementary STEM School, Apple Valley, Minn.

Join representatives from Cedar Park Elementary School, Valley Middle School, and Apple Valley High School as they share how they are actively collaborating to create a cohesive STEM corridor.

A **ITEEA Session: Integrative STEM Focal Points**

(Grades P–12)

213 A/B, Convention Center

Roger Skophammer (rskophammer@iteea.org), ITEEA, STEM±Center for Teaching and Learning™, Reston, Va.

Learn about the premier model for truly integrative STEM curriculum that focuses STEM-related standards and concepts to create Focal Points for curriculum development.

3:00–4:00 PM Hands-On Workshops

HS **Strategies and Techniques to Engage and Motivate Students in Science and Engineering Practices**

(Grades 6–College) 101G, Convention Center

Tamorah Janisko, Central Arizona College, Coolidge

Engage your students! Discover easy-to-implement strategies that effectively incorporate relevancy, diverse learning styles, and rates of learning without recreating lesson plans!

HS **Electronic Music: Introduction to Algorithmic Thinking Using Arduino Microcontrollers**

(Grades 9–12) 101H, Convention Center

Cheryl Farmer, The University of Texas at Austin

Your students love music; use it to introduce algorithmic thinking. Learn how to use a simple, inexpensive Arduino-and-breadboard circuit to teach algorithmic thinking and programming.

M **We're Made of Stars? Explore the Elements with NASA!**

(Grades 6–12) 101J, Convention Center

Sara Mitchell (sara.mitchell@nasa.gov), Syneren Technologies and NASA Goddard Space Flight Center, Greenbelt, Md.

Barbara Mattson (@NASAUniverseEdu; barb.mattson@nasa.gov), USRA, Greenbelt, Md.

In this workshop, experience the life of a star and take home activities to help your students understand their cosmic connection to the elements.

M **Incorporating the Engineering Design Process and Engineering Notebooks in Classroom Instruction**

(Grades 7–8)

102C, Convention Center

Donna Jagielski (djagiels@asu.edu), Higley Unified School District, Gilbert, Ariz.

The engineering design process and engineering notebooks are two key ingredients in a successful STEM-based program. Attention will be paid to how these are integral components of a successful STEM program and how they can help students achieve success in “non-STEM”-related classes.

M **Size Matters: Analyzing Experimental Data with Large Variations**

(Grades 6–8)

102D, Convention Center

Matthew Mirabello (mmirabello@amnh.org), American Museum of Natural History, New York, N.Y.

Mona McNamara (mmcnamara@nybg.org), The New York Botanical Garden, Bronx

Nickoleta Lytras (@nickoletaly; nickoleta.lytras@gmail.com), Salk School of Science, New York, N.Y.

“Are three trials enough?” Explore how sample size affects conclusions and learn how to estimate appropriate numbers of repeated trials. Connections to the NGSS and CCSS, *Math*.

A **Finding the Needle in the Haystack: Tools for Picking a High-quality STEM Curriculum**

(Grades P–12) 103B, Convention Center

Johannes Strobel (jstrobel@tamu.edu), Texas A&M University, College Station

Join me for an interactive session in which I introduce tools for picking a high-quality STEM curriculum. I'll share a rubric and examples to make an informed decision on choosing from the many existing curricula.

A **NSTA Press® Session: Professional Development Activities to Introduce Teachers and Administrators to the NGSS**



(General) 103C, Convention Center

Kevin Niemi (kjniemi@wisc.edu), University of Wisconsin–Madison

Eric Brunsell (@Brunsell; brunsele@uwosh.edu), University of Wisconsin Oshkosh

Join us as we share activities from the NSTA Press book *Introducing Teachers and Administrators to the NGSS: A Professional Development Facilitator's Guide*—a resource to help audiences better understand the NGSS.

4:15–5:15 PM Presentations

E **3D Printing—Not Just for High School, Upper Elementary Edition**

(Grades 3–6) 101 A/B, Convention Center

Kimberly Sandefur (sandefurk@comstockps.org), Comstock STEM Academy, Kalamazoo, Mich.

Mark Peeters (peetersm@comstockps.org), Comstock Public Schools, Kalamazoo, Mich.

See what happens when grade 4 students go on a 3-D modeling journey—learning openSCAD, engineering design, incorporating math skills, collaborating, and producing several final products.

M **Linear Equations Outbreak!**

(Grades 5–9) 103A, Convention Center

Liz Bergeron (lbergeron@uwlax.edu), University of Wisconsin–La Crosse

Have your students connect science, technology, and mathematics by using malaria data from the World Health Organization to determine the relationship between anti-malarial drugs and successful treatment of the disease. This integrated grade 7 STEM lesson is designed to simultaneously develop student understanding of linear models, statistical calculations, and patterns of interactions among organisms.

Pa **Explore the SFaz STEM Immersion Guide**

(General) 102E, Convention Center

Linda Coyle (exploringstem@gmail.com), Science Foundation Arizona, Phoenix

Get introduced to the Science Foundation Arizona (SFaz) STEM Immersion Guide. Leave with all the tools necessary to start, implement, and evaluate an effective STEM program at every level.

HS **Creating Integrated Units Through Design-Thinking and Making**

(Grades 6–12) 103D, Convention Center

Samantha Smith (@jhhsfablab; ssmith@tcsd.org), Jackson Hole High School, Jackson, Wyo.

Find out how a teacher team created integrated cross-curricular units using the design-thinking and process of “Making” to enhance and expose students to STEM skills.

M **Sewing Up Science: Crafting Technology for Teaching Science**

(Grades 6–12) 102F, Convention Center

Colby Tofel-Grehl, Utah State University, Logan

Using conductive thread and LED lights, get introduced to a hands-on middle school curriculum addressing electricity and circuitry through sewing and crafting. Lesson plans provided. We'll cover middle school NGSS disciplinary core ideas on energy: MS-PS3-2, MS-PS3-3, and MS-PS3-4.

HS **Improving Science Education: Connecting School Work to Real Life**

(Grades 8–12) 103E, Convention Center

Byron Ernest (@ByronErnest; byronernest10@gmail.com), Hoosier Academies, Indianapolis, Ind.

Join Byron Ernest, 2010 Indiana teacher of the year, as he shares best practices and illustrates research-proven methods for improving learning by using relevant and real-world contexts.

Pr **Authentic Projects, Real Learning**
(Grades 1–5) *204 A/B, Convention Center*
Kelli Ellickson (kelli.ellickson@district196.org), **Monica Foss** (monica.foss@district196.org), **Amy Benson** (amy.benson@district196.org), and **Carole Velasquez** (carole.velasquez@district196.org), Cedar Park Elementary STEM School, Apple Valley, Minn.
It's easier than you think to engage students in meaningful learning. Take away strategies that can help students become questioners, investigators, and communicators.

Pr **Linking Children's Literature with Engineering Design Challenges**
(Grades K–3) *207 A/B, Convention Center*
Renee Cunningham (reneec@olemiss.edu), The University of Mississippi, University, Miss.
Integrate your science instruction with current children's literature that spark ideas for engineering design challenges that are perfect for our youngest explorers!

E **The Seaplane Challenge: A Sea-based Aviation STEM Initiative**
(Grades 3–5) *208A, Convention Center*
Eric Silberg (eric.silberg@navy.mil), Naval Surface Warfare Center, Carderock Division, Bethesda, Md.
Julie Dunn-Campbell ([@dunn_campbell](https://twitter.com/dunn_campbell); julie_campbell@apsva.us), Taylor Elementary School, Arlington, Va.
Hear how aerospace engineers from the Navy, working with STEM educators, have designed and are in the process of implementing a new seaplane-themed STEM activity.

E **You Think Your Students Know Science? Using Multimedia and Online Collaboration in Your Formative Science Assessment**
(Grades 3–12) *208C, Convention Center*
Robert Miller ([@RobrtMiller](https://twitter.com/RobrtMiller); maxclassonline@mac.com), Port Orange Elementary School, Port Orange, Fla.
Using NSTA materials and his YouTube channel, see how one teacher creates video formative assessments and uses online tools to guide his science instruction.

Pa **Creating Partnerships to Advance STEM in Out-of-School Programs**
(Grades 3–8) *210 A/B, Convention Center*
Abigail Krueger (abby@einsteinproject.org) and **Carol Pearson** (carol@einsteinproject.org), The Einstein Project, Green Bay, Wis.
Discover how one small nonprofit used Engineering Adventures to promote additional engineering opportunities for elementary students in out-of-school programs and enhanced community partnerships.

Pa **Keeping STEM Outreach Current, Collaborative, and Career Focused**
(General) *211A, Convention Center*
Matthew Maurer (maurerm@rmu.edu) and **Sarah MacDonald** (macdonald@rmu.edu), Robert Morris University, Moon Township, Pa.
Emphasis will be placed on keeping outreach programs in STEM relevant to all K–12 students. We will discuss important aspects of partnerships, mentoring, and student engagement.

Pa **Collaboration and Innovation: Key Ingredients to Success in STEM Programming**
(General) *211C, Convention Center*
Lisa Blank ([@ljblank](https://twitter.com/ljblank); lblank@fortdrumrise.org), Lyme Central School, Chaumont, N.Y.
Find out how community partnerships support college and career readiness in STEM for rural districts. Walk away with great ideas and resources for program development!

A **Leadership Strategies for Ensuring Each Student Has a STEM Future**
(Grades K–12) *213 A/B, Convention Center*
Bob Sotak ([@scienceinquiry](https://twitter.com/scienceinquiry); bsotak@mac.com), Science/STEM Education Consultant, Edmonds, Wash.
Brian Day ([@science_education](https://twitter.com/science_education); bdlay@everettsd.org), Everett (Wash.) Public Schools
Join us as we share strategies and tools used to implement a districtwide K–12 STEM program that impacted each student, as well as articulated with higher education and industry. We'll cover identifying resources, developing a vision, and measuring progress toward that vision.

4:15–5:15 PM Hands-On Workshops

HS Merging the “Bookends” of STEM: Science and Math (Grades 6–12) 101G, Convention Center

Jeffrey Lukens (jeffreylukens0613@gmail.com), Sioux Falls (S.Dak.) School District

Integrating science and math should be seamless, natural, and painless. Come see how the philosophy of STEM has been alive for a long time.

HS Science Has Many Stories to Tell: NASA Literacy Resources for Your Students

(Grades 8–12) 101H, Convention Center

Barbara Mattson (@NASAUniverseEdu; barb.mattson@nasa.gov), USRA, Greenbelt, Md.

Sara Mitchell (sara.mitchell@nasa.gov), Syneren Technologies and NASA Goddard Space Flight Center, Greenbelt, Md. Introduce students to scientific discoveries and tell the story of how science is done with readings and hands-on activities.

M Reasoning Space Science with Simulations

(Grades 5–8) 101J, Convention Center

Gwynn Crittenden, University of Central Florida, Kissimmee

Through the use of simulation, middle school students predict, test, and analyze the effect of planet gravity on objects with different properties building logical reasoning skills.

M An Inquiry Approach to Establishing Collaborative Learning Communities in a STEM Classroom

(Grades 3–12) 102B, Convention Center

Jeremy Wheeler (jwheeler@gstboces.org) and **Brande Flaitz** (bflaitz@gstboces.org), The Great Southern Tier BOCES, Bush Campus, Elmira, N.Y.

Experience an inquiry-based exploration that will demonstrate how students can use data to practice skills and understand the power of collaborative learning in a STEM classroom.

M Engineering Activities to Inspire Middle School Youths in Out-of-School Time

(Grades 6–8) 102C, Convention Center

Michelle DiIeso (mdiieso@mos.org), Museum of Science, Boston, Mass.

Come engineer a response to prevent an outbreak! Learn how engineering activities can teach and reinforce standards while inspiring youths to engineer in real-life contexts.

Pa Place-based Integrated STEM: STEM in My Backyard and Beyond!

(General) 206 A/B, Convention Center

Louis Nadelson (louis.nadelson@usu.edu), Utah State University, Logan

Anne Seifert (anne.seifert@inl.gov), Idaho National Laboratory, Idaho Falls

Learn how to incorporate place-based integrated STEM into the K–12 curriculum, focusing on the core STEM practices and classroom curriculum and assessment.



5:30–6:30 PM Keynote Presentation**Education for the 21st Century: Creating a Climate of Success for All Students***(General)**Ballroom A, Convention Center**Sponsored by Boston Scientific*

Freeman Hrabowski (*hrabowsk@umbc.edu*), President, University of Maryland, Baltimore County, Baltimore

Welcome and Introduction of Speaker: Juliana Texley, NSTA President, Boca Raton, Fla.

Demographic trends, technological change, and globalization have created

a shifting constellation of challenges for our economy, our policies, and our approaches to educating students for the challenges and opportunities ahead. Among the most critical issues we face is the question of how our nation's schools will prepare students—including those from diverse backgrounds—for careers in science, technology, engineering, and mathematics (STEM) fields, including both research and teaching in a diverse range of schools. Dr. Freeman Hrabowski, president of the University of Maryland, Baltimore County, will discuss innovative approaches to STEM teaching and learning, STEM teacher preparation, support for the growing population of diverse students who must participate and succeed in these fields, and the importance of partnerships between schools, universities, philanthropy, government agencies, and business.

Freeman A. Hrabowski, president of UMBC (University of Maryland, Baltimore County) since 1992, is a consultant on science and math education to national agencies, universities, and school systems. He was recently named by President Obama to chair the newly created President's Advisory Commission on Educational Excellence for African Americans. He also chaired the National Academies' committee that produced the recent report, Expanding Underrepresented Minority Participation: America's Science and Technology Talent at the Crossroads.

Named one of the 100 Most Influential People in the World by Time Magazine (2012) and one of America's Best Leaders by U.S. News & World Report (2008), he also received TIAA-CREF's Theodore M. Hesburgh Award for Leadership Excellence (2011), the Carnegie Corporation's Academic Leadership Award (2011), and the Heinz Award (2012) for contributions to improving the "Human Condition." UMBC has been recognized as a model for academic innovation and inclusive excellence by such publications as U.S. News & World Report, which the past six years ranked UMBC the #1 "Up and Coming" university in the nation.

A book signing will follow from 6:30 to 7:30 PM.

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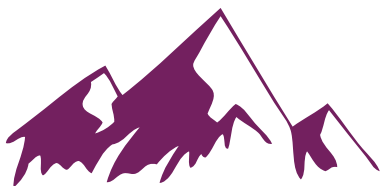
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8:00–10:00 AM Closing Session: How Can We Better Prepare Our Students for STEM-related Careers?

(General)

101C, Convention Center

8:00–9:00 AM

Part I: Strand Leaders' Reports

Adrienne Gifford, STEM Forum & Expo Steering Committee Chairperson, and Innovation and Technology Lab Director, Open Window School, Bellevue, Wash.)

Jennifer C. Williams, Primary Strand Leader, and Department Chairperson, Lower School Science, Isidore Newman School, New Orleans, La.

Dedric McGhee, Upper Elementary Strand Leader, and STEM Manager (Science, Mathematics, Health, Physical Education, Lifetime Wellness), Shelby County Schools, Memphis, Tenn.

Susan Evans, Middle Level Strand Leader, and Principal, Ridgely Middle School, Lutherville, Md.

Kavita Gupta, High School Strand Leader, and AP Chemistry Instructor, Monta Vista High School, Cupertino, Calif.

Reo D. Pruiett, Partnerships Strand Leader, and Educate Texas, Texas STEM Program Officer, Dallas

Thomas G. Evans, Administrators Strand Leader, and Principal, Eastern Technical High School, Essex, Md.

Adrienne Gifford, chairperson of the STEM Forum & Expo Steering Committee, will lead strand leaders through brief reports and summaries of the two-day experience. This is an opportunity to hear some of the highlights you may have missed.

9:00–10:00 AM

Part II: Food for Thought: A Student Panel Discussion

Moderator: **Doug Paulson**, Honorary Steering Committee Member, STEM Forum & Expo, and STEM Specialist, Div. of Academic Standards and Instructional Effectiveness, Minnesota Dept. of Education, Roseville

Student Panelists:

Jeyani Narayan, East Ridge High School, Woodbury, Minn.

Grant Two Bulls, Breck School, Minneapolis, Minn.

A panel of outstanding high school students will describe their interests, visions, and hopes of entering STEM-related careers. The students will discuss the educational opportunities they have had and programs they have experienced. They will examine the encouragement they have received to this point and consider the support they will need to move successfully into their future studies and occupations.



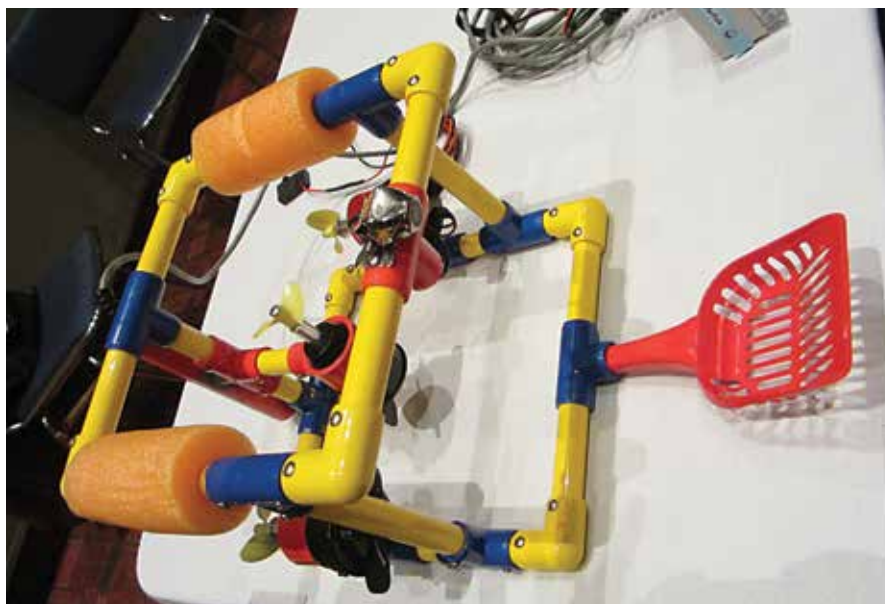
—Photo courtesy of Jacob Slaton

Exhibitors

Some exhibitors have classified their products by grade level.

Elementary	E
Middle School	M
High School	HS
College	C

Scan the QR code for a map display of the Exhibit Hall on our conference app.



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Salt Lake City, UT 84103
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Phone: 202-331-3544
E-mail: smart@asee.org
Website: smart.asee.org

The SMART (Science, Mathematics, And Research for Transformation) Scholarship for Service Program (smart.asee.org) is an opportunity for students pursuing a science, technology, engineering, and mathematics (STEM)-focused degree to receive a scholarship as well as employment after graduation as a civilian scientist or engineer at a Department of Defense facility.

- | | | |
|--|---|--|
| <p>Bio-Rad Laboratories #211
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 Phone: 800-4-BIORAD (424-6723)
 Website: www.bio-rad.com</p> <p>From DNA extraction techniques to sequencing a gene and protein analysis, Bio-Rad synergistically brings about change in science learning and provides educators with research quality kits, equipment, reagents, and curricula allowing educators to stay on the leading edge of science education.</p> | <p>The College of St. Scholastica #117
 1200 Kenwood Ave. E, M, HS, C
 Duluth, MN 55811
 Phone: 651-403-8633
 E-mail: hbergstedt@css.edu
 Website: www.css.edu</p> <p>Teaching is one of the most important and fulfilling careers, but that doesn't mean it's easy! As teaching changes and more technology is used successfully in the classroom, keeping current can be a challenge. The College of St. Scholastica offers an online Master of Education program, along with certificate options, including computer science education.</p> | <p>eCYBERMISSION #405
 1840 Wilson Blvd. M
 Arlington, VA 22201
 Phone: 866-462-9237
 E-mail: whitsett@nsta.org
 Website: www.ecybermission.com</p> <p>eCYBERMISSION is a web-based STEM competition for students in grades 6–9. Students work in a team of three or four students to solve a community-based problem using scientific practices or engineering design processes to compete for state, regional, and national prizes.</p> |
| <p>Bright Schools Competition #403
 1840 Wilson Blvd. M
 Arlington, VA 22201</p> <p>Do you want to learn how to engage your middle school students (grades 6–8) in STEM through the use of interactive lesson plans designed by teachers for teachers? Visit Booth #403 to learn more about The Bright Schools/NSTA competition!</p> | <p>Creative Discovery Museum #523
 321 Chestnut St. E, M
 Chattanooga, TN 37402
 Phone: 423-290-4641
 E-mail: jwr@cdmfun.org
 Website: www.cdmfun.org</p> <p>Creative Discovery Museum in Chattanooga, Tennessee, is working with the BioEnergy Science Center (BESC) in Oak Ridge, Tennessee, on a biofuels/alternate energies project called Farming For Fuels. Our free materials, including curriculum, hands-on activities, a “Road Trip Challenge” software app, website (learnbiofuels.org), and distance learning lessons are available to educators! Come by our booth and see what free STEM materials might work well in your classroom!</p> | <p>Edvotek Inc. #301
 1121 5th St. NW HS, C
 Washington, DC 20001
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Exhibitors

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#303
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#501
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Phone: 617-589-0230
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Engineering is Elementary® (EiE) is a project of the National Center for Technological Literacy at the Museum of Science, Boston. EiE addresses America's pressing need for effective STEM education in three ways: curriculum development and dissemination, professional development (PD), and educational research.

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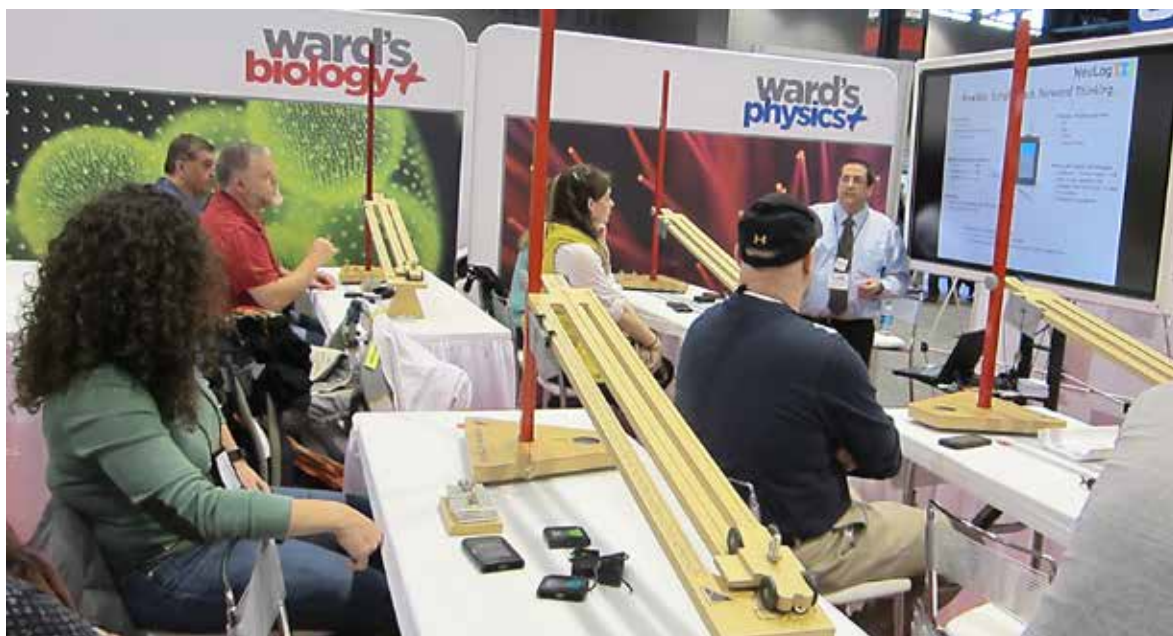
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E-mail: victoriad@flyingclassroom.com

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It's About Time partners with educators to move STEM education forward with student-focused, project-based/problem-based programs—with the engineering process embedded throughout. It's About Time is the leading publisher of NSF-funded middle school and high school science and math STEM programs.

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National Center for STEM #415
Elementary Education E, M, C
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 E-mail: ngss@nsta.org
 Website: www.nsta.org/ngss

How can NSTA help you prepare for the *Next Generation Science Standards*? Stop by our booth to hear the latest news about state adoption and check out a sampling of NSTA resources dedicated to helping teachers understand and implement the new standards.

Exhibitors

- Nomad Press** #510
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Lakewood, CO 80228
Phone: 303-989-1767
E-mails: dave@nxgenlearning.net;
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Roseville, CA 95747
Phone: 800-772-8700
E-mail: sales@pasco.com
Website: www.pasco.com
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- PAST Foundation** #503
1003 Kinnear Rd. E, M, HS, C
Columbus, OH 43212
Phone: 614-340-1208
E-mail: ltrent@pastfoundation.org
Website: www.pastfoundation.org
- The PAST Foundation is a nonprofit organization focusing on transforming education to better meet the needs of today's students. We provide teachers with a process to deliver meaningful education—which differs for every learner. The PAST Foundation-designed toolkit enables entire communities to transform traditional classrooms and reach every student. The results are engaged students, empowered teachers, and a community actively involved in student success.
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Website: www.pepcoinc.com
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 Phone: 651-917-0079
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 Website: www.kidwind.org

REcharge Labs seeks to engage and inspire today's students to become the innovative renewable energy leaders of tomorrow. Our mission is to provide effective hands-on learning resources that bring renewable energy education to teachers and their students worldwide. REcharge Labs was developed out of the educator training program from the KidWind Project. Learn more at www.kidwind.org.

Renaissance Learning #111
 2911 Peach St. E, M, HS
 Wisconsin Rapids, WI 54494
 Phone: 715-424-3636
 E-mail: julie.vetrone@renaissance.com
 Website: www.renaissance.com

Renaissance Learning is a leading provider of cloud-based assessment and teaching/learning solutions that fit the K–12 classroom, improve school performance, and accelerate learning for all. Renaissance Learning enables educators to deliver highly differentiated and timely instruction while driving personalized student practice in reading, writing, and math, every day.

Roominate #114
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 Sunnyvale, CA 94085
 E-mail: matt@roominatetoy.com
 Website: www.roominatetoy.com

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 400 Commonwealth Dr. E, M
 Warrendale, PA 15096
 Phone: 724-584-7565
 E-mail: clee@sae.org
 Website: www.awim.org

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 Minnetonka, MN 55305
 Phone: 952-653-0493
 E-mail: mgoodman@simcur.com
 Website: www.simulationcurriculum.com

Simulation Curriculum is the leading developer of interactive, standards-based astronomy, geology, meteorology, and physical geography software and curriculum for grades K–12 through college.

Southern Science Supply, LLC #311
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 E-mail: bookings@steamedu.com
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The STEM Academy, Inc. #112
 6300 Sagewood Dr., Suite H #235 E, M, HS, C
 Park City, UT 84098
 Phone: 888-STEM101
 E-mail: info@stem101.org
 Website: www.stem101.org

The STEM Academy is a national nonprofit

dedicated to advancing economic development by improving STEM literacy for all students. Our meta-disciplinary state and national standards-based K–12 and college STEM curricula creates student pathways for industry and postsecondary advancement.

STEM Jobs™ #516
 420 Rouser Rd., Suite 101 HS
 Moon Township, PA 15108
 Phone: 412-269-1663, x149
 E-mail: natalie.sacco@victorymedia.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 students to pursue STEM education and careers. We encourage students to #dowhatyoulove.

STEMfinity #410
 5465 E. Terra Linda Way, Suite 105 E, M, HS, C
 Nampa, ID 83787
 Phone: 800-985-7836
 E-mail: chad@stemfinity.com
 Website: www.stemfinity.com

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Stratasys #505
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 Billerica, MA 01821
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 E-mail: info@stratasys.com
 Website: www.stratasys.com

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 Phone: 202-289-1200
 Website: www.goethe.de/top/

The Transatlantic Outreach Program promotes education about Germany, encourages intercultural dialogue, and provides the opportunity for North American social studies and STEM educators to experience Germany in person. TOP promotes awareness of Germany within the context of its education systems, vocational training, corporate social responsibility, environmental sustainability, and more.

U.S. Dept. of Interior #502
Bureau of Ocean Energy Management
 1849 C St. NW, Room 5216 E, M, HS, C
 Washington, DC 20240
 Phone: 202-208-5636
 E-mail: boempubaffair@boem.gov
 Website: www.boem.gov

The Bureau of Ocean Energy Management (BOEM) promotes energy independence, environmental protection, and economic development through responsible, science-based management of offshore conventional and renewable energy and marine mineral resources.



—Photo courtesy of Jacob Slaton

Vernier Software & Technology #206
 13979 SW Millikan Way E, M, HS, C
 Beaverton, OR 97005
 Phone: 888-837-6437
 E-mail: info@vernier.com
 Website: www.vernier.com

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 200 The Riverway E, M
 Boston, MA 02215
 Phone: 617-879-1114
 E-mail: graduate@wheelock.edu
 Website: www.wheelock.edu/online

Wheelock is a private nonprofit college located in Boston, Massachusetts, that offers graduate degrees and continuing education in the highly sought-after field of STEM education. These online programs provide teachers with science and math content knowledge as well as an understanding of how to teach these subjects in culturally diverse settings.

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WorldStrides #500
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 Charlottesville, VA 22901
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 Website: www.worldstridesdiscovernow.org

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3D Molecular Designs (Booth #207)

Thursday, May 21	10:15–11:15 AM	L100 E, Conv. Center	Constructing and Crossing the Cell Membrane (p. 30)
Thursday, May 21	11:45 AM–12:45 PM	L100 E, Conv. Center	The Many Jobs of Proteins: Modeling Proteins and Enzymes (p. 39)
Thursday, May 21	4:15–5:15 PM	L100 E, Conv. Center	Let's Get Helical: Exploring DNA Structure/Function with Interactive Physical Models (p. 47)

Accelerate Learning—STEMscopes (Booth #519)

Thursday, May 21	10:15–12:15 PM	L100 J, Conv. Center	The Secrets to PBL Success for STEM (p. 31)
Thursday, May 21	1:15–2:15 PM	L100 J, Conv. Center	Demystifying the NGSS with STEMscopes (p. 40)
Thursday, May 21	2:45–3:45 PM	L100 J, Conv. Center	Building the Skills of Argumentation and Collaboration in STEM (p. 42)
Friday, May 22	10:15–11:15 AM	L100 J, Conv. Center	Demystifying the NGSS with STEMscopes (p. 51)
Friday, May 22	11:45 AM–12:45 PM	L100 J, Conv. Center	STEM Strategies and Actions for Student Achievement Gains (p. 61)
Friday, May 22	1:15–2:15 PM	L100 J, Conv. Center	Building the Skills of Argumentation and Collaboration in STEM (p. 62)
Friday, May 22	2:45–3:45 PM	L100 J, Conv. Center	The Value of Inquiry and Scientific Explanations (p. 63)

Animalearn (Booth #109)

Thursday, May 21	1:15–2:15 PM	L100 C, Conv. Center	Leap into the 21st-Century Science Class (p. 39)
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Bio-Rad Laboratories (Booth #211)

Thursday, May 21	10:15–11:15 AM	L100 I, Conv. Center	NGSS in the High School Classroom (p. 31)
Friday, May 22	10:15–11:15 AM	L100 I, Conv. Center	NGSS in the High School Classroom (p. 51)

Delta Education/School Specialty Science (Booth #515)

Friday, May 22	1:15–2:15 PM	L100 F, Conv. Center	Engineering Design in the FOSS Next Generation Program (p. 62)
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eCYBERMISSION (Booth #405)

Thursday, May 21	1:15–2:15 PM	L100 G, Conv. Center	Engineering Design vs. Science Practices: A Closer Look at NGSS Practices (p. 40)
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EDVOTEK, Inc. (Booth #301)

Thursday, May 21	10:15–11:15 AM	L100 D, Conv. Center	Case of the Missing Records (p. 30)
Friday, May 22	10:15–11:15 AM	L100 D, Conv. Center	Teaching STEM Using Agarose Gel Electrophoresis (p. 50)

Fisher Science Education (Booth #302)

Friday, May 22	10:15–11:15 AM	L100 A, Conv. Center	The STEM Design Challenge (p. 50)
Friday, May 22	11:45 AM–12:45 PM	L100 A, Conv. Center	Environmental Study: A Real-World Investigation (p. 60)
Friday, May 22	1:15–2:15 PM	L100 A, Conv. Center	Teaching Astronomy During the Day (p. 61)
Friday, May 22	2:45–3:45 PM	L100 A, Conv. Center	Chemistry Inquiry (p. 63)

Flinn Scientific, Inc. (Booth #201)

Thursday, May 21	10:15–11:15 AM	L100 G, Conv. Center	Flinn Activities to Integrate STEM Education (p. 30)
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Frey Scientific / CPO Science (Booth #517)

Friday, May 22	10:15–11:15 AM	L100 F, Conv. Center	A STEM Approach to Optics, Light, and Color (p. 51)
Friday, May 22	11:45 AM–12:45 PM	L100 F, Conv. Center	Solving the Mystery of STEM Using Forensic Science (p. 61)

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HHMI BioInteractive (Booth #203)

Thursday, May 21	10:15–11:15 AM	L100 F, Conv. Center	Mutations, the Cell Cycle, and Cancer (p. 30)
Thursday, May 21	11:45 AM–12:45 PM	L100 F, Conv. Center	Death Finds the Mesozoic: NGSS Practices in Physical/Earth Science Class with HHMI BioInteractive Resources (p. 39)
Thursday, May 21	1:15–2:15 PM	L100 F, Conv. Center	Deepening and Demonstrating Science Understanding with Augmented Reality (p. 40)
Thursday, May 21	2:45–3:45 PM	L100 F, Conv. Center	Hypothesis Testing Using HHMI BioInteractive’s Lizard Evolution Virtual Lab (p. 41)
Thursday, May 21	4:15–5:15 PM	L100 F, Conv. Center	Using Statistics, Mathematical Modeling, and Bioinformatics to Teach Human Evolution (p. 47)

It’s About Time (Booth #101)

Friday, May 22	10:15–11:15 AM	L100 G, Conv. Center	<i>Project-Based Inquiry Science</i> (PBIS): Creating “Coherence and Science Storylines” for Middle School Science (p. 51)
Friday, May 22	11:45 AM–12:45 PM	L100 G, Conv. Center	Incorporating Engineering into Grades 6–12 Classrooms (p. 61)
Friday, May 22	1:15–2:15 PM	L100 G, Conv. Center	Incorporating STEM into the Classroom (Middle School Science) (p. 62)
Friday, May 22	2:45–3:45 PM	L100 G, Conv. Center	Incorporating STEM into the Classroom (High School Science) (p. 63)

King Arthur Flour (Booth #416)

Thursday, May 21	1:15–2:15 PM	L100 H, Conv. Center	Bake for Good: Kids Learn-Bake-Share Program (p. 40)
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LASER Classroom (Booth #522)

Thursday, May 21	2:45–3:45 PM	L100 I, Conv. Center	STEMify Your Science Activity—From the Science to STEM of Light and Lasers (p. 42)
Friday, May 22	1:15–2:15 PM	L100 I, Conv. Center	Bringing STEM to Light! Elementary Light and Optics (p. 62)

The MiniOne Electrophoresis (Booth #509)

Thursday, May 21	2:45–3:45 PM	L100 H, Conv. Center	DNA Electrophoresis at the Speed of Education: Come Watch the DNA Move for Near Instant Results (p. 41)
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MSOE Center for BioMolecular Modeling (Booth #209)

Friday, May 22	10:15–11:15 AM	L100 E, Conv. Center	Focus on Photosynthesis (p. 50)
Friday, May 22	11:45 AM–12:45 PM	L100 E, Conv. Center	Telling Molecular Stories with David Goodsell’s Molecular Landscapes (p. 60)
Friday, May 22	1:15–2:15 PM	L100 E, Conv. Center	Genes, Genomes, and the New World of Personalized Medicine (p. 62)

Nano-Link: Center for Nanotechnology Education (Booth #511)

Thursday, May 21	1:15–2:15 PM	L100 I, Conv. Center	Nanotechnology: Hands-On Activities for All Disciplines (p. 40)
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National Geographic Learning (Booth #308)

Thursday, May 21	10:15–11:15 AM	L100 H, Conv. Center	Empowered Students Thinking Like Engineers! (p. 30)
Friday, May 22	1:15–2:15 PM	L100 H, Conv. Center	Empowered Students Thinking Like Engineers! (p. 62)

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NVBOTS (Booth #115)

Thursday, May 21	11:45 AM–12:45 PM	L100 D, Conv. Center	3D Printing's Role in Shaping the Future of STEM Education (p. 39)
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Pitsco Education (Booth #100)

Thursday, May 21	1:15–2:15 PM	L100 D, Conv. Center	Science of Speed: The Fusion of Competition, Creativity, and STEM Learning (p. 40)
Friday, May 22	1:15–2:15 PM	L100 D, Conv. Center	A New Revolution in STEM Robotics (p. 62)

REcharge Labs, LLC (Booth #215)

Friday, May 22	10:15–11:15 AM	L100 C, Conv. Center	MacGyver Windmills (p. 50)
Friday, May 22	11:45 AM–12:45 PM	L100 C, Conv. Center	Solar Hack (p. 60)

Roominate (Booth #114)

Friday, May 22	11:45 AM–12:45 PM	L100 D, Conv. Center	Hands-On Building and Circuitry Workshop (p. 60)
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SAE International (Booth #317)

Thursday, May 21	10:15–11:15 AM	L100 A, Conv. Center	Engineering the JetToy (p. 30)
Thursday, May 21	2:45–3:45 PM	L100 A, Conv. Center	STEM in the Primary Classroom (p. 41)

Texas Instruments (Booth #318)

Thursday, May 21	10:15–11:15 AM	L100 B, Conv. Center	Zombie Apocalypse! (p. 30)
Thursday, May 21	1:15–2:15 PM	L100 B, Conv. Center	STEM Behind Health—Math, Science, Diseases, and Careers! (p. 39)
Friday, May 22	10:15–11:15 AM	L100 B, Conv. Center	Decomposing Corpses and STEM Careers! (p. 50)
Friday, May 22	11:45 AM–12:45 PM	L100 B, Conv. Center	Zombie Apocalypse! (p. 60)
Friday, May 22	1:15–2:15 PM	L100 B, Conv. Center	STEM Behind Health: Math, Science, Diseases, and Careers! (p. 61)
Friday, May 22	2:45–3:45 PM	L100 B, Conv. Center	Decomposing Corpses and STEM Careers! (p. 63)

U.S. Dept. of Interior Bureau of Ocean Energy Management (Booth #502)

Thursday, May 21	1:15–2:15 PM	L100 A, Conv. Center	Diving for Science: Enhancing STEM with Real-World Underwater Archaeology (p. 39)
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Vernier Software & Technology (Booth #206)

Friday, May 22	10:15–11:15 AM	L100 H, Conv. Center	Investigating Renewable Energy with KidWind and Vernier (p. 51)
Friday, May 22	11:45 AM–12:45 PM	L100 H, Conv. Center	Vernier's Digital Tools for STEM Education (p. 61)

WhiteBox Learning (Booth #217)

Thursday, May 21	10:15–11:15 AM	L100 C, Conv. Center	The "E" in STEM: STEM Engineering (p. 30)
Friday, May 22	1:15–2:15 PM	L100 C, Conv. Center	The "E" in STEM: STEM Engineering (p. 61)

Schedule at a Glance

Primary Strand

Thursday

9:15–10:15 AM	P–2	206 A/B, Conv. Center	Give Your Sound Waves Lessons an Integrated STEM Makeover (p. 29)
10:30–11:30 AM	K–2	204 A/B, Conv. Center	Creating Problem-based Instruction with the <i>Next Generation Science Standards</i> (p. 35)
11:45 AM–12:45 PM	P–3	204 A/B, Conv. Center	Integrating STEM into the Elementary Curriculum (p. 38)
11:45 AM–12:45 PM	K–5	206 A/B, Conv. Center	Demonstrating STEM Through Art (p. 36)
3:00–4:00 PM	1–5	101F, Conv. Center	Supporting English Language Learners in STEM Education Through Engagement in Engineering (p. 43)
3:00–4:00 PM	K–2	204 A/B, Conv. Center	STEMenizing Parents: Moving the STEM Conversation Home (p. 44)
4:15–5:15 PM	K–2	204 A/B, Conv. Center	Engineering a Great STEM Lesson (p. 46)
4:15–5:15 PM	P–6	206 A/B, Conv. Center	The First “E” Is Engage: Safe and Inexpensive Experiments That Bubble, Wriggle, and Change Color (p. 46)
4:15–5:15 PM	K–3	208D, Conv. Center	3D Printing—Not Just for High School: Primary Edition (p. 45)

Friday

10:30–11:30 AM	P–2	204 A/B, Conv. Center	Engineering in Kindergarten? It’s a Natural Fit (p. 54)
10:30–11:30 AM	P–2	206 A/B, Conv. Center	Ramps and Pathways: An Integrated STEM Activity (p. 55)
10:30–11:30 AM	P–3	210 A/B, Conv. Center	Exploring the Everyday STEM Connections Encountered in a Young Child’s World (p. 53)
11:45 AM–12:45 PM	P–3	204 A/B, Conv. Center	Full STEM Ahead: Measurement as the Intersection of the STEM Disciplines (p. 59)
11:45 AM–12:45 PM	P–3	206 A/B, Conv. Center	The Engineering Design Process for K–3 (p. 59)
3:00–4:00 PM	K–4	207 A/B, Conv. Center	Engaging Students and Families in an Elementary Family STEM Night (p. 64)
4:15–5:15 PM	1–5	204 A/B, Conv. Center	Authentic Projects, Real Learning (p. 67)
4:15–5:15 PM	K–3	207 A/B, Conv. Center	Linking Children’s Literature with Engineering Design Challenges (p. 67)

Upper Elementary Strand

Thursday

9:15–10:15 AM	K–12	101F, Conv. Center	STEM on a Shoestring: Using Repurposed Materials for Engineering Activities (p. 28)
9:15–10:15 AM	3–6	208A, Conv. Center	Developing STEM Literacy Through the Practices (p. 29)
9:15–10:15 AM	3–5	208B, Conv. Center	STEM Clubhouse in Your Classroom (p. 29)
9:15–10:15 AM	3–5	208C, Conv. Center	Are Your Students Getting NOSI? (p. 29)
10:30–11:30 AM	P–6	101F, Conv. Center	Launching an Elementary STEM Program (p. 33)
10:30–11:30 AM	P–8	102A, Conv. Center	Our Student-led iPad NGSS Classroom! (p. 34)
10:30–11:30 AM	4–8	208B, Conv. Center	Workshops On Deck (p. 35)
10:30–11:30 AM	P–12	208C, Conv. Center	Engineering/Science Is for Somebody Else: How to Overcome Common Stereotypes of Engineering Through NGSS (p. 35)
11:45 AM–12:45 PM	K–5	207 A/B, Conv. Center	The Building Blocks of an Elementary STEM Program (p. 36)
11:45 AM–12:45 PM	3–8	208A, Conv. Center	Citizen Science: Projects and Activities to Engage Students in Authentic Science Research (p. 38)
11:45 AM–12:45 PM	3–5	208B, Conv. Center	Engineering for Elementary Schoolers in Out-of-School Time (p. 38)
3:00–4:00 PM	3–6	103D, Conv. Center	Physical Structures, Plants, and Everyday Tools: Helping Children Understand the Impact of STEM and the Essential Integration of All STEM Disciplines (p. 42)
3:00–4:00 PM	K–8	208A, Conv. Center	Next Steps: Ramp Up Your Engineering with Mathematics (p. 44)
3:00–4:00 PM	K–5	208C, Conv. Center	NGSS Performance Expectations in Action (p. 44)

Schedule at a Glance Upper Elementary Strand

3:00–4:00 PM	3–8	208D, Conv. Center	Habitat Connections: Action Through Citizen Science and Creating Bird-friendly Schoolyards (p. 43)
4:15–5:15 PM	2–5	101F, Conv. Center	Google Classroom and STEM—Making It Work (p. 46)
4:15–5:15 PM	K–6	207 A/B, Conv. Center	The First Year of a Lower School STEM Lab (p. 45)
4:15–5:15 PM	3–6	208B, Conv. Center	Three Strategies to Support the Transition from the State Standards to STEM (p. 46)

Friday

10:30–11:30 AM	4–5	207 A/B, Conv. Center	Secret Agent Engineering (p. 53)
10:30–11:30 AM	K–5	208A, Conv. Center	STEM Challenge Night: An Innovative Approach to Get Families Actively and Meaningfully Engaged (p. 55)
10:30–11:30 AM	3–8	208B, Conv. Center	Water: Using a STEM Approach to Teaching About This Most Valuable Resource (p. 55)
10:30–11:30 AM	4–6	208C, Conv. Center	Integrating Literacy and STEM: “Who Took Mr. G.’s Cookies?” (p. 55)
11:45 AM–12:45 PM	1–5/C	207 A/B, Conv. Center	Integrated STEM Curricula at a STEM Elementary School (p. 57)
11:45 AM–12:45 PM	3–8	208A, Conv. Center	Strange New Planet: Explore New Worlds as a NASA Scientist (p. 60)
11:45 AM–12:45 PM	3–12	208B, Conv. Center	Engineering the Built Environment (p. 60)
11:45 AM–12:45 PM	1–5	208C, Conv. Center	Assessing Student Achievement in Elementary Engineering (p. 60)
3:00–4:00 PM	K–5	208B, Conv. Center	STEM in K–5: Beebots to WeDo! (p. 64)
3:00–4:00 PM	1–6	208A, Conv. Center	Innovate, Collaborate, Communicate, Create (p. 64)
3:00–4:00 PM	K–5	208C, Conv. Center	STEM on a Theme (p. 64)
4:15–5:15 PM	3–6	101 A/B, Conv. Center	3D Printing—Not Just for High School, Upper Elementary Edition (p. 66)
4:15–5:15 PM	3–5	208A, Conv. Center	The Seaplane Challenge: A Sea-based Aviation STEM Initiative (p. 67)
4:15–5:15 PM	3–12	208C, Conv. Center	You Think Your Students Know Science? Using Multimedia and Online Collaboration in Your Formative Science Assessment (p. 66)

Middle Level Strand

Thursday

9:15–10:15 AM	6–9	102E, Conv. Center	STEM and the NGSS (p. 26)
9:15–10:15 AM	7–9	101J, Conv. Center	STEM Astronomy: Decoding Starlight—From Pixels to Images (p. 28)
9:15–10:15 AM	4–12	101 A/B, Conv. Center	STEM Projects for the Middle School Classroom (p. 26)
9:15–10:15 AM	8–12	101I, Conv. Center	“Skunk Works”: A Middle School and High School Engineering Project: Flying Airplanes in the Classroom (p. 28)
9:15–10:15 AM	6–8	103A, Conv. Center	Valley Middle School of STEM: A Team Approach to Building a STEM Magnet School (p. 26)
9:15–10:15 AM	5–8	102B, Conv. Center	A Tale of Two Great Oceans: Pressure and Wind-driven Ocean Circulation (p. 28)
9:15–10:15 AM	K–12	102C, Conv. Center	Curiosity as a Tool for STEM Education (p. 29)
9:15–10:15 AM	5–C	102D, Conv. Center	Discovering the Periodic Table (p. 29)
10:30–11:30 AM	5–12	103A, Conv. Center	Driven to Discover: Citizen Science Inspires Classroom Investigations (p. 32)
10:30–11:30 AM	6–8	101I, Conv. Center	Incorporating STEM Challenges into Everyday Curricula (p. 34)
10:30–11:30 AM	6–8	102E, Conv. Center	Integrating PBL STEM in a Middle School Core Team (p. 32)
10:30–11:30 AM	5–8	102B, Conv. Center	The Global Conveyor Belt: Density-driven Ocean Circulation (p. 34)
10:30–11:30 AM	4–8	102C, Conv. Center	Energize Your STEM Classroom! (p. 34)
10:30–11:30 AM	6–8	101J, Conv. Center	Engineering Design Inspired by Nature (p. 34)
10:30–11:30 AM	5–8	102D, Conv. Center	Operation Rescue: A Project Approach to STEM Education (p. 34)
11:45 AM–12:45 PM	5–12	102B, Conv. Center	Marine Science, Robotics, and Engineering Thematic Units: The C.A.S.E. Way—From Vision to Sustainability (p. 38)
11:45 AM–12:45 PM	4–9	103A, Conv. Center	The James Webb STEM Innovation Project: Bringing Interdisciplinary STEM Learning Experiences to the Classroom (p. 35)
11:45 AM–12:45 PM	5–8	102D, Conv. Center	A Conceptual Approach to CAD and STEM Integration (p. 38)
11:45 AM–12:45 PM	6–8	102F, Conv. Center	Moving from STEM for Some to STEM for All (p. 35)

Schedule at a Glance Middle Level Strand

11:45 AM–12:45 PM	5–8	101J, Conv. Center	Rockets to the Rescue! Engineering Designs to Solve Food Security Issues (p. 38)
11:45 AM–12:45 PM	8	102C, Conv. Center	“Animate ’em Particles”—From Hands On to Animation, CCSS, and NGSS Through C-STEM (p. 39)
11:45 AM–12:45 PM	4–12	103F, Conv. Center	NCTM Session: Learning to Drive the Bus: Strategies for Ensuring That the Journey of Class Discussion Leads to the Target Destination (p. 36)
3:00–4:00 PM	5–7	102B, Conv. Center	Traffic Lights in the Classroom (TLC) (p. 43)
3:00–4:00 PM	5–8	102D, Conv. Center	Human + (p. 43)
3:00–4:00 PM	5–8	102E, Conv. Center	Engage Elementary Students in STEAM by Planning a Trip to Mars (p. 42)
3:00–4:00 PM	4–12	102F, Conv. Center	Kinesthetic Learning—From a STEM Viewpoint (p. 42)
3:00–4:00 PM	6–12	103A, Conv. Center	Powerful and Free Simulations for STEM Teaching (p. 42)
4:15–5:15 PM	4–10	101J, Conv. Center	Dough Creatures and Circuit Sculpting to Engage Girls (and All Kids) in STEM (p. 46)
4:15–5:15 PM	4–8	102E, Conv. Center	Engineering a Prosthetic (p. 44)
4:15–5:15 PM	6–8	102F, Conv. Center	Energy House (p. 44)
4:15–5:15 PM	1–12	103A, Conv. Center	Make Student-centered Learning Visible Through Invisible Teaching Strategies (p. 44)

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10:30–11:30 AM	6–9	101 D/E, Conv. Center	Connecting Physical Science, Design, and Engineering Through Underwater Robotics (p. 52)
10:30–11:30 AM	6–8	101I, Conv. Center	Creation and Evaluation: Sharing STEM Tasks and Student Work (p. 52)
10:30–11:30 AM	6–9	101J, Conv. Center	Innovative Technology in Science Inquiry Using Free Models (p. 54)
10:30–11:30 AM	4–8	102B, Conv. Center	STEAM Journals: Adding Art to Our Data (p. 54)
10:30–11:30 AM	6–8	102C, Conv. Center	Marble Down: An Intense Middle School Engineering Project (p. 54)
10:30–11:30 AM	4–C	102D, Conv. Center	The NGSS Science and Engineering Practice of Analyzing and Interpreting Data: A Conceptual Examination (p. 54)
10:30–11:30 AM	1–12	102E, Conv. Center	Create Future Engineers: Defining and Delimiting Engineering Problems (p. 52)
10:30–11:30 AM	K–12	102F, Conv. Center	Minding Your P’s and E’s: Fostering Creativity in the Science Classroom (p. 53)
10:30–11:30 AM	6–12	103A, Conv. Center	Close Reading and Technical Writing in Science: Support the CCSS and NGSS with a <i>Hunger Games</i> Theme (p. 53)
11:45 AM–12:45 PM	5–C	101J, Conv. Center	STEM—Moving Beyond Science (p. 57)
11:45 AM–12:45 PM	6–8	102B, Conv. Center	Using STEAM to Inspire Deep Learning (p. 58)
11:45 AM–12:45 PM	6–8	102C, Conv. Center	Engineering Design Experiments for Middle School Classrooms (p. 58)
11:45 AM–12:45 PM	6–8	102D, Conv. Center	Going Beyond “Average”: Graphing and Interpreting Data Using Measures of Center and Spread (p. 58)
11:45 AM–12:45 PM	6–9	103A, Conv. Center	Integrated STEM Through Collaboration at the Middle Level (p. 57)
11:45 AM–12:45 PM	6–8	211B, Conv. Center	Fostering Schoolwide STEM Culture Among Staff and Students (p. 58)
3:00–4:00 PM	6–12	101J, Conv. Center	We’re Made of Stars? Explore the Elements with NASA! (p. 65)
3:00–4:00 PM	7–8	102C, Conv. Center	Incorporating the Engineering Design Process and Engineering Notebooks in Classroom Instruction (p. 65)
3:00–4:00 PM	6–8	102D, Conv. Center	Size Matters: Analyzing Experimental Data with Large Variations (p. 65)
3:00–4:00 PM	6–8	102E, Conv. Center	STEM Isn’t One Subject at a Time: Lessons That Bridge Content Areas (p. 63)
3:00–4:00 PM	6–8	102F, Conv. Center	Supporting the Intersections Between Computer Science and the NGSS (p. 63)
4:15–5:15 PM	5–8	101J, Conv. Center	Reasoning Space Science with Simulations (p. 68)
4:15–5:15 PM	3–12	102B, Conv. Center	An Inquiry Approach to Establishing Collaborative Learning Communities in a STEM Classroom (p. 68)
4:15–5:15 PM	6–8	102C, Conv. Center	Engineering Activities to Inspire Middle School Youths in Out-of-School Time (p. 68)
4:15–5:15 PM	6–12	102F, Conv. Center	Sewing Up Science: Crafting Technology for Teaching Science (p. 66)
4:15–5:15 PM	5–9	103A, Conv. Center	Linear Equations Outbreak! (p. 66)

High School Strand

Thursday

9:15–10:15 AM	9–C	101 D/E, Conv. Center	Forensic DNA Analysis in the Classroom (p. 26)
9:15–10:15 AM	5–C	101H, Conv. Center	Explore Building Mousetrap Vehicles to Integrate Science, Technology, Engineering, and Mathematics (p. 28)
9:15–10:15 AM	8–C	102A, Conv. Center	Using Direct Measurement Videos to Teach Science Practices (p. 28)
9:15–10:15 AM	6–12	103D, Conv. Center	Full STEAM Ahead: Engaging Engineering Activities (p. 26)
9:15–10:15 AM	7–12	103E, Conv. Center	Free STEM Integration Using InquirySpace Software (p. 26)
9:15–10:15 AM	7–12	103F, Conv. Center	NCTM Session: When the “M” in STEM Is “MS” (p. 26)
9:15–10:15 AM	8–12	208D, Conv. Center	Solids: The Neglected “State” of Chemistry (p. 27)
9:15–10:15 AM	7–12	210 A/B, Conv. Center	The Eight Elements of STEM High Schools (p. 27)
10:30–11:30 AM	9–12	101 A/B, Conv. Center	Psychological Science as a Gateway to STEM (p. 32)
10:30–11:30 AM	7–C	101 D/E, Conv. Center	Girls and STEM (p. 32)
10:30–11:30 AM	6–C	101G, Conv. Center	How Much CO ₂ Is Stored in That Forest? A STEM Activity for Middle School and High School Teachers (p. 34)
10:30–11:30 AM	9–C	101H, Conv. Center	Monday Morning Units and Activities for Your High School Classroom (p. 34)
10:30–11:30 AM	7–12	103D, Conv. Center	Developing a 3-Dimensional NGSS Classroom Emphasizing the Crosscutting Concept of Energy and Matter: Flows, Cycles, and Conservation (p. 32)
10:30–11:30 AM	9–12	103E, Conv. Center	Design Thinking: Engineering Student-centered Solutions Using Medical Biology (p. 32)
10:30–11:30 AM	3–C	103F, Conv. Center	NCTM Session: Teaching Matters! Effective Teaching Practices to Turn High-quality Standards into Successful STEM Learning (p. 32)
10:30–11:30 AM	8–12	208D, Conv. Center	Corrosion: Chemistry Made Simple, Relevant, and Fun (p. 32)
11:45 AM–12:45 PM	5–12	101G Conv. Center	English Language Learners: Integrating STEM with <i>Freak the Mighty</i> (p. 37)
11:45 AM–12:45 PM	11–C	101H Conv. Center	STEM Astronomy: X-Ray Spectroscopy of Supernova Remnants (p. 38)
11:45 AM–12:45 PM	7–12	208D Conv. Center	Bioplastic—Going from Plants to Plastics (p. 36)
3:00–4:00 PM	10–C	101 D/E, Conv. Center	Molecular Modeling and Design Using 3D Printing (p. 42)
3:00–4:00 PM	6–12	101H, Conv. Center	Infect Your Biology Classroom with Math! (p. 43)
3:00–4:00 PM	9	101I, Conv. Center	NCTM Session: Using Modeling to Explore the Spread of Disease (p. 43)
3:00–4:00 PM	9–12	103E, Conv. Center	STEM Certificates Build STEM Capacity on Campus (p. 42)
4:15–5:15 PM	9–12	101G, Conv. Center	Mathematical Models in Science and Technology (p. 46)
4:15–5:15 PM	8–C	101H, Conv. Center	A Battery-powered Coffee Warmer: Designing, Building, Testing, Evaluating, and Refining (p. 46)
4:15–5:15 PM	6–12	103D, Conv. Center	Developing 21st-Century Reasoning Skills Through an Authentic STEM Research Experience (p. 44)
4:15–5:15 PM	9–C	103F, Conv. Center	NCTM Session: It Takes Several Villages (p. 45)

Friday

10:30–11:30 AM	8–C	102A, Conv. Center	Using Direct Measurement Video to Teach Science Practices (p. 52)
10:30–11:30 AM	9–C	103D, Conv. Center	An Alternative to the Written Lab Report (p. 53)
10:30–11:30 AM	7–C	103E, Conv. Center	Increasing Very Long-Term Academic Retention via Positive Student-Teacher Relationships: Building Self-Efficacy and Teaching Techniques (p. 53)
10:30–11:30 AM	6–12	103F, Conv. Center	NCTM Session: Will the Fastest Women Marathoners Ever Beat the Fastest Men? (p. 53)
10:30–11:30 AM	7–12	208D, Conv. Center	Basic Polymer Science for the Science Classroom (p. 53)
11:45 AM–12:45 PM	10–12	101 A/B, Conv. Center	Nanoscale Science and Engineering (p. 57)
11:45 AM–12:45 PM	9–12	102A, Conv. Center	Simulate Evolution with Technology and Hands-On Tools (p. 58)
11:45 AM–12:45 PM	6–12	103B, Conv. Center	Reverse Engineering as an Instructional Tool (p. 59)
11:45 AM–12:45 PM	7–C	103C, Conv. Center	Science and Math: Data Analysis Made Easy (p. 59)
11:45 AM–12:45 PM	7–C	103D, Conv. Center	From Climate and Ocean Literacy to Meaningful Action—The Launching of I2SEA (p. 57)
11:45 AM–12:45 PM	6–12	208D, Conv. Center	Polymers: New Twists on Old Favorites (p. 57)

Schedule at a Glance High School Strand

3:00–4:00 PM	9–12	101 A/B, Conv. Center	STEM: Fueling the Future (p. 63)
3:00–4:00 PM	6–C	101G, Conv. Center	Strategies and Techniques to Engage and Motivate Students in Science and Engineering Practices (p. 65)
3:00–4:00 PM	10–12	103E, Conv. Center	Ensuring the “T” and “E” in the STEM Classroom (p. 63)
3:00–4:00 PM	7–12	208D, Conv. Center	Teach Engineering Principles on the Cheap with Concrete (p. 64)
4:15–5:15 PM	6–12	101G, Conv. Center	Merging the “Bookends” of STEM: Science and Math (p. 68)
4:15–5:15 PM	8–12	101H, Conv. Center	Science Has Many Stories to Tell: NASA Literacy Resources for Your Students (p. 68)
4:15–5:15 PM	6–12	103D, Conv. Center	Creating Integrated Units Through Design-Thinking and Making (p. 66)
4:15–5:15 PM	8–12	103E, Conv. Center	Improving Science Education: Connecting School Work to Real Life (p. 66)

Partnerships Strand

Thursday

8:00–9:00 AM	G	101 A/B, Conv. Center	The Why, What, and How of STEM Partnerships That Support Students and Teachers (p. 25)
9:15–10:15 AM	6–C	103B, Conv. Center	STEM Collaborations: Integrating Students and Teachers into EPSCoR Research (p. 26)
9:15–10:15 AM	G	211A, Conv. Center	Bridging the Attraction Gap: An Event-based STEM Partnership That Gets Results (p. 27)
9:15–10:15 AM	P–12	211B, Conv. Center	Carnegie STEM Excellence Pathway: A Journey to STEM Success (p. 28)
9:15–10:15 AM	K–12	211C, Conv. Center	Dakota’s K–12 STEM Series (p. 28)
10:30–11:30 AM	G	211A, Conv. Center	Iowa’s STEM Council Drives Business-Education Partnerships (p. 32)
10:30–11:30 AM	G	211B, Conv. Center	A Model K–12 STEM Project: The High Hopes Project (p. 33)
10:30–11:30 AM	9–C	211C, Conv. Center	Creating School and University Partnerships That Work (p. 33)
11:45 AM–12:45 PM	9–C	102E, Conv. Center	Nature of Science Understanding and Integrated Lab Models (p. 35)
11:45 AM–12:45 PM	G	211A, Conv. Center	STEM Networks in North Dakota and Minnesota (p. 36)
11:45 AM–12:45 PM	K–12	211B, Conv. Center	The Greater Southern Tier of New York STEM Education Project (p. 37)
11:45 AM–12:45 PM	4–12	211C, Conv. Center	Understanding Car Crashes: Engineering Truly Impactful STEM Lessons (p. 37)
3:00–4:00 PM	G	211B, Conv. Center	SFAz STEM Network and Online Community: Connecting STEM Programming Across the Nation (p. 43)
3:00–4:00 PM	9–C	211C, Conv. Center	Win-Win: Creating Mutually Beneficial Partnerships Between School and Local Businesses (p. 43)
4:15–5:15 PM	1–8	208C, Conv. Center	Growing the STEM Seed into a Network of Sustainability (p. 46)
4:15–5:15 PM	6–9/C	211A, Conv. Center	Addressing the Underrepresented in STEM (p. 45)
4:15–5:15 PM	P–8/C	211C, Conv. Center	Branching Out: Developing Partnerships to Enhance PreK–8 STEM Education (p. 45)

Friday

8:00–9:00 AM	G	101 A/B, Conv. Center	The Why, What, and How of STEM Partnerships That Support Students and Teachers (p. 49)
9:15–10:15 AM	G	101F, Conv. Center	STEM Integration into Rural Education Cooperative Schools (p. 49)
9:15–10:15 AM	G	101G, Conv. Center	Let’s Evaluate the Structure of Your STEM Program and Consider Ways to Support Better Partner Interactions (p. 49)
9:15–10:15 AM	G	101I, Conv. Center	Building New York City’s STEM Initiative (p. 50)
10:30–11:30 AM	6–C	103B, Conv. Center	Integrative STEM for Teachers: An Innovative Approach (p. 54)
10:30–11:30 AM	4–10	211A, Conv. Center	Taking Advantage of Urban Settings: Leveraging Science Institutions to Enhance Student Learning (p. 53)
10:30–11:30 AM	9–C	211C, Conv. Center	STEM Research and Design: A Mentoring “Data Experience” (p. 54)
11:45 AM–12:45 PM	6–8/C	103F, Conv. Center	NCTM Session: Achieving Equity: Partnerships in Urban Districts to Support Implementation of the CCSS <i>Mathematics</i> and NGSS for All Students (p. 57)

Schedule at a Glance Partnerships Strand

11:45 AM–12:45 PM	4–12	211A, Conv. Center	Statewide STEM Coalition: Leadership Delivery Through a Design Blueprint (p. 58)
11:45 AM–12:45 PM	4–12	211C, Conv. Center	STEM@SSM: STEM Outreach to Area Schools (p. 58)
3:00–4:00 PM	9–C	211A, Conv. Center	Developing Valuable Partnerships to Ensure Students' Success in the STEM Fields (p. 64)
3:00–4:00 PM	P–12	211B, Conv. Center	Manufacturing and Education: Understanding the Connection (p. 64)
3:00–4:00 PM	G	211C, Conv. Center	Partnerships for Project Based Learning in STEM (p. 64)
3:00–4:00 PM	K–12	212 A/B, Conv. Center	Apple Valley STEM Corridor: Development of a K–12 STEM Program Through Collaboration and Communication (p. 65)
4:15–5:15 PM	G	102E, Conv. Center	Explore the SFAz STEM Immersion Guide (p. 66)
4:15–5:15 PM	G	206 A/B, Conv. Center	Place-based Integrated STEM: STEM in My Backyard and Beyond! (p. 68)
4:15–5:15 PM	3–8	210 A/B, Conv. Center	Creating Partnerships to Advance STEM in Out-of-School Programs (p. 67)
4:15–5:15 PM	G	211A, Conv. Center	Keeping STEM Outreach Current, Collaborative, and Career Focused (p. 67)
4:15–5:15 PM	G	211C, Conv. Center	Collaboration and Innovation: Key Ingredients to Success in STEM Programming (p. 67)

Administrators Strand

Thursday

9:15–10:15 AM	G	101C, Conv. Center	Success Stories from Administrators (p. 25)
11:45 AM–12:45 PM	P–12	103B, Conv. Center	A STEM Model of Instruction (p. 35)
11:45 AM–12:45 PM	P–5	210 A/B, Conv. Center	Building a STEM Culture Through Family/School Partnerships (p. 36)
4:15–5:15 PM	P–12	101I, Conv. Center	Developing an Effective STEM Rubric (p. 46)
4:15–5:15 PM	G	103B, Conv. Center	Practices That Support STEM Education (p. 44)
4:15–5:15 PM	P–12	210 A/B, Conv. Center	What's in the Middle of STEM? Teacher Engagement! (p. 45)

Friday

10:30–11:30 AM	G	101C, Conv. Center	Success Stories from Administrators (p. 52)
10:30–11:30 AM	K–5	212 A/B, Conv. Center	Blueprint for Designing a Successful K–5 STEM Program (p. 54)
11:45 AM–12:45 PM	G	101F, Conv. Center	Building a Cohesive STEM Program: Focus On Eastern Technical High's Mathematics, Engineering, and Computer Science Program (p. 56)
11:45 AM–12:45 PM	G	101G, Conv. Center	Using INSPIRES to Support Integration of Engineering Design in Science and Technology Education (p. 56)
11:45 AM–12:45 PM	G	101H, Conv. Center	Supporting a Pathway for STEM Education (p. 56)
11:45 AM–12:45 PM	G	101I, Conv. Center	Building STEM Partnerships for Elementary Science Classrooms (p. 56)
3:00–4:00 PM	P–12	103B, Conv. Center	Finding the Needle in the Haystack: Tools for Picking a High-quality STEM Curriculum (p. 66)
3:00–4:00 PM	G	103C, Conv. Center	NSTA Press® Session: Professional Development Activities to Introduce Teachers and Administrators to the NGSS (p. 66)
3:00–4:00 PM	P–12	213 A/B, Conv. Center	ITEEA Session: Integrative STEM Focal Points (p. 65)
4:15–5:15 PM	K–12	213 A/B, Conv. Center	Leadership Strategies for Ensuring Each Student Has a STEM Future (p. 67)

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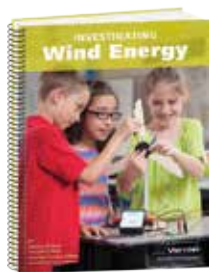
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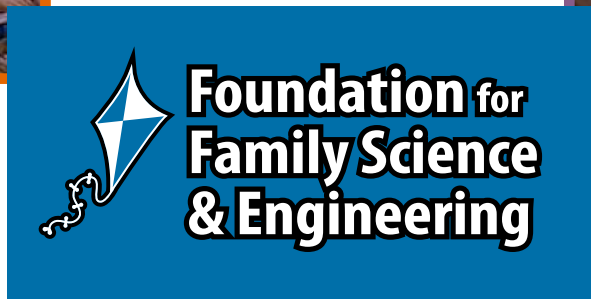
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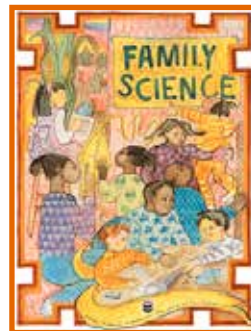


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