NSTA’s 2015 STEM Forum & Expo

Minneapolis, MN
May 20–23, 2015

#NSTA15    #STEMforum

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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

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
Welcome to the 2015 STEM Forum & Expo

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

NSTA STEM Forum & Expo
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.
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.
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.

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](http://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](http://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* Omnimax 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](http://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.
Are you passionate about STEM education?

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.
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Azi Ambrishami, Development Coordinator

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NGSS
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Jennifer Horak, NGSS Project Manager

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Adam Ebel, Web Developer

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Marcelo Nuñez, Exhibit Services Coordinator

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Emily Brady, Executive Administrator and Manager  
NSTA Recommends  

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Hima Bichali, Graphic Designer  

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Debra Shapiro, Associate Editor  

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Jack Parker, Electronic Prepress Technician  

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Robert Ferguson, AMSE Affiliate Representative  
Sharon A. Kortman, ASTC Affiliate Representative  
Lisa Martin-Hansen, ASTE Affiliate Representative  
Deborah Hanuscin, NARST Affiliate Representative  
Timothy Maze, CSSS Affiliate Representative  
Todd Hoover, NMLSTA Affiliate Representative  
Brian Shmaefsky, SCST Affiliate Representative  

**NSTA Officers, Board of Directors, Council, and Alliance of Affiliates**

**NSTA Mission Statement**

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

**Officers and Board of Directors**

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**Alliance of Affiliates**

Todd Hoover, NMLSTA Affiliate Representative  
Brian Shmaefsky, SCST Affiliate Representative  

**NSTA STEM Forum & Expo** 15
Conference Resources • Future Conferences

All cities are subject to change pending final negotiation.

National Conferences on Science Education

Nashville, Tennessee
March 31–April 3, 2016

Los Angeles, California
March 30–April 2, 2017

Area Conferences on Science Education

2015 Area Conferences
Reno, Nevada—October 22–24
Philadelphia, Pennsylvania—November 12–14
Kansas City, Missouri—December 3–5

2016 Area Conferences
Minneapolis, Minnesota—October 27–29
Portland, Oregon—November 10–12
Columbus, Ohio—December 1–3

2017 Area Conferences
Baltimore, Maryland—October 5–7
Milwaukee, Wisconsin—November 9–11
New Orleans, Louisiana—November 30–December 2
All attendees can evaluate concurrent teacher and exhibitor sessions online while simultaneously tracking professional development certification (based on clock hours). Use this form to keep track of all sessions/events attended during the 2015 STEM Forum & Expo. Sessions/events such as exhibit hall visits are not available for online evaluation. However, these events still qualify for professional development.

**Beginning June 15, 2015, STEM Forum transcripts can be accessed at the NSTA Learning Center (learningcenter.nsta.org) by logging on with your STEM Forum Badge ID# and then clicking on “My PD Record and Certificates.” Keep this form and use it to add the following activities to your STEM Forum transcript. Completed transcripts can be printed from this website 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.

First Name: _____________________ Last Name: _____________________ Badge ID# __________________

Evaluate sessions by accessing the STEM Forum & Expo session browser: www.nsta.org/stembrowse. You will need your badge number to evaluate sessions. See page 8 of the program for instructions. **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.

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

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

**Wednesday, May 20  4:00–7:45 PM**
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**Thursday, May 21  8:00 AM–8:30 PM**
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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, videos, 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, government agencies, and business.

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

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20% savings on NSTA Press® books

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An index of all strand sessions starts on page 86.

Primary (Early Childhood)

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

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

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

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

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

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

DON’T MISS OUT ON THE FUN!

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!

www.nsta.org/stemforum
Visit NSTA’s SCIENCE STORE
Exhibit Hall A

Offering the latest resources for science teachers, including new releases and best sellers!

- Fun NSTA-branded gear—unique hats, shirts, mugs, collectible pins, and more
- All members receive discounts of 20% on NSTA Press and Gear items and 10% on books from other publishers
- Enjoy free shipping when you place your order online in the on-site store for both books and Gear

Check in often for special giveaways, contests, and more throughout the conference!

Visit www.nsta.org/store to make a purchase today, or call 800-277-5300.
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

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.
Wednesday, May 20

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.

6:30–7:45 PM  Opening Keynote Presentation

The Flying Classroom: Inviting Students to Soar
(General)   Ballroom A, Convention Center

Barrington Irving (@Captainirving; victoria@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.
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

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

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

**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.

**Forensic DNA Analysis in the Classroom**
(Grades 9–College)  101 D/E, Convention Center  
**Ryan Olson** (ryanolson@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.

**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.

**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.

**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.

**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.

**Full STEAM Ahead: Engaging Engineering Activities**
(Grades 6–12)  103D, Convention Center  
**Lauren Rentfro** (@DrLRentfro; rentfrla@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.

**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.

**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.
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.

The Eight Elements of STEM High Schools  
(Grades 7–12) 210 A/B, Convention Center  
Elizabeth Noble (@OutlierUChicago; enoble@uchicago.edu), Heather King (@outlierrande; hking@uchicago.edu), Sandra Holt (@sandraholt_msw; holtsand@uchicago.edu), and Melanie LaForce (@melanielaforse; 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.

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. REGISTRATION OPENS IN AUGUST 2015

NSSTA STEM Forum & Expo 27
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.

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

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.

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!

“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.

STEM Astronomy: Decoding Starlight—From Pixels to Images  
(Grades 7–9)  
101J, Convention Center  
Donna Young (donna@aaavso.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.

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.

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.
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.

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.

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 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  
*(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.
Thursday, 10:15–11:15 AM

**Exhibitor Workshops**

**10:15–11:15 AM Exhibitor Workshops**

**Engineering the JetToy**

*Grades 4–6*  
L100 A, Convention Center  
Sponsor: SAE International  
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.  
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:

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.

Photo courtesy of The Works Museum
10:30–11:30 AM  Presentations

**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.

**Girls and STEM**  
(Grades 7–College)  101 D/E, Convention Center

Mariel Kolker (@MarielKolker; marel.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.

**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.

**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.

**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.

**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.

**NCTM Session: Teaching Matters! Effective Teaching Practices to Turn High-quality Standards into Successful STEM Learning**  
(Grades 3–College)  103F, Convention Center

Diane Briars (djmath@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.

**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.

**Iowa’s STEM Council Drives Business-Education Partnerships**  
(Generic)  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.
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.

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
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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minionetm
Teaching STEM through biotechnology

Science
Learn how DNA migrates and understand the fundamentals of electrophoresis and molecular biology

Engineering
Designed specifically to address classroom requirements while maintaining quality and performance of research grade equipment

Math
Learn how to plot a semi-log graph and estimate the size of DNA fragments based on known ladders.

Technology
Employs the latest blue LED technology to replace traditional UV illumination

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USPN 8,974,651 *Other patents pending
How Much CO₂ Is Stored in That Forest? A STEM Activity for Middle School and High School Teachers  
(Grades 6—College)  
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.

Monday Morning Units and Activities for Your High School Classroom  
(Grades 9—College)  
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!

Incorporating STEM Challenges into Everyday Curricula  
(Grades 6—8)  
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.

Engineering Design Inspired by Nature  
(Grades 6—8)  
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.

Our Student-led iPad NGSS Classroom!  
(Grades P—8)  
Shelley Lee (leshe@uwstout.edu), 1995–1996 NSTA President, and University of Wisconsin—Stout, Menomonie  
Loretta Wilbur (jwilbur@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!

The Global Conveyor Belt: Density-driven Ocean Circulation  
(Grades 5—8)  
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.

Energize Your STEM Classroom!  
(Grades 4—8)  
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.

Operation Rescue: A Project Approach to STEM Education  
(Grades 5—8)  
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 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.

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.

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.

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

Nature of Science Understanding and Integrated Lab Models  
(Grades 9–College) 102E, Convention Center  
Margery Gardner (magard01@syr.edu) and John Tillotson (@johnwtillotson; jwtiltot@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.

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.

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 STEM Model of Instruction  
(Grades P–12) 103B, Convention Center  
Juan-Carlos Aguilar (jagular@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.
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.

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.

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.

The Building Blocks of an Elementary STEM Program
(Grades K–5) 207 A/B, Convention Center
Kelly Van Meter (@KellyVanMeter2; kvanmeter@eanesisd.net), Lesley Ryan (@lee_ap_ryan; lryan@eanesisd.net), and
Debbie Smith (@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.

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.

Building a STEM Culture Through Family/School
Partnerships
(Grades P–5) 210 A/B, Convention Center
Julie Brenegan (@molliemae57; julie.brenegan@gcisd.net),
Grapevine-Colleyville ISD, Grapevine, Tex.
Tona Blizzard (@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.

STEM Networks in North Dakota and Minnesota
(General) 211A, Convention Center
David DeMuth (@ndstem; david.demuth@vcsu.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.
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.

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

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
120 W. Kellogg Blvd., St. Paul
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.
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.

Rockets to the Rescue! Engineering Designs to Solve Food Security Issues
(Grades 5–8) 101J, Convention Center
Kirk Astroth (@kirkastroth; 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.

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.

“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/1HJWmk1 to download the software ahead of time.

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.

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.

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 (bvj2@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.

Engineering for Elementary Schoolers in Out-of-School Time
(Grades 3–5) 208B, Convention Center
Tania Tauer (@EiE_org; ttauere@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.

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**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.

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**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.

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**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.

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**1:15–2:15 PM  Exhibitor Workshops**

**Diving for Science: Enhancing STEM with Real-World Underwater Archaeology**  
(Grades 6–College)  
*L100 A, Convention Center*

**Lori Trent**, PAST Foundation, Columbus, Ohio  

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.

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**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.

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**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 (bradbblue@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.

(Grades 6–9) L100 G, Convention Center  
Sponsor: eCYBERMISSION  
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 nanoscale 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


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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The power to change tomorrow

For years, Renaissance Learning™ has pioneered the use of data and technology to accelerate learning. Today, we partner with nearly 50% of all U.S. schools to help turn big ideas into reality.

Our cloud-based assessment, teaching, and learning solutions fit the K12 classroom, raise the level of school performance, and accelerate learning for all.

By delivering deep insight into what students know, what they like, and how they learn, Renaissance Learning helps educators leverage all that we can know today about the ones who have the power to change tomorrow.

See our website for a brief video on what the future holds: www.renaissance.com
Thursday, 2:45–3:45 PM

**STEMify Your Science Activity—From the Science to STEM of Light and Lasers**
(Grades 6–College) 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.

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) L100 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

**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.

**Engage Elementary Students in STEAM by Planning a Trip to Mars**
(Grades 5–8) 102E, Convention Center

Laura Grimm (dltn_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.

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

Darrell Walker (@dwalker_l; 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.

**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.

**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.

**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.

**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

#### 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.

#### Infect Your Biology Classroom with Math!
(Grades 6–12) 101H, Convention Center
Peggy Welch (@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.

#### 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.

#### 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.

#### 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.
STEMenizing Parents: Moving the STEM Conversation Home  
(Grades K–2) 204 A/B, Convention Center  
Peter Mastrogiovanni (peter.mastrogiovanni@rcsdk12.org), Tina Rodger (tina.roger@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.

Next Steps: Ramp Up Your Engineering with Mathematics  
(Grades K–8) 208 A, 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.

NGSS Performance Expectations in Action  
(Grades K–5) 208 C, Convention Center  
Michelle Dileo and Tania Tauer (@EiE_org; ttauers@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

Engineering a Prosthetic  
(Grades 4–8) 102 E, Convention Center  
Kim O’Brien (johanskm@milwaukee.k12.wi.us), Milwaukee (Wis.) Public Schools  
Crystal Malone (malonecc@milwaukee.k12.wi.us) and Michelle Huckle, 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.

Energy House  
(Grades 6–8) 102 F, 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.

Make Student-centered Learning Visible Through Invisible Teaching Strategies  
(Grades 1–12) 103 A, Convention Center  
Gina Tesoriero (@STEMsuccessedu; ginasstoriero@gmail.com) and Amanda Solarsh (@StemSuccessEdu; stemsuccessedu@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.
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.

The First Year of a Lower School STEM Lab  
(Grades K–6)  
207 A/B, Convention Center  
P. Matthew Dillon (@IolaniLSFabLab; pm Dillon@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.

3D Printing—Not Just for High School: Primary Edition  
(Grades K–3)  
208D, Convention Center  
Kimberly Sandefur (sandefark@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.

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.

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.

Branching Out: Developing Partnerships to Enhance PreK–8 STEM Education  
(Grades P–8, College)  
211C, Convention Center  
Lori Maxfield (lrmaxfield@carlow.edu) and Suzanne Ament (sament@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.
Thursday, 4:15–5:15 PM

**4:15–5:15 PM Hands-On Workshops**

**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.

**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.

**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.

**Developing an Effective STEM Rubric**
(Grades P–12) 101I, Convention Center
Melanie LaForce (@melaniemlaforce; laforce@uchicago.edu) and Elizabeth Noble (enoble@uchicago.edu), Outlier Research & Evaluation, Chicago, Ill.
Rukiya Curvev 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.

**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.

**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.

**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.

**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 Cantlebary (@CantlebarysCubs; cantlebary@fultonschools.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.

**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.
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

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
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.

9:15–10:15 AM Panel Workshops

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.

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.
Building New York City’s STEM Initiative

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

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
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

Connecting Physical Science, Design, and Engineering Through Underwater Robotics
(Grades 6–9) 101D/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.

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.

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.

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.
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.

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 Suters (lsuters@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.

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.

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.bechtel@wartburg.edu), Wartburg College, Waverly, Iowa  
Review interesting findings from a dissertation study on 92 students within a Midwestern high school chemistry course.

NCTM Session: Will the Fastest Women Marathoners Ever Beat the Fastest Men?  
(Grades 6–12) 103F, Convention Center  
Paul Kelley (paulrkelley@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.

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!

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@dl128.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.

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.

Taking Advantage of Urban Settings: Leveraging Science Institutions to Enhance Student Learning  
(Grades 4–10) 211A, Convention Center  
Alicia Lamfers (alamfers@denverzoo.org), Denver Zoo, Denver, Colo.  
Melissa Botteicher (mdbotteicher@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.
STEM Research and Design: A Mentoring “Data Experience”  
(Grades 9–College)  
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.

10:30–11:30 AM Hands-On Workshops

Innovative Technology in Science Inquiry Using Free Models  
(Grades 6–9)  
Carolyn Staudt (@cjstaudt; cstaude@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.

STEAM Journals: Adding Art to Our Data  
(Grades 4–8)  
Erick McGinley (mcginleyj@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.

Marble Down: An Intense Middle School Engineering Project  
(Grades 6–8)  
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?

The NGSS Science and Engineering Practice of Analyzing and Interpreting Data: A Conceptual Examination  
(Grades 4–College)  
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.

Integrative STEM for Teachers: An Innovative Approach  
(Grades 6–College)  
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.

Engineering in Kindergarten? It’s a Natural Fit  
(Grades P–2)  
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.
**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 cove molding and unit blocks to support students in designing and building marble runs, simultaneously engaging in physics and spatial thinking.

**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.

**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.

**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.

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**New Science Teacher Academy**

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.

**Application Deadline**
August 15, 2015

Apply online at www.nsta.org/academy.
11:45 AM–12:45 PM  Panel Workshops

**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.

**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.

**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.

**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 these 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

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.

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.

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 (@chsdind@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.

From Climate and Ocean Literacy to Meaningful Action—The Launching of I2SEA
(Grades 7–College)  103D, Convention Center
Jason Hodin (@12ledu; 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.

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 (mjtaavormina@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.

Integrated STEM Curricula at a STEM Elementary School
(Grades 1–5, College)  207 A/B, Convention Center
Judith Morrison (jmorriso@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.

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 (sherrirukes@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.
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.

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.

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

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).

Using STEAM to Inspire Deep Learning  
(Grades 6–8) 102B, Convention Center  
Jessica Lura (@msjlura; jlura@bullischarterschool.com) and Kristina Plattner (@MrsPlattner; kplattner@bullischarterschool.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.

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.

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 (mmnamara@nybg.org), The New York Botanical Garden, Bronx  
Nickoleta Lytras (@nickoletaly; 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.
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.

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.

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.

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.
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.

Engineering the Built Environment
(Grades 3–12) 208B, Convention Center
Dylan Ryder (@DylanRyder; dryder@theschool.columbia.edu), The School at Columbia University, New York, N.Y.
Stefanie Smith (@stefmsmith; smith@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.

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
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 (swhitney@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
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 STEMbehindHealth.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** (bradbblue@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** (whitney@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.
2:45–3:45 PM  Exhibitor Workshops

Chemistry Inquiry
(Grades 7–12)  L100 A, Convention Center
Sponsor: Fisher Science Education
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 (shwhitney@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

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 down draught/spring rate formulas to diagnose your driver’s problem and win the race! Dropbox of STEM resources shared.

STEM Isn’t One Subject at a Time: Lessons That Bridge Content Areas
(Grades 6–8)  102 E, 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!

Supporting the Intersections Between Computer Science and the NGSS
(Grades 6–8)  102 F, 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.

Ensuring the “T” and “E” in the STEM Classroom
(Grades 10–12)  103 E, 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.
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 Mac-Donald (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.

Innovate, Collaborate, Communicate, Create
(Grades 1–6) 208A, Convention Center
Brian Crosby ([bcrosby; bcroob@washoeschools.net]), Nevada’s Northwest RPDP, Reno
Experience real examples of global hands-on classroom inquiry projects. Leave with ideas for projects you can implement right away.

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 (@katiesfarley; 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.

STEM on a Theme
(Grades K–5) 208C, Convention Center
Carrie McGowan (carrie.mcgowan@shs.org) and Robin Ostenfeld Adams (robin.ostenfeld.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.

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.

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.

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.

Partnerships for Project Based Learning in STEM
(General) 211C, Convention Center
Alfred Hall II (alhall1@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.
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.lynnch@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.

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

**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!

**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.

**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.

**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 (mmcanamara@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.

**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 (@NASAIuniverseEdu; 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.
Friday, 3:00–4:00 PM

**Find 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.

**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.

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**4:15–5:15 PM  Presentations**

**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.

**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.

**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.

**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 antimalarial 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.

**Creating Integrated Units Through Design-Thinking and Making**  
(Grades 6–12)  
**103D, Convention Center**

**Samantha Smith** (@jhhsfablab; smith@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.

**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.
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.

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!

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; 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.

You Think Your Students Know Science? Using Multimedia and Online Collaboration in Your Formative Science Assessment  
(Grades 3–12)  
208C, Convention Center  
Robert Miller (@RobertMiller; 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.

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.

Keeping STEM Outreach Current, Collaborative, and Career Focused  
(General)  
211A, Convention Center  
Matthew Maurer (maurerm@rmu.edu) and Sarah Mac-Donald (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.

Collaboration and Innovation: Key Ingredients to Success in STEM Programming  
(General)  
211C, Convention Center  
Lisa Blank (@ljblank; lblank@fortdrumisc.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!

Leadership Strategies for Ensuring Each Student Has a STEM Future  
(Grades K–12)  
213 A/B, Convention Center  
Bob Sotak (@scienceinquiry; bso@mac.com), Science/STEM Education Consultant, Edmonds, Wash.  
Brian Day (@science_education; bday@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

**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.

**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.

**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.

**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.

**Engineering Activities to Inspire Middle School Youths in Out-of-School Time**  
(Grades 6–8)  
102C, Convention Center  
Michelle Dilesø (mdilesø@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.

**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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- The Art and Craftsmanship of Teaching
- Combining Science with Agriculture
- Achieving Success with the NGSS

For more information and to register, visit: www.nsta.org/conferences
8:00–10:00 AM   Closing Session: How Can We Better Prepare Our Students for STEM-related Careers?

(General)  

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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Houston, TX 77056
Phone: 800-531-0864
E-mail: stemscopes@acceleratelearning.com
Website: www.acceleratelearning.com

STEMscopes is a digital science solution for preK–12 students offering core curriculum for state, NGSS, and Early Explorer. Born from the lab and penned by the hands of expert teachers, STEMscopes takes in feedback, best practices, and the latest pedagogy to develop the most effective STEM curriculum. Each curriculum is supported by STEMcoach, a free STEM community that allows teachers to share best practices and lessons while learning from experts in the field.

Animal Jam #409
105 North 400 West E, M
Salt Lake City, UT 84103
Phone: 801-355-4440, x116
E-mail: meg@wildworks.com
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Animal Jam is a safe and exciting online playground for kids who love animals and the outdoors. Players create and customize their own animal characters and dens, chat with friends, adopt pets, team up for adventures, and feed their curiosity about animals and the natural world around them.

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1818 N St. NW, Suite 600
Washington, DC 20036
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.
Exhibitors

Bio-Rad Laboratories  #211
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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.

Bright Schools Competition  #403
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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!

Britannica Digital Learning  #120
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Chicago, IL 60654
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For middle school STEM solutions that are easily integrated into classrooms, turn to Britannica. Winner of the Teachers’ Choice Award, Pathways: Science is an online approach to teaching scientific investigations. Focused on the new standards, Britannica 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.

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

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.

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

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!

Delta Education/School Specialty Science  #515
80 Northwest Blvd.  E, M
Nashua, NH 03063
Phone: 800-258-1302
E-mail: customerservice.delta@schoolspecialty.com
Website: www.deltaeducation.com

Delta Education is your leading educational partner in providing hands-on, inquiry-based K–8 curriculum and instructional resources. With programs like FOSS® and DSM®, informationals texts (Delta Science Content Readers), and STEM resources, we help you develop students who set a world-class standard for college and workplace readiness.

eCYBERMISSION  #405
1840 Wilson Blvd.  M
Arlington, VA 22201
Phone: 866-462-9237
E-mail: swhitsett@nsta.org
Website: www.ecybermission.com

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.

Emporia State University  #504
1 Kellogg Circle, Box 52  HS, C
Emporia, KS 66801
Phone: 620-341-5430
E-mail: ahuddles@emporia.edu
Website: www.emporia.edu/grad

Located in the heart of the scenic Flint Hills, Emporia State University is in close proximity to the three major metropolitan areas of Kansas—Wichita, Topeka, and Kansas City, Missouri. Emporia State serves 6,100 students in nationally recognized academic programs. ESU offers 28 master’s programs, nine certificate programs, and a PhD program.
Energy Concepts’ contextual, standards-based systems provide real-world STEM and CTE learning for students in applied sciences, engineering, electricity/electronics, and industrial controls. ECI provides teachers and administrators with turn-key training systems, from textbooks, lab manuals, and experiments to lab equipment/supplies and ongoing support, all focused on critical thinking for student success.

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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Batavia, IL 60510  
Phone: 800-452-1261  
E-mail: flinn@flinnsci.com  
Website: www.flinnsci.com  

Flinn Scientific is the leader in science and laboratory chemical safety. Publisher of the world-renowned Flinn Science Catalog Reference Manual, Flinn develops and offers a full line of chemistry, biology, physics, life science, Earth science, physical science, and safety products for middle school and high school.

The Flying Classroom #223  
14950 NW 44th Court, Suite 23  
Opa Locka, FL 33054  
Phone: 305-619-4214  
E-mail: victoriad@flyingclassroom.com

The Flying Classroom is a supplemental STEM+ curriculum company that covers core STEM subjects. From inner-city athlete to STEM leader, Captain Irving takes students on a learning adventure as he explores the exciting world of science. All lessons meet the national standards.

Foundation for Family Science & Engineering #422  
4614 SW Kelly Ave.  
Portland, OR 97239  
Phone: 503-245-2102  
E-mail: info@familyengineering.org  
Website: www.familyscienceandengineering.org

The Foundation for Family Science & Engineering’s signature programs—Family Science and Family Engineering—engage elementary-aged children and families in fun hands-on activities. Family Science and Engineering events create a welcoming and accessible environment for diverse communities to discover the exciting worlds of science and engineering, and explore STEM careers.

Frey Scientific/CPO Science #517  
80 Northwest Blvd.  
Nashua, NH 03063  
Phone: 800-225-3739  
E-mail: customercare.frey@schoolspecialty.com  
Websites: www.freyscientific.schoolspecialty.com; www.cposcience.com

Frey Scientific offers a complete line of supplies, equipment, technology, and lab design services for grades K–12. Frey also offers the CPO Science learning systems that are ideal for differentiated instruction. Secondary level supplemental science curriculum offerings are Inquiry Investigations® and iNeo/SCI®.

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1455 E. Rio Rd.  
Charlottesville, VA 22901  
Phone: 800-852-1453  
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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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Nano-Link’s goal is to promote nanotechnology education at multiple grade levels by providing comprehensive resources for students and educators. These resources are supported by hands-on educator workshops and online content and activity kits.

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National Center for STEM Elementary Education #415  
2004 Randolph Ave.  
St. Paul, MN 55105  
E-mail: stem@stkate.edu

The National Center for STEM Elementary Education is leading the march toward STEM literacy for elementary teachers. Through graduate STEM certificates of professional development for teachers, we seek to improve teacher effectiveness, advance student performance, strengthen STEM literacy, and increase individual candidate appeal in competitive job markets.

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Website: www.ngl.cengage.com

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National Institute of Biomedical Imaging and Bioengineering (NIBIB) #319  
31 Center Dr., Room 1C14  
Bethesda, MD 20892  
E-mail: coneyjohnsons@mail.nih.gov  
Website: www.nibib.nih.gov

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NGSS@NSTA #401  
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Website: www.nsta.org/ngss

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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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The STEM Academy, Inc. #112
6300 Sagewood Dr., Suite H #235
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.

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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.

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| Washington, DC 20000                          |             |
| 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        |
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| Bureau of Ocean Energy Management             |             |
| 1849 C St. NW, Room 5216                       | E, M, HS, C |
| Washington, DC 20240                          |             |
| Phone: 202-208-5636                           |             |
| E-mail: boempublicaffair@boem.gov              |             |
| Website: www.boem.gov                         |             |

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| E-mail: info@vernier.com                       |             |
| Website: www.vernier.com                      |             |

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| Boston, MA 02215                               |             |
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| 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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**Friday**

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<td>Middle</td>
<td>101 D/E, Conv. Center</td>
<td>Connecting Physical Science, Design, and Engineering Through Underwater Robotics (p. 52)</td>
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<tr>
<td>10:30–11:30 AM</td>
<td>Middle</td>
<td>101I, Conv. Center</td>
<td>Creation and Evaluation: Sharing STEM Tasks and Student Work (p. 52)</td>
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<td>101J, Conv. Center</td>
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<td>STEM Isn’t One Subject at a Time: Lessons That Bridge Content Areas (p. 63)</td>
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<tr>
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<td>10:30–11:30 AM</td>
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<td>11:45 AM–12:45 PM</td>
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<td>103D, Conv. Center</td>
<td>Increasing Very Long-Term Academic Retention via Positive Student-Teacher Relationships: Building Self-Efficacy and Teaching Techniques (p. 53)</td>
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  - 5–C 101H, Conv. Center: Explore Building Mousetrap Vehicles to Integrate Science, Technology, Engineering, and Mathematics (p. 28)
  - 8–C 102A, Conv. Center: Using Direct Measurement Videos to Teach Science Practices (p. 28)
  - 6–12 103D, Conv. Center: Full STEAM Ahead: Engaging Engineering Activities (p. 26)
  - 7–12 103F, Conv. Center: NCTM Session: The Eight Elements of STEM High Schools (p. 27)
  - 8–12 208D, Conv. Center: Solids: The Neglected “State” of Chemistry (p. 27)

**High School Strand**

- **Thursday, 9:15 – 10:15 AM**
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  - 8–C 102A, Conv. Center: Using Direct Measurement Videos to Teach Science Practices (p. 28)
  - 6–12 103D, Conv. Center: Full STEAM Ahead: Engaging Engineering Activities (p. 26)
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- **Friday, 10:30 – 11:30 AM**
  - 9–C 101H, Conv. Center: Monday Morning Units and Activities for Your High School Classroom (p. 34)
  - 7–C 103E, Conv. Center: Increasing Very Long-Term Academic Retention via Positive Student-Teacher Relationships: Building Self-Efficacy and Teaching Techniques (p. 53)
  - 6–12 103F, Conv. Center: NCTM Session: Will the Fastest Women Marathoners Ever Beat the Fastest Men? (p. 53)
  - 10–C 103D, Conv. Center: Developing 21st-Century Reasoning Skills Through an Authentic STEM Research Experience (p. 44)
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#### Thursday

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<td>101 A/B, Conv. Center</td>
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<tr>
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<td>103B, Conv. Center</td>
<td>STEM Collaborations: Integrating Students and Teachers into EPSCoR Research (p. 26)</td>
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<td>Bridging the Attraction Gap: An Event-based STEM Partnership That Gets Results (p. 27)</td>
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<tr>
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<td>A Model K–12 STEM Project: The High Hopes Project (p. 33)</td>
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<tr>
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<td>211C, Conv. Center</td>
<td>Creating School and University Partnerships That Work (p. 33)</td>
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<td>102E, Conv. Center</td>
<td>Nature of Science Understanding and Integrated Lab Models (p. 35)</td>
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<tr>
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<tr>
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<td>6–9/C</td>
<td>211A, Conv. Center</td>
<td>Addressing the Underrepresented in STEM (p. 45)</td>
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<td>The Why, What, and How of STEM Partnerships That Support Students and Teachers (p. 49)</td>
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<td>STEM Integration into Rural Education Cooperative Schools (p. 49)</td>
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<tr>
<td>9:15–10:15 AM</td>
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<td>Let’s Evaluate the Structure of Your STEM Program and Consider Ways to Support Better Partner Interactions (p. 49)</td>
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### Administrators Strand

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<td>101F</td>
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