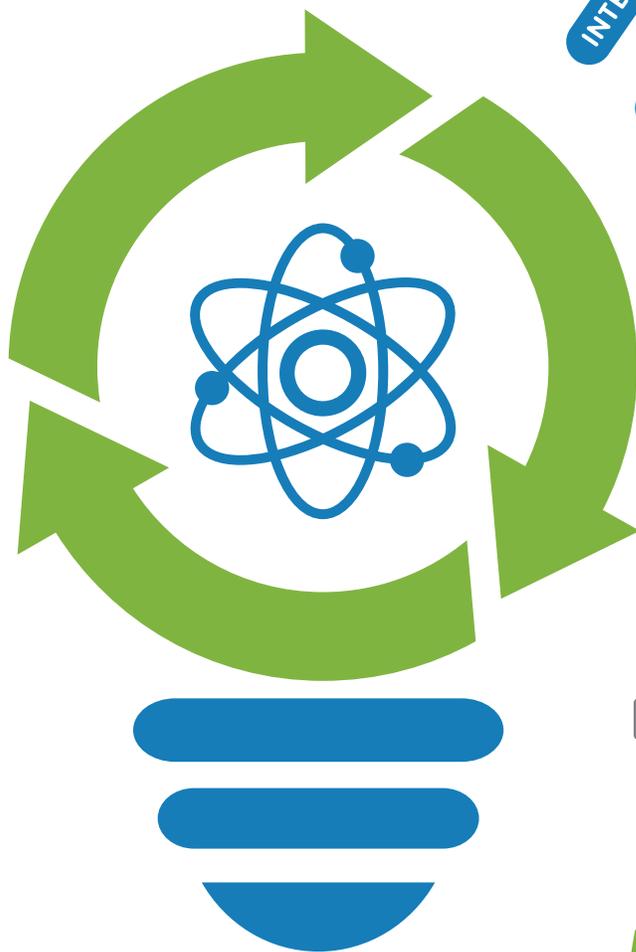


SUSTAINABLE SCIENCE

MAST Conference
Preview

November 1 + 2, 2018



INTEGRATED SCIENCE LEARNING

EQUITY & DIVERSITY IN STEM

NEW TEACHER RESOURCES

INNOVATIVE LEARNING

LITERACY IN SCIENCE

Boxboro Regency Hotel
Boxboro, MA

REGISTER TODAY!
MassScienceTeach.org

Annual MAST Conference Preview

- WHO:** “Massachusetts Association of Science Teachers” (MAST)
Your state chapter of NSTA
- WHAT:** The Annual 2018 MAST Conference
- WHERE:** The Holiday Inn – Boxborough, MA
(242 Adams Place, Boxborough – I495 at Exit 28, free onsite parking)
- WHEN:** Thursday, November 1, 2018 (7am - 3:45pm)
Friday, November 2, 2018 (7am - 3:45pm)
- WHY:** To fulfill our nonprofit mission: To enhance science teaching and empower teachers of science.
- COST:** MAST Conference Registration Fees
Registration fees include a MAST membership (1yr)
- | | |
|---------------------------|-----------------|
| Current Member*
(MAST) | Retired/Student |
| 1 day \$100 | 1 day \$40 |
| 2 day \$150 | 2 day \$60 |

Lunch is included in the registration cost. Registrants will receive a ticket at check-in

Conference Registration Fees (includes admission to all workshop sessions and the exhibit hall, a box lunch and continental breakfast each day, and refreshments/snacks in exhibit hall during breaks). *Conference Registration fees include the MAST membership fee.* Please visit the MAST website to become a member. MAST annual membership dues are \$35.

Overnight Accommodations*: Guest rooms are available at a special MAST Conference rate of \$104 per night for a single or double room, \$114 for a triple, or \$124 for the quad rate. Rates apply based on the number of adults in each room. All room rates are quoted exclusive of applicable state and local taxes, currently 11.7%. The “cut-off date” for accepting reservations at the special rate is October 10, 2015. Reservation requests received after 5:00 pm local time at the Hotel on the cut-off date will be accepted on a space and rate availability basis. Contact the Boxboro Regency – Boxborough to make a reservation by phone at 978-263-8701 or online at www.boxbororegency.com.

EXHIBIT HALL

The commercial and non-profit exhibitors featured in our 13,200 sq. ft Exhibit Hall represent museums, educational product companies, book publishers, local science organizations, and more! Browse the exhibit tables for ideas, discover new products and services, make connections, request additional information, get free samples, and talk with knowledgeable salespeople in a friendly and informative environment. *The Exhibit Hall will be open from 7am to 3:45pm each day, and will be the location of our continental breakfast and refreshment breaks.*



2018 MAST CONFERENCE KEYNOTE SPEAKERS

Hotel Ballroom

THURSDAY, NOVEMBER 1 - 9:15am



JIMMY VOORHIS

National Geographic Young Explorer, Geoscientist, Mountain Guide

From Brockton to the Roof of North America: Challenges & Opportunities in Sustainability

Mr. Voorhis grew up in Brockton, MA. In university and graduate school, he fell in love with geology and mountain climbing. After a few years spent as a mountain guide on Denali, Alaska and in New Hampshire, he began studying the impacts of climate change on winter sports in New Hampshire, blending his passion for understanding Earth processes with his love of climbing. His keynote will describe his trajectory from public school student to scientist studying environmental change, and identify current challenges in land, climate, and resource use that affect Massachusetts communities. He will identify opportunities to shape classroom cultures promoting environmental sustainability.



FRIDAY, NOVEMBER 2 - 9:15am



DR. VINCE ROTELLO

UMASS Amherst, University Distinguished Professor of Chemistry

Multidisciplinary Thinking Outside the Box: Fighting Antibiotic-Resistant Bacteria using Nanomaterials

The emergence of new antibiotic-resistant bacteria is rapidly accelerating, with strains now resistant to all known antibiotics beginning to be observed. These multi-drug-resistant (MDR) bacteria are a rapidly emerging threat to human health, causing thousands of deaths each year in the US alone. In our research we have brought together chemistry, biology and even a bit of physics to create new nanosponges 100-300 nanometers in diameter. These nanosponges are highly effective against bacteria and are not harmful to mammalian cells (including red blood cells), making them promising treatments for both wound and internal infections.

Vincent Rotello is the Charles A. Goessmann Prof. of Chemistry and a Univ. Distinguished Prof. at UMass, Amherst. He received his B.S. in Chemistry in 1985, Illinois Institute of Tech., and his Ph. D. in 1990 in Chemistry, Yale Univ. He was an NSF postdoctoral fellow at MIT from 1990-1993, and joined the faculty at the UMASS in 1993. He was the recipient of the NSF CAREER & Cottrell Scholar awards, Camille Dreyfus Teacher-Scholar, and the Sloan Fellowships. He has received the Langmuir Lectureship (2010), and in 2016 he received the Transformational Research & Excellence in Education Award presented by Research Corp., the Bioorganic Lectureship of the Royal Society of Chemistry (UK), the Australian Nanotechnology Network Traveling Fellowship, and the Chinese Academy of Sciences, President's International Fellowship for Distinguished Researchers. He is a Fellow of both the American Assoc. for the Advancement of Science (AAAS) and of the Royal Society of Chemistry (U.K.). He is also recognized in 2014 & 2015 by Thomson Reuters as one of the "Most Influential Scientific Minds". He is currently the Editor in Chief of Bioconjugate Chemistry, and is on the Editorial Board of 14 other journals. His research program focuses on using synthetic organic chemistry to engineer the interface between the synthetic and biological worlds, and spans the areas of devices, polymers, and nanotechnology/bionanotechnology, with over 540 peer-reviewed papers published to date. He is actively involved in the area of bionanotechnology, and his research includes programs in delivery, imaging, diagnostics and nanotoxicology.

Information contained in this Conference Preview is correct upon posting on our website.

Sessions are subject to change and/or new sessions may be added.

Please check the conference booklet that will be distributed on Conference day.



SESSION 1

Thursday | 8 am to 9 am

- 1 RECYCLABLE STEM: The Race Car Challenge**
 Mia Dubosarski & Donna Taylor | Board Room
 This workshop engages middle school educators in an integrated STEM lesson that focuses on designing a vehicle that wins it all! Using only recyclable boxes and lids, participants will create a vehicle and use it to unpack concepts of energy, friction, and gravity while practicing the process of problem-solving.
- 2 ENERGY GAMES, CHANTS, & PLAYS: Introducing Energy Literacy to Elementary Students!**
 Kimberly Swan & Nancy Gifford | Cotillion
 Learn how to introduce elementary students to basic energy concepts early on! Participants will be able to head back to their classrooms with fun and exciting lessons that teach energy buzz words and provide a hands-on glimpse into how energy works– all disguised through songs, stories, games, and chants.
- 3 SUPPORT LITERACY WITH SCIENCE INTERACTIVE MODELS FROM PBS LEARNINGMEDIA**
 Carolyn Jacobs & Paula Halligan | Deck
 Interactive Lessons engage students in a curricular topic using digital media while supporting literacy strategies. Lessons include video, short readings, writing prompts and assessment. Students practice close reading, learn vocabulary and synthesize data. We'll introduce the lessons and discuss various ways to implement them.
- 4 CLAIM-EVIDENCE-REASONING:
 The Value of Framing Scientific Explanations In Your ESL & Bilingual Classrooms**
 Kristan Buckman | Director
 Explaining observed phenomenon in a scientific way, making observations and analyzing data are connected to understanding science. This instructional strategy is changing how labs are conducted and making science investigations meaningful for students. ELD strategies will be shared and modeled for an equitable learning environment.
- 5 INTEGRATING SCIENCE & LITERACY STANDARDS**
 Nicole Scola & Hillary Paul Metcalf | Seminar
 This session will help teachers and administrators develop their capacity to integrate the science and technology/engineering (STE) and ELA/Literacy standards. Participants will build a shared understanding of the complementary ELA/Literacy and STE standards by grade level and identify opportunities to integrate across content areas.

SHARE-A-THON

- 6A CUSTOMER & TECHNICAL SUPPORT ASSOCIATE**
 Shannon Gracie & David Seymour | Colonial
 Let STEMPilot show you how using Aviation and Simulation as a project based learning tool in the classroom to teach STEM, gives students and teachers a fun and engaging way to learn while virtually eliminating fragmentation between the classes.
- 6b BIOMIMICRY IN THE ELEMENTARY CLASSROOM**
 Heather Starkel & Sarah Quimby | Colonial
 Using Engineering and Biology standards, we've created a unit that integrates science, reading, and writing for third- and fourth-graders. The unit culminates in a "Shark Tank" showcase where students share their biomimetic designs to a panel of local professionals for a big (fake) check to bring their design into production.
- 6c STEAM IN THE CLASSROOM**
 Lisa Whitney | Colonial
 With Yellowstone National Park as the venue, participants will learn how to use both traditional and innovative methods to incorporate Art into STEM lessons. Throughout the workshop, we'll explore new ideas and strategies while networking with other educators on best practices for cross-curricular design.

6d TEACHING SCIENCE WITH LIMITED TIME

Sarah Drinkwater | Colonial

As a third grade teacher, I am asked to focus on reading and writing. This session will share ideas on how I teach science with a limited time block. I am able to incorporate science into the ELA block as a learning center with science readings, responses, and short activities.

6e BIO-INSPIRED INVENTIONS

Christina Nicolson & Yuni Cho | Colonial

Mrs. Nic's STEAMLab will demonstrate how your students and colleagues can design, test, and use new polymer materials that are revolutionizing bio-inspired devices for medicine and industry. DIY projects will include: 1) a soft robotics gripper for prosthetic hand, 2) a light-weight aerogel for airplane fuselages, 3) biodegradable sutures for surgery, and 4) laser activated glue for hole-in-the-heart children. - Mrs. Nic's mentor, Jeffrey M. Karp, and his lab: www.karplab.com.

6f CROSS-DISTRICT SCIENCE MAPPING

Tony DiLuna & Nancy Milligan | Colonial

The CDSM is a collaborative of 100+ educators from 30 districts who have used the UbD framework to create curriculum aligned to the 2016 Massachusetts STE Frameworks. Come learn about our process and explore our units which have embedded open-source materials to allow for universal usage of our work.

6g BANANAS FOR CARBOHYDRATES & CELLS

Dawn A. Tamarkin, Ph.D. | Colonial

Bananas are great biology classroom learning tools! See how to incorporate bananas and banana cells to teach a wide range of lessons about carbohydrates, cells, and plants. All you need are bananas and iodine (and a microscope to view cells if available).



SESSION 2

Thursday | 11 am to 12 pm

Lunch to follow...12pm to 1pm

8 WHAT'S A "CER" & WHY DO I NEED ONE?

Nancy Gifford & Annie Haven | Board Room

Come learn how to create standards-based Claim, Evidence, and Reasoning assignments with your students! See how crafting CERs parallels literacy standards and fosters opportunities for cross-curricular planning. We will share strategies for student success, as well as student-created exemplars and rubrics.

9 INTENTIONAL COLLABORATION: Teacher Moves To Address Equity In The Classroom

Ariel Serkin & Teresa Marx | Cotillion

This workshop will introduce techniques on establishing a learning environment that values and demonstrates the benefits of diversity, confronts bias and bigotry, and expands students' access to STEM education so they can grow, learn, and to be challenged and reach their full potential.

10 STEM IN EARLY CHILDHOOD EDUCATION

Corrine Steever & Rachel Diersen | Deck

Incorporating STEM learning into curriculum early on helps equip young children with the scientific knowledge and opportunities to enhance skills in science practices, such as observation, interpretation, and explanation. Join New England Aquarium staff as we introduce resources available to support early childhood educators. Participate in activities aligned with 2016 MA STE standards.

11 TEACH READING THROUGH THE LENS OF SCIENCE WITH ENGAGING, AUTHENTIC FICTION & NATIONAL GEOGRAPHIC NONFICTION TEXTS.

Amy Strong | Director

Participants will experience the real-world of science through the eyes of National Geographic Explorers, reading and science materials. The presenter will show how to enhance the learning of the practices of science using fiction and non-fiction texts. Leave with some great take-aways!

12 LEARNING BINARY CODE TO UNDERSTAND INFORMATION TRANSFER

Jayne Kerner & Samantha Genier | Seminar

We will explore a unit that teaches how communication systems use waves to transfer information via digital signals, encoding information ranging from a simple text message to an image from the Hubble Space Telescope. Participants will explore hands-on activities that introduce signals, binary, ASCII, and basic properties of waves.

13 THE 5E'S IN 60 MINUTES

Aaron Osowiecki & Jesse Southwick | Federal

The 5E's - Engage, Explore, Explain, Extend, Evaluate - facilitate conceptual development while providing many opportunities for formative assessment during the lesson. Participants will experience the 5E's while investigating the speed of marbles at the bottom of a ramp. Teachers will see the 5E's in action and learn how to bring the 5E's into their own classroom.

14 "CUTTING THE CARBON" ENVIRONMENTAL ENGINEERING

Karen Mayotte | Colonial

Inspire students to combat climate change via the engineering design process. Learn how to incorporate indoor hydroponic farm-to-table systems, with also a focus on outdoor gardening initiatives. Other engineering design challenges include carbon capture systems, purification prototypes for safe drinking water, and go-green designs for structures.

15 THE 100 LANGUAGES OF CHILDREN? Reggio Emilia Approach

Ronit | Boxwood

Fundamental values and principles that focus on an image of a child who is curious, intelligent, and engaging. The purpose is to explore how the Reggio approach can help deepen and extend learning, for learners of all ages. Participants will consider: their image of the child, the learning environment and materials, how they might spark children's interests, the variety of ways children can express their learning (hundred languages of learning) including children with special rights (this term is used by Reggio educators for children we refer to in the U.S. as children with special needs).

16 NATIONAL GEOGRAPHIC'S GEO-INQUIRY PROCESS IN ACTION!

Anastasia Cronin | Fern

Learn how National Geographic's Geo-Inquiry process can further your student's understanding of the world and empower them to generate solutions that to make a difference. In this interactive session, educators will learn new strategies to help students develop the critical thinking skills to ask geographic questions, collect information, use GIS to visualize data, create a compelling story, and ultimately become advocates for change in their community.

17 BEST PRACTICES IN STEM SPACE DESIGN & USE

Jake Foster & Laura Smith | Greenwood

This session presents initial findings of a review of best practices for K-12 STEM learning spaces commissioned by the Massachusetts School Building Authority. The review includes elementary classrooms, science labs, and makerspaces to provide recommendations for the sizing, configuration, outfitting, management, maintenance, and use of STEM learning spaces.

18 DATA LITERACY USING HANDS-ON & VIRTUAL LABS

Dr. Bob Gilmore | Ivy

This interactive session will provide techniques and strategies that you will be able to use to facilitate and assess your students path toward improved science practices and data literacy. You will walk away with lesson plans, assessments, and rubrics that you can use and adapt for your classroom immediately.



SESSION 3

Thursday | 1 pm to 2 pm

19 STRATEGIES FOR TEACHING SCIENCE TO EL STUDENTS

Patty Myers & Roxanne Desmarais | Board Room

This workshop will focus on effective teaching strategies for the English Language Learners in our classrooms. Participants will explore and implement innovative ways of teaching science content and vocabulary. Participants will discover the positive outcomes of hands-on learning, teaching and learning through reflection and the value of discovery/inquiry teaching methods. You will learn more about English Language Learners, their needs and how to choose appropriate materials and hands-on activities for the K-4 classroom.

20 INTEGRATING BIOMIMICRY DESIGN IDEAS INTO YOUR LIFE SCIENCES CURRICULUM

Bryan Colahan & Ann Kaiser | Cotillion

Biomimicry looks at Nature's approach to engineering sustainable solutions to problems. It can be used as the foundation for STEM projects that allow teachers in grades K-8 to incorporate Engineering Design thinking and practices into their curriculum. This workshop will feature interactive modeling of activities and resources to support a PBL approach.

21 THE STORIES OF SCIENCE:

Integrating Literacy & Science To Spark Lifelong Learners, Communicators & Thinkers

Janet MacNeil | Deck

Learn how to integrate literacy and science by teaching students to effectively communicate the stories of science: arguments to support claims (explanation stories), informative/explanatory texts (information stories), and narratives (personal stories). These strategies support Common Core Standards and engage students in authentic ways to read, write and talk about science.

22 WHAT HAPPENS WHEN OBJECTS COLLIDE?

Steven R. Murray | Director

Participants will take part in hands-on activities to investigate the phenomena of colliding objects. The activities from the k-5 FOSS NextGen science curriculum will be focusing on Energy and Energy Transfer and constructing explanations and using evidence to support explanations. Participants will receive associated reading materials.

23 TEACHING WEATHER & CLIMATE WITH DIGITAL MEDIA

Rachel Connolly, Nancy Gifford & Carolyn Jacobs | Seminar

How can we use media to convey key weather and climate concepts and enhance curriculum? In this interactive session, we'll explore strategies for engaging students with media and showcase Instructional Modules, produced by WGBH in collaboration with NASA and available FREE on PBS LearningMedia™.

24 SCREEN-FREE CODING & ROBOTICS FOR PRE-K-2ND GRADE:

A Hands-On Experience with KIBO!

Jason Innes | Federal

Get hands-on with robotics for students ages 4-7! Learn how young students can learn STEAM concepts such as sequencing and coding in a fun and engaging way. In this workshop, you'll learn how you can easily integrate robotics into your classroom to enhance any curriculum or theme with unlimited possibilities.

25 CAUSE AND EFFECT:

An 8th Grade Integrated Curriculum Outline Based On The 2016 MA ST&E Frameworks

Laura Rossier & Michelle Fox | Colonial

After four years of teacher-lead exploration and implementation, we have created five essential cause/effect questions to focus our yearlong curriculum. The units intertwine physical science concepts with astronomy, plate tectonics, growth in organisms, natural selection and weather and climate. We will share our five guiding questions and unit outlines.

Integrated Science Learning laura_rossier@newton.k12.ma.us

26 INVENTION EDUCATION & YOUTH INNOVATION: School Invention Conventions

Nicole Bellabona & Mary Lyon | Boxwood

Young Inventors' Program (YIP) of Northern New England encourages critical thinking, and the basic principles of design thinking that lead youth in the creation of their own invention that is ultimately showcased in a School Invention Convention celebration. STEAM invention education strategies will be shared by a panel of Invention Convention educators.

27 SPARK CREATIVITY & FUEL INNOVATION BY TEACHING STUDENTS TO ASK THEIR OWN STEM QUESTIONS

Kathy Shay | Fern

Learn the Question Formulation Technique (QFT), a simple, powerful step-by-step strategy that teaches students how to collaboratively produce, improve, and strategize on how to use their own questions. Participants will actively experience the QFT and access comprehensive free online resources to help incorporate the QFT into your classroom.

28 UPPER ELEMENTARY SUSTAINABLE SCIENCE

Karen Woods, Annie Bodian, Deanne Ross & Nicholle Peixnho | Greenwood

In this workshop, participants will learn about ways to teach hands-on science lessons that focus on sustainability. Three teachers, from grades 3,4, and 5, will present the innovative ways they are teaching the STE Standards in their classrooms. Lessons will focus on: life-cycle of a frog, erosion, and developing a sustainable community. Participants will walk away with ideas they can implement in their schools that engage students in science and engineering, integrate literacy and math, and encourage social learning, all while promoting an environmental awareness.

29 SEEDS OF STEM: Problem-based STEM Curriculum For Early Childhood

Mia Dubosarsky, Suchira Channoi & Colleen Bostwick | Ivy

The session will introduce early childhood teachers and administrators who work with children ages 4-6 years to a new, developmentally appropriate, STEM curriculum. Participants will be introduced to Problem Panda, to the many problems he encounters during the 8 units of the curriculum, and engage in solving the habitat challenge.



SESSION 4

Thursday | 2:15 pm to 3:15 pm

30 BUILDING ON SCIENCE: A Pathway For Integrating Science & Literacy

Jennifer Craddock | Board Room

Literacy extends the science learning in elementary classrooms. Applies to variety of science domains Elementary
Learn how one district's ELA and STE leadership and teachers developed literacy units that build from the science units to extend student's science learning through reading, writing, speaking, and listening.

31 ESTABLISHING THE SOCIAL EMOTIONAL CLIMATE OF MY DIFFERENTIATED CLASSROOM

Dr. Bob Gilmore | Cotillion

This interactive session will provide techniques and strategies that you will be able to use to establish and maintain the desired social-emotional climate of your differentiated science classroom. You will walk away with lesson plans, assessments, and rubrics that you can use and adapt for your classroom immediately.

32 HONEYBEES-A TOOL TO TEACH SUSTAINABILITY

Mary Duane - EAS Master Beekeeper | Deck

Honeybees are critical to the sustainability of our food supply. Learn about the important role that honeybees play in the production of fruits and vegetables. The presentation will begin with a background on Honeybee Biology and the role of Honeybees and pollination. Resources and Ideas on how to teach Honeybee Biology and Pollination will be presented.

33 ALPHABET SOUP - UDL FOR ELL'S IN STEM CLASSES:

Tips & Tricks for Educators to Increase Access & Equity

Ana Hurley | Director

Having trouble making UBD's that include the WIDA Can-do descriptors, UDL, and SEL for all of your STEM students? Have no fear, a workshop of tips and tricks is here to assist you in your classroom design to improve access and equity to all learners!

34 SUPPORT LITERACY WITH SCIENCE INTERACTIVE MODLES FROM PBS LEARNINGMEDIA

Carolyn Jacobs & Paula Halligan | Seminar

Interactive Lessons engage students in a curricular topic using digital media while supporting literacy strategies. Lessons include video, short readings, writing prompts and assessment. Students practice close reading, learn vocabulary and synthesize data. We'll introduce the lessons and discuss various ways to implement them.

35 BUILDING SYSTEMS FROM SCRATCH

Laura Rossier Carlin, Michelle Fox & Gillian Puttick | Federal

We will focus on systems thinking by creating games about topics in science. It will include an introduction to the unit on climate change, with a focus on systems thinking. Participants will take part in an activity that integrates systems thinking and game design using Scratch. BYOD

36 DESIGNING A MAKERSPACE FOR ALL K-5 STUDENTS

Diane Kablik | Colonial

How can a Makerspace increase student achievement? How does a Makerspace address; diverse learners, increase student and teacher voice, professional development, and more? Learn how Concord Public Schools' journey to designing a Makerspace opened the doors to creating opportunities that foster critical thinking, problem solving, and 21st century skills.

37 SMITHSONIAN SCIENCE FOR THE CLASSROOM TO THE RESCUE

Johanna F. Strange, Ed.D. | Boxwood

Find out how this K-5 science program takes the stress out of teaching Engineering Design while adhering to the MA STE Standards. The problem-solving approach teaches students the skills needed to systemically plan and design solutions to real-world problems such as how to provide freshwater to those in need.

38 TEACHING SPACE SCIENCE WITH DIGITAL MEDIA

Rachel Connolly, Nancy Gifford & Carolyn Jacobs | Fern

How can we use media to convey key space science concepts and enhance curriculum? In this interactive session, we'll explore strategies for engaging students with media and showcase NEW Instructional Modules, produced by WGBH in collaboration with NASA and available FREE on PBS LearningMedia™.

39 SINGING SCIENCE: Teaching Through Chants, Call-Backs, & More!

Dan Adler | Greenwood

Learning science means challenging concepts, and volumes of vocabulary. Language learners in particular can struggle with inscrutable terms like endoplasmic reticulum. Help your students master science through total physical response, a teaching method based on the coordination of language and physical movement. This session will cover how to use chants, gestures, call-backs, and songs to improve mastery!

40 DEMYSTIFYING 3D NGSS & STEM USING THE PHENOMENON OF EARTHQUAKES

Kristan Buckman | Ivy

Creating and using models of waves, seeing patterns through simulations and designing authentic and engaging solutions are in this study of the phenomenon of earthquakes.



SESSION 5

Friday | 8 am to 9 am

41 ENGAGE GIRLS IN STEM & COVER NGSS/STE BY HAVING STUDENTS DEPLOY SENSORS WITH STEMGEM

Larissa Nietner & Eva-Maria Olbers | Board Room

Hands-on learning offers unique opportunities to engage girls in science class. Middle schoolers use tech every day. By empowering students to create sensing technology in a few simple steps, we can turn teens into passionate scientists and inventors. We'll share MA STE and NGSS-compatible lesson plans and research findings.

42 BUILD A SOLAR COOKER THAT ACTUALLY COOKS

Shawn Reeves | Cotillion

Attendees build a panel-type solar cooker for all-seasons, almost as cheap as the common pizza-box warmer, but much more effective. Associate STE with a quotidian activity like cooking for lifelong learning for all. Concepts: Radiation, absorption reflection & transmission, power, energy, temperature, E-M spectrum, insolation. Apply to borrow high-tech instruments.

43 INNOVATIVE CONCEPTUAL ENGINEERING DESIGN (ICED) EPIC CHALLENGE PROGRAM: Sustainable Human Colony On Mars

James Gorman & Christine Cote | Deck

The presenters detail their work with Dr. Charles Camarda, a NASA astronaut, to engage students in design solutions for sustainable human colony on Mars. Key elements explained: "Epic" challenge, ICED methodology, importance of failure, Teamology, mentors, and low cost. They will provide specific example so you can emulate their efforts.

44 PLACE-BASED EDUCATION: Design A Stimulating, Inexpensive, NGSS Supported Field Trip In Your Community Or On Your School Grounds

Tarin Weiss | Director

The local community, as well as your own school grounds, offer a range of natural phenomena that can provide K12 students authentic experiential learning opportunities. In this workshop, learn how to identify key field trip locales that promote NGSS 3-D learning. A framework for designing a field trip along with pre- and post-trip information and assessments will be provided.

45 SCIENCE AND TECHNOLOGY/ENGINEERING MCAS UPDATE

Isadel Eddy, Steve Long & Katie Bowler | Seminar

Science test developers will present information about the new STE tests. Topics will include test designs and reporting categories for the new grades 5 & 8 and high school tests. Constructed responses will also be discussed, with an emphasis on constructing explanations using data.

SHARE-A THON

46a WIND WEIGHTLIFTING CHALLENGE

Kimberly Swan & Nancy Gifford | Colonial

Come try your hand at our Wind Weightlifting Challenge! What will make the biggest difference in electrical output of your wind turbine: blade material, blade shape, gear ratio, pitch, number of blades? A hands-on, critical thinking challenge for your students to work as engineers in a competitive setting!

46b MODEL MY WATERSHED

Audrey Feitor | Colonial

Model My Watershed is a free, web-based application that invites students to explore the condition of their local watershed with a scientifically valid watershed model. The curriculum allows students to analyze data while they explore authentic science experiences in their local watershed, and use real-data simulations to teach Environmental Sustainability.

46c THE NEW STYROFOAM

Gisele Rubino & Kate Anderson | Colonial

Beyond Benign has created a unique curriculum incorporating the principles of Green Chemistry. We will demonstrate how to grow your own packaging alternative to styrofoam using mushroom material. Learn how cutting edge green chemistry technologies are serving as tools to capture the imagination of the next generation of problem solvers.

46d UTILIZING SCAFFOLDS TO HELP STUDENTS FORM TESTABLE QUESTIONS

Laura Rossier & Mike Sao Pedro | Colonial

Learning content while implementing science practices entails high cognitive demand. During the inquiry process students benefit from scaffolded supports while generating testable questions. From a hands-on acceleration lab to Inq-ITS Virtual Labs to in-class remediation, teachers will explore and discuss student results and plan scaffolded activities for their own classrooms.

46e NEW CLIMATE CHANGE EDUCATION RESOURCES

Jane Heinze-Fry & Sandra Ryack-Bell | Colonial

Presenters will share new climate change education resources. Learn to navigate a hyperlinked climate change concept map. Bring a wifi-accessible tool to explore the map on the spot! Receive a Massachusetts weather-climate strand map, an annotated bibliography of climate change education resources, and opportunities for further professional development.

46f STEM FOR SYRIAN REFUGEES

Shirin Haddadin & Ayman Halaseh | Colonial

STEM for Syrian Refugees is a project which builds science classrooms and teaching capacity for Syrian refugee children and teachers in camps and host communities in Jordan by supplying science education supplies, teachers training and conducting fun science activities with children using simple affordable materials that can be found inside the camps.

46g THE ELECTRON GAME

Avon Lewis | Colonial

There are many aspects of successful scientific research that are not commonly explored in secondary education. In this presentation, I will share a simulation style game that introduces students to the ideas of peer review, grant proposals, publication, and drawing conclusions from data when the “true” value is completely unknown.

46h BUILDING AND USING SHAKE LIGHTS TO DEMONSTRATE MAGNETIC INDUCTION

Clayton Handleman | Colonial

Shake lights are simply coils through which magnets are passed in order to generate electricity and light an LED. Working Model shake lights will be displayed and demonstrated. Methods for building and using as demonstrators will be discussed. Teaching and building materials and documentation will be provided.



KEYNOTE: DR. VINCE ROTELLO
9:15 am - Ballroom

**SESSION 6**

Friday | 11 am to 12 pm

Lunch to follow...12pm to 1pm

48 CHANGES IN THE LAND; FIELD SCIENCE & CLASSROOM MAP ACTIVITIES CREATING UNDERSTANDING OF MASSACHUSETTS' CHANGING LANDSCAPE

Pamela Snow & Emilie Cushing | Board Room

How are both natural and human forces shaping the land where we live? Using a combination of field ecology in the schoolyard and land cover change map based activities in the classroom, teacher Emilie Cushing, will share how she is structuring an exploration into student analysis of how the landscape around her school and town is changing over time. Her students are collecting, recording project data and contributing that information to a region-wide network of Schoolyard field sites based at Harvard Forest. Schoolyard Ecology Program Coordinator, Pamela Snow, will share how teachers in grades 6-12 can participate in the "Our Changing Forest" project or similar work in getting students actively involved in Citizen Science projects led by professional Ecologists and supported year round by education and science staff at an internationally recognized ecological research institution.

Workshop participants will participate in a hands-on activity that involves calculating approximately how much carbon is being stored in the forests in several Massachusetts' towns. Teacher Emilie Cushing developed this activity for use in her classroom and will offer workshop participants the chance to be the students during this workshop. Land Cover Change maps used in this workshop are all available as free downloads online.

49 EXPLORING CLIMATE CHANGE

Kimberly Swan & Nancy Gifford | Cotillion

Join this hands-on session to learn activities for students that better equip them to visualize climate as a system, how carbon cycles throughout the Earth's systems, and how CO₂ speeds up the transfer of thermal energy. Ideal for grades 6-8!

50 EPIDEMIC CRISIS & PUBLIC BEHAVIOR: System Dynamics & Modeling As Pedagogical Approaches

Shari Weaver & Oleg Pavlov | Deck

When an epidemic strikes, what can we do to mitigate its impact? Join us as we use computational tools to collect data from an epidemic simulation to model a disease moving through a population. Learn how system dynamics facilitates the integration of science practices enabling students to understand complex systems.

51 BIOFUEL PRODUCTION: An Ecological Tale Of Two Niches!

Tamica Stubbs | Director

With rising greenhouse gases, bio-engineers have learned to apply observations from decomposers towards biofuel solutions. In this workshop, learn to extract enzymes from mushrooms (based on their natural decomposing abilities/niche), optimize their reaction rates and model the genetic engineering of a bacterial plasmid (using genes from mushrooms) for biofuel production.

52 DNA GLOW LAB: A New Way To Investigate DNA Structure

Bruce Bryan | Seminar

Discover a completely new approach to studying DNA in the classroom. Have your students directly investigate how factors like temperature, pH, and genetic sequence affect DNA structure. Go beyond building paper and candy models; use modern biotechnology techniques to introduce a lab component to your DNA unit. And it glows!

53 COMPOSTING AT SCHOOL FOR SUSTAINABILITY & SCIENCE

Ann McGovern | Federal

Compost at school in a classroom worm bin or outdoor compost bin for sustainability and integrated science learning of life science standards. Bring a 14-gallon or larger plastic tote to make your worm bin; worms provided free! Demonstration of easy outdoor compost bins available from DEP's Green Team program. Great tie-in with school gardening and sustainable life skills.

54 THE FULL COURSE: Modeling Antibiotic Resistance

Stephanie Brunnett | Colonial

Why is it important to take an antibiotic as described? Why must you take all the pills and not stop, even if you feel better? In this activity, students model the development of antibiotic resistance in a sample of harmful bacteria. This activity addresses misconceptions about antibiotic resistant bacteria and their evolution in a hands-on way. Key skills developed include making and using graphs and tables, evaluating models, and number concepts.

55 SUSTAINABLE LIVING: A Green Chemistry Final Project

Raksmey Derival | Boxwood

The Sustainable Living Project is the final project in Innovation Academy Charter School chemistry classes. Guided by the 12 principles of green chemistry, students are able to design a safer personal care product that balances safety, cost and performance. Tips on DIY face/body soap scrubs will be shared.

56 LAW OF CONSERVATION OF MASS: How To Teach Science Practice Through Content

Ariel N. Serkin & Teresa Marx | Fern

Participants will conduct a lab experience and then develop several foundational science practices such as measuring and recording experimental data, graphical analysis of class data, and using experimental evidence to develop and support a scientific model. Teachers will leave with curriculum materials they need to implement this lab in their own classrooms.

57 A NEW FRONTIER FOR STEM EDUCATION: Brain Computer Interface For Adaptive Learning

Nishikant Sonwalkar, Sc.D. MIT | Greenwood

The development of brain-computer interface for accelerated adaptive learning is a groundbreaking idea for educational application of EEG headbands. The application of EEG data for accelerated identification of personal learning preference and neuro feedback will significantly improve the quality of the blended and online personalized education in schools.

58 HOW TO TEACH STUDENTS NOT TO PLAGIARIZE

Barbara Ferri | Ivy

We constantly ask students to write in their own words, but do not teach them the skills they need to do this. This workshop will address misconceptions regarding what plagiarism is, as well as run through an exercise using a science current event article to show students how to avoid copying someone's work. The reading comprehension technique of reciprocal teaching will be used in this activity.



SESSION 7

Friday | 1 pm to 2 pm

59 BEECOLOGY: A Bio-CS Bridge To Address Ecological Problems

Liz Ryder, Jen Field, Ron Cochran, Jo vanderSpek, Shari Weaver, Rob Gegear & Carolina Ruiz
Board Room

Bring your laptop and learn how to integrate computer science and biology to address the issue of pollinator decline. Explore how the programming language Starlogo can be used to model natural phenomena. Discover how this methodology can be applied to other scientific concepts and/or problems.

60 SCIENCE PRACTICES ASSESSED

Stacey Militello & Brianna Mondello | Cotillion

When MA adopted new STE standards, the Shrewsbury middle schools took it one step further and adopted a new way of assessing student learning by the science practices. What does that mean in the classroom? To teachers, students, and families?

61 ENVIRONMENTAL DATA MOSAICS: Data Literacy Through Art

Brian Mernoff | Deck

During the Environmental Data Mosaic Workshop held at the MIT Museum, middle school students engaged with real scientific data. Explore how students learned to read, interpret, and share what they have learned about environmental data sets through the creation of a pictorial “data story.”

62 STEM-ULATING ACTIVITIES ON HUMAN ECOLOGY

Rebecca Pierce | Director

Discover innovative ways to teach students about human-environmental interactions, while also building STEM skills through problem solving, mathematical modeling, role-playing simulations and more! Receive lesson plans in an electronic format, all matched to state standards.

63 BLENDED LEARNING: Changing A Students Learning Experience

Kerry Lynch | Seminar

Every teacher wants to feel like they have connected with all their students in their classroom on any given day. Personalized learning is attainable in the science classroom with the use of blended learning techniques. Simply changing the way students are offered curriculum can dramatically change the student experience. After incorporating blended learning techniques into my high school science classes, students felt more in charge of their learning, teacher to student interactions increased, discipline issues decreased and most important students felt like they were getting the help they needed. Strategies to introduce Blended Learning will be discussed.

64 LITERACY IN LAB

Karen Borges | Federal

You can't capture importance of lab if students can't apply the concept to their lives. In this presentation, a variety of reading assignments and their partner labs will be displayed along with the analysis and connections from past students. There will be time for a Q and A and a small demonstration that would go along with a reading.

65 MONITOR STUDENT PROGRESS & UNDERSTANDING IN REAL-TIME WITH GENIVENTURE

Kiley McElroy-Brown, Trudi Lord & Frieda Reichsman | Colonial

Bring laptops/tablets to play Geniventure, Concord Consortium's free, online dragon genetics software where students explore mechanisms of genetics and molecular biology. Compatible with Chromebooks and iPads, Geniventure features an in-game intelligent tutoring system to guide students to success while teachers monitor progress and conceptual understanding with a real-time dashboard.

66 HIGH SCHOOL MCAS BIOLOGY THROUGH THE GARDEN & FOOD SYSTEM

Anna Cotton & Suzie Scordino | Boxwood

Presentation will include an overview of the year, unit plans, projects, labs, classroom activities, homework and assessment to teach high school MCAS Biology through the theme of growing and cooking food. Participants will have time to ask questions, problem solve and develop resources for their own classrooms.

67 HAZARDOUS WEATHER:

Winter Storms - NWS Resources & Lesson Plans For Teaching Weather

Brian Casey | Fern

Hazardous weather, such as thunderstorms, hurricanes, and winter storms can cause property damage, bodily injury or even death. Understanding the causes and forecasting of such events is an important skill in New England. This workshop is one of a series produced by Project ATMOSPHERE, an initiative of the American Meteorological Society. It will introduce educators to AMS/National Weather Service resources for teaching about weather.

68 LINKING TRANSFORMATION AND PCR IN YOUR CLASSROOM

Whitney Hagins, Maggie Keeler & Michelle Mischke | Greenwood

Discover the new, exciting BioTeach Transformation and PCR labs! Participants will explore an easy, fast PCR protocol to test transformed and non-transformed cells for the ampicillin resistance gene. Experimental protocols will be available for free download and instructions for obtaining free and reduced cost reagents will be provided.

**69 TEACHING SCIENCE THROUGH NONFICTION:
Using The Immortal Life Of Henrietta Lacks As A Framework**

Gina Castellanos Ellsworth | Ivy

How do you get the attention of students who are not traditionally interested in science? Tell them a story of complex characters and twisting plot lines. Come listen to how Henrietta's story grabs students' attention and feel free to share your own literacy strategies!



SESSION 8

Friday | 2:15pm to 3:15pm

70 A CLOSER LOOK AT STUDENT MODELS: Invasive Species

Stephanie Brunnett | Board Room

Are your students struggling to interpret diagrams of content they understand? Students are often asked to create and analyze models to demonstrate their understanding but the skills of modeling is often taken for granted in our teaching. How can you teach modeling skills and content at the same time in a meaningful way? This card sort style activity models the introduction of a new species with special attention to the effect on existing predators and producers. Students model the flow of energy and matter in an ecosystem while evaluating their models and examining its limits. Participants will receive a set of materials to try in their classrooms.

71 ENDEAVOR: STEM Career Exploration Resource

Catherine Hasbrouck | Cotillion

This workshop is about about Endeavor-- a no-cost digital program that leads students through interactive STEM content and connects students' interests to in-demand STEM careers. Attendees will create a teacher account, explore the content of the program, plan integration with existing or new units, and learn how to implement the resource.

72 FROM VIDEO TO VR: Teaching Environmental Justice With NOVA

Ralph Bouquet | Deck

Now in its fifth decade of production, NOVA remains committed to producing in-depth science programming. This session will explore NOVA's free resources for educators that address environmental justice topics—ranging from Flint's water crisis to the impact of climate change on coastal communities—using video, interactives, and virtual reality.

73 INTRODUCTION TO THE CIRCULAR ECONOMY

Andy Dennenberg & Kathryn Tiessier du Cros | Director

This workshop is designed to build awareness of the circular economy concept and how to incorporate systems thinking into the classroom. Participants will dissect the components in the manufacture, sale, and disposal of a common consumer item, and will brainstorm interventions to the system that will result in waste reduction.

74 DESIGN AN ALIEN FOR YOUR PLANET

Rick Glatz | Seminar

Use the Create-an-Alien activity to assess 8th grade science.

75 BIOBUILDER: BRINGING ENGINEERING INTO THE BIOLOGY CLASSROOM

Lindsey Lecuyer | Federal

Created by an award winning team from MIT, BioBuilder aims to make biological engineering and the new field of biodesign accessible to high school students. Discover how BioBuilder brings the newest in genetics into your classroom through free curricula, after school clubs, and professional development opportunities.

76 THE GENETICS & BIOETHICS OF OPIOID ADDICTION & TREATMENT!

Tamica Stubbs | Colonial

Recently, opioid dependency & abuse have exploded in the U.S. as have the call for improved treatments thereof. In this session, explore how molecular genetics is capitalizing on gene variants to predict addiction risks for opioid abusers and how to use Hardy-Weinberg and Chi Square analysis to understand its significance.

77 INQUIRY WITH WEB GIS STORYTELLING

Ann Witzig | Boxwood

Engage student inquiry projects with Web GIS Storytelling. Use the story within digital Geographic Information System maps to create a stronger narrative based on student-collected data. In this presentation, beginners are introduced to Web GIS mapping and the Story Maps application to analyze student data on community environmental issues.

78 POGILS AND CASE STUDIES: The New “Lecture”

Amanda Pedersen & Jessica Pilla | Fern

With the new standards emphasizing the Science Practices, lectures need to be replaced with more student-centered learning. This workshop will focus on incorporating POGILs and Case Studies in the classroom as an alternative to teacher-driven lecture. The workshop will focus on how to deliver content with student-centered activities.

79 CONNECTING GENOTYPE TO PHENOTYPE USING PCR IN RAPID CYCLING BRASSICA RAPA

Bruce Bryan | Greenwood

Use modern molecular techniques to investigate Mendelian inheritance in the common classroom plant, Rapid Cycling Brassica rapa. Observe a phenotype, the presence or absence of the purple pigment anthocyanin, and connect that phenotype to an underlying genetic cause. Expand your classical genetics to include molecular techniques.

80 SEEDS OF STEM: Problem-based STEM Curriculum For Early Childhood

Mia Dubosarsky, Suchira Channoi & Colleen Bostwick | Ivy

The session will introduce early childhood teachers and administrators who work with children ages 4-6 years to a new, developmentally appropriate, STEM curriculum. Participants will be introduced to Problem Panda, to the many problems he encounters during the 8 units of the curriculum, and engage in solving the habitat challenge.