



The Science Educator

VDOE Endorses VAST



Start Your VAST PDI on Thursday with the PreCon

☐ Talk to your Principal,
share this newsletter, ask
your Principal to come
to the PreCon with you.

☐ Register for the PDI

☐ Get a Sub

☐ Make Sub-plans

☐ Get a hotel room,
Arrive Wed. Night
Nov. 15 or Thursday
morning Nov. 16 and
depart Saturday Nov.
18; Better yet Sunday
Nov. 19 (sight-see
Williamsburg!)

☐ Choose which session to
attend

☐ Set-up for Concurrent
Sessions

☐ Collect items for Science
Supply Auction

☐ Plan for Next Year!!



COMMONWEALTH of VIRGINIA

DEPARTMENT OF EDUCATION

PO BOX 2120

RICHMOND, VIRGINIA 23218-2120

TO: Science Educators

FROM: Eric M. Rhoades, Director
Office of Science and Health Education

Anne Petersen, Science Specialist Office of Science and Health Education

Jim Firebaugh, Science and Mathematics Specialist Office of Science and
Health Education

Tina Mazzacane, Mathematics and Science Specialist
Office of Science and Health Education

2016 Virginia Association of Science Teachers Professional Development Institute

The Virginia Association of Science Teachers (VAST) and the Virginia Department of Education are pleased to announce the 2016 VAST Professional Development Institute (PDI) to be held November 17-19, 2016, at the Double Tree by Hilton, Williamsburg, Virginia. The VAST PDI is a forum for science educators and administrators to network with fellow science teachers, gain new instructional strategies and lesson ideas, enhance their science content knowledge, and experience cutting-edge technology. This year's VAST PDI will offer over 200 concurrent sessions intended to support the Virginia Science Standards of Learning. In addition, presentations will be conducted by nationally known keynote speakers. The VAST PDI preconference is designed to provide educators and administrators the opportunity to participate in a one-day cross-curricular session titled Science and Literature: A Creative Interface for All Students.

VAST, a professional association with over 2000 members, advocates for high-quality science instruction for all students. The VAST PDI is designed to provide sessions for educators and administrators in all science content areas and at all grade levels. The PDI also provides an avenue for communication among all members of the science teaching community.

We encourage science educators and administrators to take the opportunity to include VAST PDI as part of their professional development plan. The VAST PDI provides educators an engaging opportunity to earn relicensure points or college credit.

For more information regarding the Virginia Association of Science Teachers or the annual PDI, please visit www.vast.org or contact Susan Booth, Executive Director at susan.science@gmail.com.

From the Executive Director

Find Your Passion:



We are asking you to reach out to other science teachers to help make VAST stronger. We are a community of successful educators and we need to continue to grow.

Look at what we have to offer:

- Social Media-Facebook, Twitter, Instagram, etc.
- Website announcing upcoming events and news
- Many online resources
- Join a committee
- Network in your field
- Get involved past the membership level.



We want you to be involved and let your creative juices flow.
We want to have rich experiences for all members.

So, help others to get involved by spreading the word to join VAST.
Remember why you joined or who extended that hand to get you to join...return the favor.

You are the added value to the lives of all VAST members so get more involved personally or professionally. Be positive and share your knowledge!

THANKS for being a member of VAST!

Susan Booth, EdS
Executive Director



2016 Annual PDI: The Faces of Science in Virginia

DoubleTree by Hilton, 50 Kings Mill Road, Williamsburg, VA
Don't wait! Make your reservation online or a phone call.
Save on registration by acting before **October 18** for Early Bird Registration. See page 12 for more information.

Menu

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President's Corner

HAPPY SUMMER!



Welcome to the Summer issue of
The Science Educator!

VAST has been involved with many happenings in the state of Virginia that affect you as teachers and is also hard at work preparing for the 2017 VAST PDI in Williamsburg, VA. Below are some of the highlights of VAST efforts on your behalf:

House Bill 516

In April, VAST was approached by the National Council of Teachers of English (NCTE) to join them to request that Governor McAuliffe to veto House Bill 516 that would require schools to identify materials that were “sexually explicit” and notify parents. VAST did and sent a letter in support of the veto of House Bill 516 which was defeated. Please see page 5 for a copy of the governor’s letter vetoing the bill and the thank you note to VAST for their support from NCTE President Lu Ann Maciulla McNab.

Profile of a Graduate

In May, VAST sent a request to the Virginia Board of Education to participate in discussions on the ***Profile of a Graduate***, “which will identify what skills students need in high school and then change statewide graduation requirements to meet the expectations laid out in the profile. In late May, VAST was called into fast action by an invitation from Dr. Staples, VBOE, to attend a round table discussion on ***Profile of a Graduate***. Julia Cothron represented VAST and was asked to submit a list of two or three concerns regarding the Profile of a Graduate that were considered high priority. Following this, VAST was invited to make public comment at the four public hearings across the state of Virginia on the following issues: VAST Advocacy Committee members Juanita Jo Matkins and Paula Leach did a Herculean task to develop responses to these issues in less than a week. Please see p. 33-34 for the statements to be read for public comment. Eight VAST Board members accepted the invitation to read the statements at the four public hearings (see pages 33-35).

VAST Retreat on Partnerships



On July 6th, 20 people from industry, government, museums, nonprofits, and education organizations attended the VAST Partnership Retreat held at Lewis Ginter Botanical Garden in Richmond. Facilitators were Chuck English, Director of Playful Inquiry, and Science Museum of Virginia; Myra Thayer, VSELA President and Nikki Hastings, VP Operations, Hemoshear. Participants explored VAST role in partnerships, the purpose of partnerships, and the expected outcomes and how these findings could be improve VAST as an organization. The synergy among the different groups allowed for active discussion and a revitalized and renewed approach to VAST Strategic Goal for Partnerships that was expanded and will serve as an invaluable tool for VAST as it moves forward with partnership development with other organizations. A key discussion point of the day was the value of networking as a tool for partnership. Nikki Hastings provided networking tips and VirginiaBio hosted a networking session that followed the day’s work.

Continued...

Tips for networking like a boss: When you attend the VAST PDI, be sure to consider using these tips as you expand your network.

Go to an event.

Go solo forge and a new relationship.

Bring a business card.

Know a three second elevator pitch.

Do not worry about yourself. Put the focus on your purpose.

Remember that people love people who listen.

Follow up with people after the event.

VAST PDI

In light of stabilizing partnerships, VRUE and will conduct its annual conference in conjunction with VAST November 16 and 17. We welcome their participation. This issue is packed with information regarding the VAST PDI November 17 to 19 in Williamsburg. Be sure to check out the Donna Sterling Institute preconference (see p. 9-10) on Science and Literacy, the concurrent sessions (see p.) and much more. Be sure to register by **October 18, 2016**. Early Bird Registration. Or by **October 28, 2016**. Standard Registration.

Enjoy the remainder of your summer and see you at the VAST PDI.

Best regards,

Kathy

House Bill 526 is vetoed!

VAST joined NCTE and other organizations across the state of Virginia to request that Governor McAuliffe veto Bill 526. The governor did veto the bill. Please see the his letter on the next page.

VAST Members:

Your Input is needed. Please Send in Your Ballot by November 2, 2016



Ballot

Proposed Additions to VAST's Operating Procedures:

At the May 21, 2016 meeting, the VAST Board approved the following:

Article VII, Section 1, B

“Any member of the Executive Committee may negotiate a contract(s) that is(are) within the VAST budget and bring the proposed contract(s) to the Executive Committee for approval by a simple majority. Thereby, authorizing the Executive Director and/or Treasurer, as signatories of VAST's funds to sign the contract(s).”

_____ Approve _____ Do Not Approve

Deadline for receipt of ballots is November 2, 2016.

Return your completed ballot to: Celeste Paynter, email: vice.president@vast.org

or mail to: Celeste Paynter,

200 Daniels Rd., Keysville, VA, 23947

Kathy Frame, VAST President

House Bill 526 Vetoed by Governor McAuliffe

VAST joined NCTE and other organizations across the state of Virginia to request that Governor McAuliffe veto Bill 526. The governor did veto the bill.



COMMONWEALTH of VIRGINIA

Office of the Governor

Terence R. McAuliffe
Governor

April 4, 2016

Pursuant to Article V, Section 6, of the Constitution of Virginia, I veto House Bill 516, which would require schools to identify materials as "sexually explicit" and notify parents if teachers plan to provide instructional material containing such content. The legislation would also require teachers to provide alternative instructional materials if requested by a parent.

Open communication between parents and teachers is important, and school systems have an obligation to provide age-appropriate material for students. However, this legislation lacks flexibility and would require the label of "sexually explicit" to apply to an artistic work based on a single scene, without further context. Numerous educators, librarians, students, and others involved in the teaching process have expressed their concerns about the real-life consequences of this legislation's requirements.

We have long entrusted curriculum management to our local school boards. School boards are best positioned to ensure that our students are exposed to those appropriate literary and artistic works that will expand students' horizons and enrich their learning experiences. School boards are also most knowledgeable about those materials that will best position our students to succeed in Advanced Placement and other college preparatory programs.

The Virginia Board of Education has been examining this issue recently and has been engaged in lengthy and substantive conversations with school boards, teachers, parents, and students about existing local policies and potential state policies to address these concerns.

Because the Board of Education is already considering this issue in a broader and more complete context, I believe House Bill 516 is unnecessary.

Accordingly, I veto this bill.

Sincerely,

A handwritten signature in black ink, appearing to read "Terence R. McAuliffe".

Terence R. McAuliffe

Thank You Email for VAST,

Thank you extended to VAST for its support in helping defeat House Bill 516 from NCTE President Lu Ann Maciulla McNabb:

"Kathy - Please let your association know they made a difference!"

Lu Ann Maciulla McNabb
National Council of Teachers of English

Why Come to the VAST 2016 Professional Development Institute ?



The Virginia Association of Science Teachers (VAST)

VAST is a professional organization of and for science educators. For more than 64 years, VAST has held its annual Professional Development Institute in key regions of the state. This event provides high-quality professional development to Virginia's science educators.

PDI Strands:

- ***Environment***
- ***Community***
- ***Industry***
- ***Science***

Join VAST in Williamsburg, VA for three days of professional and personal growth through:

- ***Networking!***
- ***Renown speakers!***
- ***Presentations with fresh ideas***
- ***Exhibits***

Who Should Attend?

Classroom science teachers (Pre-K-12), science specialists, science coaches, department chairs, principals, school division science leaders, home school educators, pre-service science teachers, college/university science teacher educators, and informal science educators.

Conference Location

The 2016 VAST PDI will be held at the DoubleTree by Hilton, Williamsburg. For more information, visit <http://www.vast.org/hotelinfo.html>.

What is Included With Your Conference Registration?

Full conference registration includes:

- Access to short courses (Thursday only) with \$5 registration fee per course.
- Admittance with your badge to the exhibit hall each day with a special event on Thursday night.
- Five general sessions, auction and dance on Friday night.
- All concurrent sessions and commercial workshop sessions (Friday, and Saturday).

Special Conference Registration

- Thursday/Saturday only registration includes admittance to the events listed above that take place on those days.
- Saturday only registration includes admittance to events listed on Saturday.

Ticketed Events

For an additional fee, registrants can purchase tickets for the Pre-Conference sessions, short courses, field trips, onsite lunches, and the annual RISE Awards

2016 Virginia Association of Science Teachers Professional Development Institute



General Session Speakers

November 18, 2016, Thursday, 5:30 to 6:45 PM General Session I Keynote

Ellen Stofan

NASA Chief Scientist

Dr. Ellen Stofan was appointed NASA chief scientist on August 25, 2013, serving as principal advisor to NASA Administrator Charles Bolden on the agency's science programs and science-related strategic planning and investments. Prior to her appointment, Stofan was vice president of Proxemy Research in Laytonsville, Md., and honorary professor in the department of Earth sciences at University College London in England. Her research has focused on the geology of Venus, Mars, Saturn's moon Titan, and Earth. Stofan is an associate member of the Cassini Mission to Saturn Radar Team and a co-investigator on the Mars Express Mission's MARSIS sounder. She also was principal investigator on the Titan Mare Explorer, a proposed mission to send a floating lander to a sea on Titan. Her appointment as chief scientist marks a return to NASA for Dr. Stofan. From 1991 through 2000, she held a number of senior scientist positions at NASA's Jet Propulsion Laboratory in Pasadena, Calif., including chief scientist for NASA's New Millennium Program, deputy project scientist for the Magellan Mission to Venus, and experiment scientist for SIR-C, an instrument that provided radar images of Earth on two shuttle flights in 1994. Stofan holds master and doctorate degrees in geological sciences from Brown University in Providence, R.I., and a bachelor's degree from the College of William and Mary in Williamsburg, Va. She has received many awards and honors, including the Presidential Early Career Award for Scientists and Engineers. Stofan has authored and published numerous professional papers, books and book chapters, and has chaired committees including the National Research Council Inner Planets Panel for the recent Planetary Science Decadal Survey and the Venus Exploration Analysis Group.



November 19, 2016, Friday, 11:30 AM to 12:15 PM General Session II

Tamra L. Willis, Ph.D.

Associate Professor, College of Education, Mary Baldwin College



With a focus on "outdoor learning," Dr. Willis teaches a variety of courses for both pre-service and in-service teachers. In addition, she directs the Master of Education in Environment-Based Learning (EBL), a program designed for K-12 teachers and outdoor educators who use the natural environment to teach all subjects. Dr. Willis has obtained a number of grants involving partnerships between MBC, school divisions, natural resource agencies, and industries. The projects provide professional development for teachers and support their efforts to implement environment-based education programs with their students. A former elementary teacher, Dr. Willis strives to improve the system in ways that make learning more relevant and engaging for both K-12 students and educators. The EBL program is all about real-world connections to learning, so that students get a chance to explore the world around them, investigate the natural order of things, and discover for themselves how

others perceive the world. Students are able to study every subject as they research, investigate, and debate issues, draw their own conclusions about challenges facing the world and develop and act upon possible solutions. One primary goal is to eliminate the question, "Why do we have to learn this?" Dr. Willis earned her BS in elementary education from Appalachian State University; MS in middle grades education from James Madison University; and PhD in environmental science education and leadership from the University of Tennessee, Knoxville. She holds a Virginia teaching license in Early Education K-4 and Middle Grades 4-8.

Continued....

Dr. Willis is active in a number of state, regional, and national organizations related to children and nature. In 2013, she received the Virginia Environmental Education (EE) award called "The Otter" for her work promoting EE with teachers and building the capacity of EE in the Commonwealth.

November 19, 2016, Friday, 7:30 to 8:30 AM Awards Ceremony

Carolyn Hayes, Ed.D.

Past President NSTA



Dr. Carolyn Hayes is the Retiring President of the National Science Teachers Association (NSTA). She began serving her one-year term on June 1, 2016. Dr. Hayes is a retired high school biology teacher from Greenwood, Indiana. She brings years of leadership and teaching experience to NSTA through her work as a classroom teacher, college professor, science coordinator, author, and science consultant. In addition to having taught high school science for nearly 30 years in Indiana, she worked in various positions at several universities since 1976. An NSTA member since 1987, Dr. Hayes has contributed extensively to the association. She served as a district director, chaired the 2012 national conference in Indianapolis, worked on numerous committees, has written articles for *The Science Teacher*, and has presented several sessions at NSTA national and area conferences. Dr. Hayes has received many awards including the Presidential Award for Excellence in Science Teaching, Secondary Science, HASTI's

(Indiana) Distinguished Service Award, NABT Outstanding Biology Teacher Award - Indiana, the Radio Shack National Teacher Award and the STEM Conference Excellence in Science Education Award. She holds a B.S. degree in biology from Indiana University, a M.S. degree in secondary education from Indiana University, and an Ed.D. in curriculum and instruction and biology from Indiana University.

November 20, 2016, Saturday, 9:00 to 10:00 AM General Session III Speaker

Trevor Frost

National Geographic Explorer

Trevor Frost is a National Geographic Explorer who resides in Richmond, Virginia and has always been drawn to rivers. In his free time, you can find him kayaking the rapids of the James River. He suggests that you could help save rivers by spending as much time as you can on a river that is part of your life. For every second you spend on that river you will fall more in love, and your desire to protect it will grow.



November 20, 2016, Saturday, 2:15 to 3:30 PM General Session IV

Dianna Cowern

Physics Girl



Dianna Cowern is a science communicator and educator. She is the primary content creator for her YouTube channel, Physics Girl with PBS Digital Studios. Dianna received her BS in physics from MIT before researching low-metallicity stars at the Harvard Center for Astrophysics. She then pursued her career in STEM outreach as an educator at the Reuben H Fleet Science Center and as a physics outreach coordinator at UCSD. With over 335k subscribers and 20M views, her work on Physics Girl has been featured on the Huffington Post, Slate Magazine, and Popular Science.



PDI PreCon

PreCon Events:

Donna R. Sterling Institute
Science & Literature:
A Creative Interface for All Students

VAST PDI • Williamsburg



Check the web for news, conference updates, registration, and forms.

VAST continues to honor science education pioneer Dr. Donna R. Sterling's legacy of "challenging the status quo" with a day focused on teaching practices to develop the generation of future scientifically literate citizens and scientists!

Plan to attend, preferably with your team of three teachers and an administrator. Registration for the preconference may be added to your PDI registration and special charges are available for just the preconference or for your team of three teachers and an administrator.

The preconference registration includes **1 free book, lunch, and access to short courses** as well as the **speaker Thursday night Ellen Stofan, Chief NASA Scientist!**

PreCon Session 1: Two concurrent sessions - 8:30 a.m. - 3:00 p.m.

Session 1: 8:30 a.m. - 3:00 p.m.

Elementary

Engage Students, Create Opportunities, and Design Lessons with Children's Trade Books for Science Learning

Presenter: Christine Royce



Description:

Participants will engage in model lessons that utilize children's trade books - both fiction and nonfiction - to teach science and enhance reading, writing and speaking skills, including supporting research for integration; and participants will be actively engaged in lessons that cover the life, physical and earth/space sciences as well as hitting on crosscutting concepts and practices. A list of all suggested books, references and materials are included in the workshop.

Christine Anne Royce has investigated and used children's literature in the classroom for more than fifteen years and understands the importance of integrating subjects at the elementary level to maximize instruction, learning and time. Royce, the co-author of *Teaching Science Through Trade Books* as well as the co-author for the column *Teaching Through Trade Books* which appears in NSTA's elementary journal *Science and Children* will select some of her favorite and some of the more popular topics that have been included in each.

Session 1: 8:30 a.m. - 3:00 p.m.

Secondary

Engaging Your Student Experts: Practical Strategies to Support Reading, Writing and Vocabulary Learning in the Secondary Science Classroom

Presenter: Stephanie Blackburn



Description:

In this highly interactive session, you will learn 12-15 learning strategies that engage and support reading, writing, and vocabulary development across the science curriculum, and can be implemented immediately with your students!

Stephanie Blackburn has over 20 years' experience as a literacy specialist. She has served as a middle-school and secondary classroom teacher, instructional coach, Title I literacy specialist, Title I lead teacher, and district level consultant. Currently, Stephanie is a Literacy Specialist in Chesterfield County Public Schools. In addition to her position serving children during the day, she is adjunct faculty for both William & Mary and VCU teaching literacy learning courses for PreK-12 preservice and in-service teachers, ELL teachers, and Literacy Specialists.

Session 2 next page.

PreCon Session 2: 3:15 p.m. - 5:15 p.m. • Three Concurrent Short Courses

Short Course 1:

Inquiry for All: Stop Teaching to the Test and Start Teaching Students!

There has been quite a bit of attention given to inquiry learning in science classes, but in practice, it often is only found in advanced or honors level classes. The reasons for this include concerns about classroom management, student motivation, and the pressures of state testing. In reality, it is the struggling students, and those with learning disabilities, those who have not traditionally been successful or motivated in science classes, who most need a non-traditional approach to learning science. At risk students can thrive and learn with access to a student centered, intellectually challenging, and interactive learning environment. The same concerns that may lead some teachers to avoid these methods are often solved when students are excited and engaged. **Suitable for K-12 teachers.**

*Come for the PreCon, Thursday,
and be there for General Session I.*

Short Course 2:

Let's Talk Science

Are you using discourse / talk strategies effectively? Explore, share, and communicate science thinking using practiced steps. This interactive session will model a discourse / talk session using non-fiction literature. **Suitable for K-5 teachers.**

Short Course 3:

Faces of Environmental EDUCATION from the Past to the Present

The classroom and local community are ideal places for helping students understand their connection to the environment. Participants will gain an understanding of environmental education from the past and how it relates to environmental literacy in 2016. Current environmental challenges and opportunities for teachers and schools in VA will be discussed and resources provided to help teachers develop environmentally literate students ready to face the challenges of the 21st century. **Suitable for 6-12 teachers**

Session 3: Keynote Session and Opening of the 2016 VAST Professional Development Institute

5:30 p.m. - 6:45 p.m. Speaker: Dr. Ellen Stofan, NASA Chief Scientist

Thursday November 17, 2016 Pre-Conference: Science & Literature: A Creative Interface for All Students Donna R. Sterling Institute 8:30 am to 5:00 pm

Thursday, November 17, Preconference Registration Fees

\$100 With paid registration to the VAST PDI

\$120 Preconference Only (Thursday)

\$350 Team Registration (3 Teachers + 1 Administrator) - Thursday only

Thursday short Course Fee

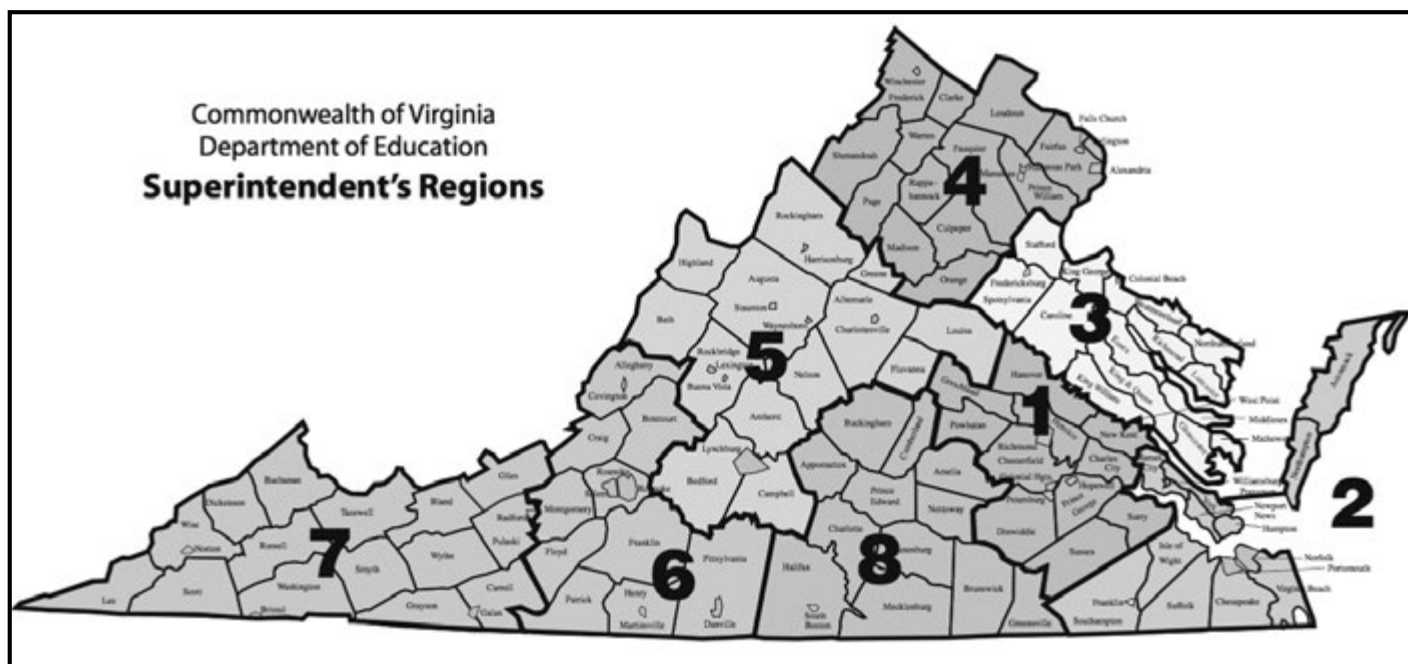
\$5 per Course

Preconference Registration Price includes book, lunch, and access to short courses as well as Thursday night speaker!

VAST Regions: Do You Know Your Region?

Why? When you fill out your membership and when you register for the PDI, you are asked for your region. At the PDI you will have an opportunity to meet with others in your area as well as your Regional Director. Your regional director may communicate with you about professional development and other opportunities close to where you live and work.

After the first General Session on Thursday at the PDI from 6:45 p.m.-8:30 p.m. don't miss the **Night with the Exhibitors** (*Cash Bar*) and **Meet Your Regional Director** (*Complimentary Cider and Snacks*)



Associated Microscope Inc is on Virginia State Contract for sales of the following brand of microscopes:

Swift, National, Leica, Accu-Scope & Unitron

Associated Microscope Inc. provides On Site Service & Repair of microscopes, balances & spectrophotometers



2016 VAST PDI REGISTRATION

Professional Development Institute

Optional Thursday Short Courses \$5/Course with Paid

Registration Online at www.vast.org

Payment Methods

Secure credit card, check payable to VAST, or purchase order.

Important dates

August 1 to September 5, 2016. Presenter (Member, Nonmember, Commercial) PDI Registration.

April 8 to October 18, 2016. Early Bird Registration.

October 19 to October 28, 2016. Standard Registration.

Fee Structure

VAST Membership \$25

Thursday Preconference Registration Fees

(Includes Two Afternoon Short Courses and Choice of Either Elementary or Secondary Morning Session, Book, and Lunch) or Secondary)

\$100 With paid registration to the VAST PDI

\$120 Preconference Only (Thursday)

\$350 Team Registration (3 Teachers + 1 Administrator
-Thursday only)

Thursday, November 17, 2016, PreCon

8:00 a.m.-8:30 a.m. Registration Desk for
Pre-Conference/Short Courses
(Preconference Registration Fee Includes Lun

Registration:

Presenter (Member, Nonmember, Commercial)
Registration. Deadline: September 5, 2016

Member Presenter Registration: \$155

Nonmember Presenter Registration: \$200

Commercial Presenter Registration: \$150/hour

Early-bird Registration. Deadline:

October 18, 2016

Member Registration (this includes Life Members and Retired Members): \$170

Nonmember Registration \$220

Student Registration: \$99

Spouse/Guest Registration: \$98

Standard-Registration. Deadline:

October 28, 2016

Member Registration: \$205

Nonmember Registration: \$250

Student Registration: \$130

Spouse/Guest: \$98

Saturday Only: \$100

2016 VAST PDI Hotel Information

DoubleTree by Hilton: Williamsburg
50 Kings Mill Road
Williamsburg, VA 23185

Room rate: \$89.00 for single and double occupancy.
Taxes: 11% sales tax and \$2 per night lodging tax. The
above rates do not include any applicable state or
municipal taxes, fees or assessments.

Parking: Complimentary self-parking. Valet: Not available.

Check in: 4:00 PM

Check out: 11:00 AM



High-Speed Internet

Reserve your room NOW click the link below:

<http://doubletree.hilton.com/en/dt/groups/personalized/W/WBGKRDT-SCE-20161112/index.jhtml>

Or call 1. 800.222-.TREE (8733)

Schedule-at-a-Glance



Wednesday November 16, 2016

5:30 p.m.-8:30 p.m. VAST Board Meeting & Dinner

Thursday, November 17, 2016, PreCon

8:00 a.m.-8:30 a.m. Registration Desk for Pre-Conference/Short Courses Open
(Lunch included in Preconference Registration Fee)

8:30 a.m.-5:15 p.m. Donna R. Sterling Institute
Science & Literature: A Creative Interface for All Students

8:30 a.m.-3:00 p.m. Session 1: Elementary: Engage Students, Create Opportunities, and Design Lessons with Children's Trade Books for Science Learning

8:30 a.m.-3:00 p.m. Session 1: Secondary: Engaging Your Student Experts: Practical Strategies to Support Reading, Writing and Vocabulary Learning in the Secondary Science Classroom

3:00 p.m.-7:30 p.m. Registration Desk Open for Short Courses/Conference Registration

3:15 p.m.-5:15 p.m. Session 2: Short Courses 1, 2, 3 ***Pre-Registration and tickets required.

5:30 p.m.-6:45 p.m. VAST Professional Development Institute Opening
General Session I, Keynote Speaker: Ellen Stofan, Chief Scientist NASA

6:45 p.m.-8:30 p.m. Night with the Exhibitors (Cash Bar)
Meet Your Regional Director (Complimentary Cider and Snacks)

Friday, November 18, 2016

7:00 a.m. Continental Breakfast

7:30 a.m.-6:00 p.m. Registration Desk Open

8:00 a.m.-9:00 a.m. Concurrent Session 1

9:00 a.m.-6:00 pm Exhibit Hall Open. Pick up Raffle ticket for Friday's Exhibitor Raffle

9:15 a.m.-10:15 a.m. Concurrent Session 2

10:30 a.m.-12:15 p.m. General Session II- Business Meeting: Presentation of the 2017 VAST
Candidates for Office and Vote by Ballot

General Session II- Speaker: Tamra Willis, Environmental Based Learning,
Mary Baldwin University

12:30 p.m.-2:00 p.m. Ticketed Lunch

1:45 p.m.-2:45 p.m. Concurrent Session 3

2:45 p.m.-3:15 p.m. Exhibit Hall Raffle

3:15 p.m.-4:15 p.m. Concurrent Session 4

4:30 p.m.-5:30 p.m. Concurrent Session 5

6:15 p.m.-7:15 p.m. Ticketed Dinner

7:30 p.m.-8:30 p.m. Awards Ceremony. Guest Speaker: Carolyn Hayes, NSTA President

8:45 p.m.-10:30 p.m. Auction and DJ (Cash Bar)

Saturday November 19, 2016

7:00 a.m. Continental Breakfast

7:30 a.m.-10:00 a.m. Registration Desk Open

8:00 a.m.-10:00 a.m. General Session III - VAST Membership Meeting: Meet Your New Officers

General Session III - Speaker: Trevor Frost, National Geographic Explorer.

8:30 a.m.-12:00 p.m. Exhibits

10:05 a.m.-11:05 a.m. Concurrent Session 6

11:20 a.m.-12:10 p.m. Concurrent Session 7

12:15 p.m.-1:00 p.m. Ticketed Lunch

1:00 p.m.-2:00 p.m. Concurrent Session 8

2:15 p.m.-3:30 p.m. General Session IV - Speaker: Physics Girl: Dianna Cowern



Friday Night Event @ VAST PDI



2016 PDI
November 18, 2016
8:45 pm - 10:30 pm



DJ Music
AUCTION FUN
SCIENCE AUCTION

How about an Auction? There is seldom a better floor show for a group of science teachers than to see them bidding against each other for that one thing they could really use. The best part is that to participate, it will cost you exactly nothing. That's right – **NOTHING!** Besides, real money isn't good at the auction!

Do you have a box of glassware sitting in the back of your stockroom that has only a future of collecting dust? Maybe you have an old telescope that you would love to use, if only you could find a replacement part? Wouldn't it be great to be able to trade these and other surplus bits with your fellow teachers of science, and have a good time doing it?

VAST BUCKS

Everybody can visit the exhibitors to receive VAST Bucks! Now mind you, it is not real money! They are VAST Bucks, good only at the auction to be held Friday night, November 20th. When else have you had the chance to burn through hundreds and thousands of other people's money?

HOW TO EARN MORE VAST BUCKS

All that you have to do to "earn" VAST Bucks is to:

Visit the exhibitors during the open hours of the Exhibit Hall up through Friday evening. You may need to remind them to give you some VAST Bucks!!

A FEW RULES TO FOLLOW

- First, and foremost is safety – if the item is not safe to use, then consider disposing of this item another way. Please don't donate such items. On the other hand, if an item is broken and could be repaired or is useful for parts, tag it as such.
- Second, don't bring chemicals to the auction. There are just too many safety and storage issues, and besides, passing off a problem to someone else just isn't nice!
- Third, you need to make sure that if you are "buying" something, you intend to use it in the teaching of science and not selling it at your next yard sale.
- And Fourth, is permission, make sure that any item you donate is yours to donate OR that you have permission to donate the item for our auction. Finally, you need to make sure that anything you buy you can carry away. We don't deliver and we don't store, so if you bought it, you're taking it that evening!

VAST Professional Development Institute (PDI) 2016

DRAFT Concurrent Sessions

November 18-19, 2016 (Friday and Saturday)

STEM Activities for Early Childhood Preschool - Grade 3

General Science, preK-2

Thomas Custer, Zula International

Join us for a fun, hands-on workshop that will help you to strengthen STEM in your program. You will learn about strategies to foster exploration and critical thinking skills for young children through hands-on science. We will discuss the concepts of inquiry and inquiry based teaching techniques. You will take away hands-on, cross-curricular, STEM activities that stimulate critical thinking. Teachers and principals will learn how to implement or strengthen STEM in their schools.

Infusing Math into Science with Real World Results

Math in Science, GRADES 3-5

Susan Bardenhagen, VAST Region 4 Director

Often science is taught as units in elementary classrooms. By planning how math skills and concepts support these units, the elementary teacher can mesh the two curricular areas, giving more quality time to both. Literacy can be supported by science processes, too, by empowering scientific readers, scientific problem-solvers, and data collectors. Presenter will model activities and provide strategies for infusing and integrating.

The Making of a Galimoto

Math in Science, GRADES 3-5

Mindy Gumpert, Old Dominion University

Bill McConnell, Virginia Wesleyan College

Join us to experience a classroom-tested STEM lesson based on a trade book that highlights science, engineering, and problem solving within a multicultural theme. We provide a workshop context in order for you to discover, first hand, how inquiry-based instructional strategies and the collaborative design and construction of a galimoto, or a toy vehicle, can address important VSOLs while inspiring our future STEM leaders.

Get Energized: PBL EQUALS Success in Science & Literacy

General Science, GRADES 3-5

Anne Mannarino, Regent University

Elizabeth Edomondson, Virginia Commonwealth University

Participate in integrated science and literacy tasks embedded in an energy- themed Problem-based Learning (PBL) unit. You will leave with ways to energize your classroom.

Linking Science and Literacy with Problem-Based Learning

Engineering, GRADES 3-5

Cathy McAuley, Coles Elementary School

Charlotte Trost, Coles Elementary School

Tara Kimmey, Coles Elementary School

How to plan, structure, and organize classrooms using problem based learning. Students will become motivated by solving relevant problems based on curriculum needs, through engineering and literacy.

"YIPEE!": Problem Based Learning Meets the SOLs

General Science, GRADES 3-5

Virginia Neil, Highland Elementary School

Lisa Roberson, Highland Elementary School

Marty Leech, Highland Elementary School

"Yippee, It's Science Time" That's what students say when their SOL based science lessons include Problem Based Learning and hands-on activities. "Yippee, My students really understand the concepts!" That's what teachers say when they teach these units. Come join us and we will share some of these lessons and how to design them, so you can say, "Yippee!" too.

Even Animals Live Downstream!

General Science, GRADES 3-5

Katie Rexrode, Five Ponds Press

Leslie Swenson, Five Ponds Press

Bring meaning to your instruction by integrating science SOLs 4.5 and 4.9. Participate in engaging activities designed to help students understand the niches of a variety of marine organisms in the Chesapeake Bay. Learn how to create a simple watershed model to discuss the importance of being good stewards of the environment, because "we all live downstream." In addition, participants will walk away with a wealth of instructional resources for SOL 4.5 from Five Ponds Press.

Physics is Elementary with VIP**Physics/Physical Science, GRADES 3-5****Jeff Steele, Liberty High School****Catherine Brewington, Cosby High School**

The VA Instructors of Physics has polled elementary teachers and the VA DOE to ask “What areas of physical science can we help with?” Come find the answer in the forms of lessons you can put into action immediately that will have your students experiencing and learning physical science through inquiry. You will find answers to your questions, ideas to implement, and make-and-take experiments to implement while you enjoy experiencing some inquiry learning of your own.

“Science Is for Me”— Hands-On Modules Engaging All Students**Engineering, GRADES 3-5****Johannes Strobel, University of Missouri****Olivia Hua, McGill University**

Science/engineering are associated with strong stereotypes. Join us as we synthesize existing stereotypes and show how the strategies of hands-on integrated STEM can help address stereotypes and engage all your students. Participants will engage with a learning module designing a Wildlife Corridor, which incorporates authentic engineering design with integrated mathematics and science.

Needle in the Haystack: Picking High-Quality STEM Curriculum**General Science, GRADES 3-5****Johannes Strobel, University of Missouri/Hand2Mind****Olivia Hua, McGill University**

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

It's All About That Team**Engineering, GRADES 3-5****Nina Valdivieso, Northern Shores Elementary School****Traci Mettler, Northern Shores Elementary School**

Come join us on a team-building adventure! You will participate in fun and active team-building activities.

Meet the SOLs in Your Schoolyard**Environmental Science, ELEM****Barbara Adcock, Powhatan County Public Schools**

Students can be inspired to be good stewards of their environment and you can meet many of your SOLs in all core areas outdoors. This session will give you a variety of specific ideas for outdoor learning. Digital copies of lessons which have been used may times will be made available to participants.

STEM + the Arts = STEAM - Infusion Supports a Growth Mindset**General Science, ELEM****Susan Bardenhagen, VAST Region 4 Director**

Scientists, Technology and Engineering Industries, and Math educators identify that our students and future workforce need problem-solving, critical thinking, and innovative strategies. Artists acknowledge that their creative efforts are influenced by scientific inquiry, mathematical patterns, and the design process. STEAM-infused education can then be a community's vehicle to preparing its future. This workshop will provide current research and model cross-cutting instructional strategies.

Coming to an Ocean or River Near You**Environmental Science, ELEM****Eileen Biegel, Algonkian Elementary School**

Participants will learn how to implement the foundational concepts for environmental literacy education into the K-5 curriculum. Using the National Marine Sanctuaries and the Chesapeake Bay watershed as a foundation, participants will learn how to integrate Virginia's K-5 Sustainability Standards through a cross curricular approach. A standards and principles crosswalk will present a variety of content area teaching strategies, classroom activities, and resources.

Sprouting Success with Agriculture in the Classroom**General Science, ELEM****Lynn Black, Agriculture in the Classroom**

Join the staff from Agriculture in the Classroom for a highly interactive session that will help you sprout successful learners in your PK-5 classroom. Attendees will enjoy the hands-on, minds-on activities and make-and-takes that will use the farm and surrounding environment to bring the science standards to life. In addition to workshop activities, participants will leave with curriculum and resources ready to grow young minds.

Saving the World One Student at a Time**Environmental Science, ELEM****Jaclyn Claytor, Nuckols Farm Elementary**

A classroom teacher shares how the VISTA program helped her to construct an award-winning project, “Saving a National Treasure,” and how she used the funding from her award to enrich her knowledge of science and the environment on a national level. Come learn what it takes to construct an authentic, award-winning project, and how easily you can transform any science unit into a hands-on, problem based project that will make a lifelong impact on your students' school experience.

Your Students Can Code and Learn SOLs!**General Science, ELEM****Rebecca Dovi, CodeVA****Judy Fitzpatrick, Short Pump Elementary School**

Classroom teacher and Code VA will introduce attendees to options to teach computer programming /coding that supports the SOL's and 21st century learning skills.

The STEM Revolution: Develop Literacy with Graphic Science**General Science, ELEM****Judy Elgin Jensen, O'Brien Associates****Timothy Jensen, Concord Data Corporation**

Join Max Axiom as he shrinks to atomic size and explores chemical reactions. Teleport with him into the large intestine and engage your senses! Graphic content and strong literacy support enhance science instruction and challenge readers at all levels. Learn how Graphic Science offers options for engagement, intervention, and summer programs. Challenge students mentally and visually while they read, write, and do science. Find out more about Graphic Science with Max Axiom and take home samples.

Writing in Science Class: An Oxymoron? Take 5! for Science!**General Science, ELEM****Judy Elgin Jensen, O'Brien Associates****Timothy Jensen, Concord Data Corporation**

Transform the first five minutes of science class with a burst of writing! Encourage critical thinking about science concepts and minds-on inquiry skills through diverse and creative writing prompts. Experience how students would brainstorm about 75 topics in life, earth, and physical science, for unique ways to engage and assess. Help students develop science literacy as they transform science language into meaning for themselves. Join us and compete for a free copy of Take 5! for Science.

A MakerSpace with Little Space & Time That Supports SOLs?**General Science, ELEM****Judy Fitzpatrick, Henrico County Public Schools**

MakerSpaces can support the SOLs and are possible even with limited space, time, and financial resources. They provide hands-on, creative ways to encourage students to design, experiment, build, and invent as they deeply engage in science, engineering and tinkering. A classroom teacher will share ideas to include this in your teaching, from preparing your K-5 students to determining projects that support your curriculum to implementation and assessment for all elementary classrooms.

"What Is Happening to Our Climate?" Elementary GLOBE**Earth/Space Science, ELEM****Tina Harte, NASA Langley Research Center**

Join us to learn about the newest book in the Elementary GLOBE Series "What in the World is Happening to Our Climate?" Elementary GLOBE is designed to introduce students to the study of Earth System Science while incorporating literacy skills. The books introduce students to key concepts in water, soil, seasons, aerosols, Earth system and "climate". Learning activities complement the science content in each storybook engaging students in hands-on learning experiences.

Integrative and Investigative Elementary Science**General Science, ELEM****Patricia Hastings, Longwood University****Jodie Brinkmann, Longwood University**

With the continued marginalization of science and social studies in today's elementary school schedules, how are we preparing students to be informed participating citizens on the increasingly complex socio-scientific issues they will face as adults? This session provides overworked educators with specific ways to integrate content areas while providing students opportunities to practice investigative process skills needed for civic decision making.

Oh Honey! The Plight of the Honey Bee**Biology/Life Science, ELEM****Elizabeth (Libby) Nicholson, Broadus Wood Elementary School**

This session introduces participants to a problem-based learning unit that provides students interdisciplinary opportunities to learn about bee and plant life cycles, bee conservation, and human dependence on bees for food. We model some activities from the unit. Participants will learn how to start their own school garden to support bee populations as well as engage students in all elementary grades in cross-curricular standards-based learning and scientific inquiry during a year-long unit.

Elementary Science: The Basis of Scientific Investigation**General Science, ELEM****Anne Petersen, Virginia Department of Education****Tyler Waybright, Virginia Department of Education**

Elementary science education equips students with skills and habits of mind that provide a strong foundation for future science courses. The ability to ask questions, observe closely, look for evidence and make rational arguments are all by-products of rich science learning experiences at a young age. This session will focus on how to approach science in a cross curricular fashion and provide instructional scaffolding strategies that can be used to develop students' investigative skills.

3D Designing and Printing at the Elementary Level

Engineering, ELEM

3D design and printing in the elementary classroom? YES YOU CAN! Learn the logistics of how one elementary science teacher makes this a reality in the classroom. This session will provide an overview of current classroom practices as well as thorough demonstration of HOW to begin, nourish, and take next steps to make this a reality in YOUR classroom. Participants are encouraged to bring an electronic device.

Becky Schnekser, Cape Henry Collegiate

Hands-on Life Cycle Project with Silkworms

Biology/Life Science, ELEM

Silkworms have been domestically bred for nearly 5,000 years. Today silkworms have become domesticated insects. Students will learn about the life cycle of silkworms while growing their own silkworm moth from a larva. They will practice observation skills, following directions, assuming responsibility, measuring, graphing and recording data. Workshop participants will take home a silkworm larva.

Catherine Short, Butterflies in Flight

Roller Coast Fun!

Physics/Physical Science, ELEM

Edith Rudd, Virginia State University

Trina Spencer, Virginia State University

Leslie Whiteman, Virginia State University

Wanda Velez, Virginia State University

WARNING: These activities may bring lots of excitement and enjoyment to your elementary school class! Come join us as we discuss and engage in roller coaster lessons that reinforce physical science investigations focused on the principles of energy, force and motion. This session will also provide examples of nonfiction and informational text that supplement these activities.

Elementary Science Extravaganza

General Science, ELEM

Come and experience the fun of being an elementary teacher! Through various activities, teachers will walk away with lesson ideas to take back to your school and your classroom! Sessions will be offered for every grade level and there will be door prizes.

Barbara Young, Virginia Department of Education

Engineering Design Challenge: Capitalizing on Local Industry

Engineering, ELEM-MS

How do I prepare my students to be college, career and citizen ready? Bring your students together to collaborate in rigorous, career-based engineering design challenges (EDC). An EDC breaks down the barriers between the STEM disciplines and exposes students to STEM careers, capitalizing on the expertise of local industry. By partnering with local industry, educators can develop learning experiences that are relevant and require students to apply their knowledge to solve real-world problems.

Jacob Andrus, Newport News Public Schools

Tami Byron, Newport News Public Schools

Teachers and Students are Ready for the NGSS's Engineering

Engineering, ELEM-MS

With hands-on activities, participants will see how teachers and students, especially in the elementary grades, are fully prepared to address the Engineering component of the NGSS. Use of simple materials and everyday situations to teach fundamentals of engineering in any classroom, by any teacher, and to every student will be demonstrated. Assessment of learning will be included, as well as specific alignment with the Engineering components of the NGSS.

Arthur Bowman, Norfolk State University

Learning Physical Science through Engineering

Physics/Physical Science, ELEM-MS

Teachers will learn how to incorporate engineering design into their science classroom by assembling and testing different boat hull prototypes and building a "brushbot." This lesson is typically taught in the physical science classroom to help students learn how to apply scientific concepts to real-world situations.

Dara Brinkman, Portsmouth Public Schools

Margie Tiner, Portsmouth Public Schools

Make it STEMtastic

General Science, ELEM-MS

Join us for a number of hands on STEM activities covering flight, 3D printing, Popsicle stick bridge building, robotics and programming at the middle school level. We will discuss how to manage a problem solving classroom. You will leave this session with lessons and ideas covering the many facets of STEM education. Take it beyond the buzz word and make it a part of your everyday teaching. This session will also include grant resources and how to fund your awesome classroom.

Alison Dossick, Oak Knoll Middle School

We All Need Trees

Environmental Science, ELEM-MS

Learning Tree

This Project Learning Tree activity is appropriate for grades Pre K-6. Students are often surprised to learn how many different products we get from trees. Use this activity to help your students learn just how much we depend on trees in our daily lives. We'll all participate in a group activity and then learn more about what forests provide through a presentation. Everyone will receive the printed activity and a kit of sample forest products from Virginia with posters.

Page Hutchinson, VA Dept. of Forestry/Project

Kari Abbott, VA Project Learning Tree

Future Goals: Teaching STEM Through Hockey**Math in Science, ELEM-MS****Eric Johnson, EverFi
Brooke Yoder, EverFi**

Hockey Scholar is a no-cost, online learning resource where students explore real-life applications of fundamental math, science, and engineering concepts using hockey simulations. The twelve engaging mini-labs are designed with the scientific method in mind and aligned to VDOE Science SOLs for 5th - 8th grade students. Educators will register and access Hockey Scholar and discuss implementation strategies that can extend the digital simulations into offline labs.

Science Safety for All Seasons K-8**General Science, ELEM-MS****Cheryl Lindeman, Randolph College
Lani Patrick, Campbell County Public Schools**

You just can't put a price on safety! Join our session to update your knowledge about how to take appropriate precautions to prevent accidents and create a manageable science safety plan for your classroom and science projects. Work with fellow teachers and pre-service teachers to analyze case studies and review the new Virginia Science Safety Guidelines.

Cultivating Investigators: Pollination Gardens**Environmental Science, ELEM-MS****Candace Lutzow-Felling, Blandy Experimental Farm/University of Virginia
Emily Ford, Blandy Experimental Farm/University of Virginia
Lillian Ledford, Blandy Experimental Farm/University of Virginia**

Have you noticed that most schoolyard garden planning resources are teacher centered? Learn techniques to provide your students with the knowledge and skills to design and select plants for their pollination gardens. Engage in teaching techniques to help students measure and understand plant spacing needs and why it is important to consider plant-pollinator adaptations when selecting plants. Use an on-line native plant search that will guide your students to select pollination garden plants.

Explore the NEW GLOBE Cloud Protocol and E-Training**Earth/Space Science, ELEM-MS****Sarah McCrea, NASA LaRC**

The NASA S'COOL Project has integrated with the GLOBE Cloud Protocol, creating a new Clouds Protocol for the education community! Join GLOBE and walk through the new and improved science protocol, review complimentary learning activities, and explore the value of corresponding NASA satellite data. Attendees will experience new data input options and certification opportunities. Be one of the first in the community to participate in this new protocol and receive free classroom materials!

Energy House**Engineering, ELEM-MS****Kimberly Swan, NEED Project
Rebecca Lamb, NEED Project**

Learn about efficiency, conservation, and economic returns by using various materials to insulate a cardboard house and then test its efficiency. Great unit for upper elementary and middle school aged students.

Practical and Effective Classroom Management**General Science, ELEM-MS****Jeannine Tate, Retired Principal**

Learn practical, proven strategies that can be implemented immediately. Decrease the amount of time spent giving multiple warnings and repeated requests for appropriate behavior in order to dramatically increase the amount of time spent on instruction.

Inquiry or Burst!!**General Science, ELEM-MS****Christina Wade, Carter G. Woodson Middle School**

Hands on Inquiry Science instruction can be hard to achieve in a classroom, but it is not impossible. It is actually quite easy once you understand what Inquiry based science instructions looks like in a classroom. This session will give you simple, easy ideas to help achieve this in your classroom.

Using Artifacts of a Mystery Cemetery to Teach SI Skills**General Science, MS****Sham Bevel, Virginia Beach City Public School**

Are you looking for a fun way to incorporate scientific investigation objectives into your curriculum? By using artifacts of a "mystery cemetery", you will analyze a 3-D cemetery and draw logical conclusions about the gender, age, and status of the skeletons. This activity supports critical thinking and the following scientific investigation skills; drawing conclusions, recording measurements, analyzing/explaining data, making observations and inferences.

Exploring Variables that Affect Heat Transfer and Weather**Earth/Space Science, MS****Kip Bisignano, Delta Education/FOSS
Roxane Dupuis, Delta Education/FOSS**

In this hands-on session, we explore the Earth-Sun relationship to understand the interaction of multiple variables that affect weather and climate on Earth. Activities include analyzing data, exploring models of solar angle, and heating different Earth materials. Finally, we will consider the variables and explore how they impact Virginia's weather and climate. We'll share information about the newly revised FOSS program for middle school science. Materials and resources provided.

It Happens So Fast: Wave Communication**Physics/Physical Science, MS****Roxane Dupuis, Delta Education/FOSS**

How are sounds and images sent through radio waves? We'll develop models to answer this question and engage in selected hands-on science activities and engineering challenges from the new FOSS Waves module. Your students will understand the technical applications of sound and light waves related to modern day communication. Materials and resources provided.

Kip Bisignano, Delta Education/FOSS**Computer Science in Middle School Science - Project Guts****General Science, MS****Rebecca Dovi, CodeVA****Josh Bearman, Lucille Brown Middle School**

Curious about including coding in your middle school science class? Project Guts' middle school science program connects computer science to science through computer modeling and simulation. The modules address performance expectations in both the NGSS and Computer Science Teachers Association K-12 Computer Science Standards.

Action Research and PD for High Needs Science Classrooms**General Science, MS****Meredith Kier, College of William and Mary**

Teachers often face unique challenges within high needs schools, including fewer resources for quality professional development (PD). Secondary preservice science teachers (PSTs) will present how they collaborated with their cooperating teachers (CTs) in high needs schools to identify specific struggles faced within the science classroom. PSTs will present blended models of online PD that addresses issues of science learning and engagement developed in corroboration with their CT.

Graph It! Representations Your Science Students Should Know**Math in Science, MS****Virginia Lewis, Longwood University****Julia Cothron, MathScience Innovation Center (retired)****Paula Leach, ITTIP@Longwood University**

Have you ever wondered what graphs your students have studied? Representation is one of the five goals of mathematics instruction in Virginia. Become aware of the graphical representations your students are learning in middle school mathematics and Algebra 1. Brush up on your own understanding of the "M" in STEM to better use mathematics in your science classes. We will discuss line plots, stem-and-leaf plots, line graphs, circle graphs, box-and-whisker plots, histograms, and scatterplots.

Using Video to Document Teachers' Learning in Science**General Science, MS****Melani Loney, Old Dominion University****Joanna Garner, Old Dominion University**

Summer professional development in science education can be a fun experience, but how can you be sure that you will leave the PD with a firm grasp of the information presented? This session will discuss the use of video reflection at the close of science teacher professional development and its role in helping teachers to review content, strategy and implementation plans. Ideas for using this method with science students to summarize field-based and classroom experiences will also be explored.

Teaching the Nature of Science in an SOL classroom.**General Science, MS****Rebecca Musso, Stafford Middle School, Stafford, VA**

This session will include a brief review of the Nature of Science. Ready-made questions for both formative and summative assessments about the Nature of Science and how to make them content-specific will be presented. Strategies to incorporate questions that will demonstrate students' knowledge of the nature of science easily in every day activities will be presented.

Physical Science: Exploring Chemistry Inquiry**Physics/Physical Science, MS****Anne Petersen, Virginia Department of Education****Venicia Ferrell, Hampton City Public Schools**

The Physical Science Standards of Learning provides foundations for both chemistry and physics, yet many classrooms are not conducive to developing the processes and skills that are acquired in a laboratory setting. This session will provide teachers with practical, hands-on, inquiry exercises in chemistry designed to develop scientific investigation skills and that are safe and economical for the middle school classroom environment.

Drag: Good for Mars, Bad for Cars**Engineering, MS****Jinx Rasmussen, Virginia Middle School****Janet Meadows, Virginia Middle School**

This session combines NASA's Rockets to Racecars drag component with NASCAR's Acceleration Nation to make a wonderful lesson on positive and negative drag. We will construct a Mars landing gear to deliver a payload on Mars without dumping it out. We will then construct a racecar to determine the effects of drag on how fast the car can go.

VDOE Science Update - Middle School**General Science, MS****Eric Rhoades, Virginia Department of Education****Tina Mazzacane, Virginia Department of Education**

Learn about professional development, instruction, and assessment resources available to middle school science teachers. VDOE instruction and assessment specialists offer updates on instruction and assessment resources and programs including the science standards review process.

Explore Science with LEGO MINDSTORMS Education EV3**Engineering, MS****Erin Sowa, LEGO Education**

Explore and understand science with the LEGO MINDSTORMS Education EV3. What is gravity? How do pneumatic systems use air to lift heavy objects? Can a robot lift more than its own weight? LEGO Education solutions for middle school science let you and your students work like real scientists to answer questions while meeting national curriculum targets. Hands-on experiments will bring abstract concepts to life while igniting student engagement and gain a better understanding of physical science principles.

Exploring with Virtual Reality in the Science Classroom**General Science, MS****Jillian Wendt, University of the District of Columbia**

In this session, you'll learn how to utilize virtual reality with Google™ Cardboard and BYODs in the middle school science classroom to teach adolescents about the natural world, ecosystems, and Virginia's unique geology—all without leaving the classroom. Participants will learn how to create your own Cardboard and unique immersive experiences to meet science standards and to provide students with an exciting and fun-filled way to experience the world around them. Be sure to bring a smartphone!

Activities for the Anthropocene**Environmental Science, MS-HS****Lindsey Bailey, Population Connection**

In this interdisciplinary, hands-on session, discover classroom activities and interactive online resources to help students explore different aspects of the Anthropocene (the human age) including population growth, climate change, changes in biodiversity and land use. The presented activities build knowledge and skills in life and social sciences, while applying learning to authentic problems. Receive a CD of activities matched to state standards.

Investigating Renewable Energy with KidWind and Vernier**Environmental Science, MS-HS****Jackie Bonneau, Vernier Software & Technology**

Teach engineering design principles with a focus on renewable energy using KidWind Wind and Solar Experiment Kits. Collect and analyze data using a Vernier Energy Sensor with a LabQuest 2 interface. Explore real-world renewable energy design problems with activities from our Renewable Energy with Vernier lab book.

Keepin' it Real: Obtaining Real-World Data for the Classroom**Earth/Space Science, MS-HS****Jacquelyn Calder, Moody Middle School**

It's time to throw out those worksheets and get some real data for your classroom! Learn how to obtain air quality data from Virginia DEQ and apply to your classroom instruction. In addition, explore My NASA Data, a database with pre-planned lessons from NASA Langley Research Center. My NASA Data allows students and educators the opportunity to obtain and analyze satellite data about our Earth. These resources can also lead to student-developed research projects for environmental studies.

Creating a World Energy Summit in Your Classroom**Environmental Science, MS-HS****Liza Esser, Capitol Hill Day School**

Global sustainability is an exciting context for interdisciplinary topics—like energy—to build students' critical thinking and problem-solving skills. Developing global competence prepares students to navigate through college to career and civic life in an interconnected world. Learn how we created a simulation of a World Energy Summit to teach physical science content about energy, while engaging in a dialogue about important real-world issues surrounding climate change and energy resources.

Interdisciplinary STEM Pedagogy and Lesson Plans**Environmental Science, MS-HS****George Glasson, Virginia Tech****Brenda Brand, Virginia Tech****Catherine Ulrich, Virginia Tech****Mae Hey, Virginia Tech**

Presenters will share interdisciplinary STEM pedagogical approaches and lessons that engage students in laboratory or field investigations that connect to place-based socio-scientific issues. Pre-service science and mathematics teachers collaborated to develop STEM lessons that included Virginia SOLs and the "cross-cutting concepts" of the Next Generation Science Standards. The lessons engage students in inquiry-by-engineering design processes.

Using Argument-Driven Inquiry to Develop Science Proficiency**Biology/Life Science, MS-HS****Jonathon Grooms, George Washington University****Victor Sampson, The University of Texas - Austin****Ashley Murphy, The University of Texas - Austin**

Arguing from evidence is a key practice of scientists. Come participate in an ADI investigation to learn how to engage your students in scientific argumentation to model the essential practices of the scientific community. Argument-Driven Inquiry is a research based instructional model that will help your students learn how to design and conduct investigations, analyze and interpret data, communicate ideas through argumentation sessions, and demonstrate understanding with scientific writing.

Engineering Integrated Science Units and Teacher Manuals

Engineering, MS-HS
Shirley Weng, University of Virginia

Alexandra Iuga, University of Virginia
Sara-Alyse Nelson, University of Virginia
Frackson Mumba, University of Virginia

Integrating engineering design in science teaching is a challenging task. We have developed teacher guide manuals for developing engineering design integrated science lessons. We will present teacher guide manuals, and engineering design integrated science lessons and activities that address biology/life science, chemistry, and physics SOLs and engineering design. You will learn how to create engineering design integrated science lessons. You will receive teacher guide manuals and lessons.

The Science Cafe: A Performance Task

Biology/Life Science, MS-HS

Cindy Kube, Salem High School
Angela Boubouheropoulos, Salem High School

Are you looking for an engaging performance task that incorporates inquiry, research, technology and communication? Welcome to the Science Cafe! In this task, students select a research topic in biochemistry and create infographics. In the role of research scientists, they share their infographics in a casual, cafe environment. The goal of the Science Cafe is help students realize why it is important for scientists to effectively communicate the value of research to the general public.

NASA DATA for All of Your Earth Science Data Needs: Part I

Earth/Space Science, MS-HS

Preston Lewis, NASA LaRC
Daniel Oostra, NASA LaRC

The session will introduce how to use MY NASA Data to begin the process of student research through data. Attendees will receive an in-depth look at the capabilities of the Live Access Server that will enable their students to produce custom data visualizations. Participants will leave the session with the ability to take this free online-based tool back to the classroom and have students creating their own visualizations right away, and use throughout all stages of their science career.

Inquiry Bonanza! Pre-Service Teachers Share Inquiry Lessons

General Science, MS-HS

Jacqueline McDonnough, Virginia Commonwealth University

Abstract: Do you want to wow your students? Do you need to inject some pizzazz into your instruction? Attend our session where secondary science preservice teachers will share inquiry-based, hands-on lessons in this interactive session. You will have an opportunity to see and participate in these classroom tested activities.

VA SEA: Building an Alliance Between Scientists and Teachers

Environmental Science, MS-HS

Sarah Nuss, Chesapeake Bay National Estuarine Research Reserve
Carol Hopper Brill, Virginia Institute of Marine Science

The Virginia Scientists and Educators Alliance (VA SEA) at VIMS offers graduate students training in science communication and pedagogy. Graduate students develop a lesson based on their research, which is tested by project teachers. The graduate students present their refined lessons in an expo setting, making these new resources available to a wider audience of teachers. In this session, VIMS educators will demonstrate one of the completed VA SEA lessons centered around ocean acidification.

Understanding Your Community's Watershed

Environmental Science, MS-HS

Stephanie Playton, Longwood University
Paula Leach, Longwood University

Do you need a way to interest your students in accurately examining their own neighborhood, school yard or community for environmental problems and challenges? This free portal, Teaching Environmental Sustainability-Model My Watershed, gives teachers and students access to scientifically valid tools to accurately examine watersheds through models and simulations to evaluate, design, and test solutions for current watersheds.

Asynchronous Learning in Science

General Science, MS-HS

Michelle Plunkett, Loudoun County Public Schools

Have you ever wondered how to make your classroom fit the different timelines of learning in your class? This session will show you the benefits, hardships, styles, and grading options available to you. Not all students need to learn at the same pace but the classroom needs to be set up so it is not more difficult for you.

You Could be the Next Secondary Science PAEMST Awardee

General Science, MS-HS

Eric Rhoades, Virginia Department of Education

This year secondary teachers (7-12) are eligible to apply for one of the highest honors in science teaching, the Presidential Award for Excellence in Mathematics and Science Teaching. Learn more about his award program from Virginia awardees and the state coordinator. You could be the next Virginia PAEMST Awardee!

Mars: The Final Frontier**Earth/Space Science, MS-HS****Tysha Sanford, Virginia Space Grant Consortium
Joyce Corriere, Virginia Space Grant Consortium**

Are you a teacher who doesn't have time to incorporate problem solving, real world-applications, and team building into your curriculum? This session will address how to get students ready for 21st century jobs by applying team building with real-world application and a focus on one of NASA's main missions. Design Challenge Handouts and other activities will be provided.

Enhancing the STEM Curriculum with Virtual Simulations**Biology/Life Science, MS-HS****Susan Stanbery, Campbell County Schools**

Online simulations can help teachers take advantage of research-proven instructional strategies to help students of all ability levels develop conceptual understanding in math and science. Teachers can enhance instruction with powerful interactive visualizations of concepts. Students can manipulate key variables, generate and test hypotheses, and engage in extensive "what-if" experimentation. Teachers will experience a basic lesson using "Gizmos" and peruse the site for additional lessons.

Energy Industry Simulation Activities**Engineering, MS-HS****Kimberly Swan, NEED Project
Rebecca Lamb, NEED Project**

Can you meet energy demands in our Baseload Balance game? Get out of your seat to balance generation and load as you work together to keep the city's lights on! Then, try your hand at getting the oil out! Attempt to get the "oil" out by designing effective "rigs"! Ideal for middle and high school teachers.

Beyond the Walls: Science Inquiry Outside the Classroom.**Biology/Life Science, MS-HS****Veronica Warwick, York River Academy
Matthew Warren, Burton High School**

Take a look at ways in which you can enrich the study of science outside the normal traditional classroom. This includes but not limited to field trips, lab investigations, and real world applications.

A Physics Smorgasbord**Physics/Physical Science, MS-HS****Tony Wayne, Albemarle High School**

Come by and see several teachers from the Virginia Instructors of Physics show a variety of physics demonstrations, labs and/or activities. There will be handouts and so much more. Many of the demo you can try on the spot with us. This session is an open door season. This means participants can come and go any time during the session and still see everything. After the conference check out the handouts at <http://vip.vast.org/2016VASTPDI>.

First Years of Teaching Panel Reflection with Noyce Scholars**General Science, MS-COL****Jaclyn Beck, The College of William and Mary
Amy Chen, The College of William and Mary****Meredith Kier, The College of William and Mary W&M Noyce Scholars,**

Join W&M Noyce Scholar graduates as they reflect on their first years of teaching. Participants will be introduced to the Noyce program, and will engage in a question and answer discussion regarding teaching experiences in the first 1 – 3 years. Pre-service teachers are encouraged to attend and to ask questions such as those regarding the job search, the decision to teach in a high-need school, authentic engagement in the school and community, and strategies for working with diverse learners.

NASA Data and Resources Focusing on Earth's Energy: Part II**Earth/Space Science, MS-COL****Lin Chambers, NASA Langley Research Center**

Come learn about NASA resources relating to renewable energy sources and Earth's Energy budget. A variety of interactive classroom ready items will be presented. You will learn about new GIS-based tools that make it easy for you to design inquiry-based lessons and for your students to explore real data. Participants will get an overview of Earth's Energy budget and examples of materials and lessons that you can bring back to your classroom, helping student understand these important concepts.

Rubbery Statistics: Using Inferential Statistical Tests**General Science, MS-COL****Julia Cothron, MathScience Innovation Center (retired)
Paula Leach, ITTIP at Longwood University**

Look at data from experiments involving rubber bands in a new way. Explore ways that you can graphically display observations and measurements. Then, learn to select the appropriate statistical test to determine if a significant difference exists for a set of data. Brush up on the steps for hypothesis testing using two-sample t-Test and Chi-Square Goodness of Fit. Grades 8-12.

Zombies in the Neighborhood? No Worries. STEM Them!**General Science, MS-COL****Jeffrey Lukens, Texas Instruments**

Use the "Zombie Craze" to make STEM become "un-dead" in your science classroom! This is not only a hands-on session, but a brains-on session, as well!

More than Maps: Using GIS in Earth and Environmental Science**Environmental Science, MS-COL****Mark Frazier, Roanoke Valley Governor's School**

A Geographical Information System (GIS) clarifies how Earth's systems cooperate to power our amazing planet. The visual focus gives students the big picture of what happens where globally. Through the US Department of Education's ConnectEd Initiative, K12 schools can obtain the ArcGIS platform of the Environmental Science Research Institute (esri) at no cost. This tool requires only a computer with internet access and a curiosity to explore what is currently known (daily!) about the earth.

Data-Driven Activities in Earth Sciences**Earth/Space Science, MS-COL**

Russell Kohrs, Massanutten Regional Governor's School for Environmental Science and Technology
Margaret Greene, Virginia Earth Science Teachers Association (VESTA)

This session will explore student-centered experiences and methods that successfully immerse students into the natural environment while also collecting data for analysis in the lab or classroom. The collection of such data introduces students to new ways of seeing uncertainty, the challenges of limited quantities of data, and exposure to failure. Bring your own experiences to share as we explore new and exciting ways to teach and excite students about science and the world around them.

Infect Your Science Classroom with Math!**Math in Science, MS-COL****Jeffrey Lukens, Texas Instruments**

Integrating science 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.

Do-It-Yourself Environmental Monitoring: Building Sensors**Environmental Science, MS-COL****George Meadows, University of Mary Washington**

The availability of inexpensive and easily programmed microcontrollers offers a number of opportunities to engage students in the process of environmental monitoring. This maker approach allows students to not only collect and analyze relevant data, but to also build and code the sensors they are using to gather that information. In this session I will demonstrate a number of such devices including conductivity meters, temperature sensors, GPS modules, seismometers, and data logging boards.

Student-Driven Research on Renewable Energy for your School**Environmental Science, MS-COL****Remy Pangle, Center for Wind Energy at James Madison University**

In this workshop the Center for Wind Energy will give an overview of the new student-driven structured research project being offered as a precursor to joining the Wind for Schools program as a host school (wind turbine installed at the school). The School Electricity Assessment (SEA) has students researching their energy use, how to conserve energy, and the potential for wind and solar systems at their school.

Enhancing Classroom Learning Through Digital Dissection**Biology/Life Science, MS-COL****Samantha Suiter, People for the Ethical Treatment of Animals (PETA)**

Alternatives to animal dissection are increasingly being sought by educators to reduce costs, avoid harmful animal use and integrate technology in the classroom. This interactive training session will cover educational efficacy, economic benefits, ethical considerations and current laws and policies regarding the use of animals in science education. Participants will gain hands-on experience with popular digital dissection software programs and are asked to bring a laptop.

Forensic Bone Analysis: What Bones Tell Us**General Science, HS****Anthony Bertino, retired SUNY @ Albany****Patricia Nolan Bertino, retired Scotis-Glenville HS**

Skeletons provide clues: age, sex, height, ethnic background, diet, lifestyle, geographic origins.

Applying STEM, discover what is "written in bones." Case studies: Colonial Jamestown, Romanovs, African-American Burial Ground. Handouts/Resources.

Time and Money Saving Techniques in Forensic Science**General Science, HS****Anthony Bertino, retired SUNY @ Albany****Patricia Nolan Bertino, retired**

The budget provided for an elective course like forensic science is often very limited. Join us to learn how to inexpensively make materials for your classroom. Magnetic fingerprint techniques will be discussed. Blood spatter materials and techniques will be described. New ways to approach chromatography on the mini-scale will be demonstrated. With a little time and a limited budget, you will be able to make your own equipment for several class activities.

VDOE Science Update - High School**General Science, HS****Eric Rhoades, Virginia Department of Education****Anne Petersen, Virginia Department of Education**

Learn about professional development, instruction, and assessment resources available to high school science teachers. VDOE instruction and assessment specialists offer updates on instruction and assessment resources and programs including the science standards review.

Interactive Science Notebooks- They are for High School Too!**Biology/Life Science, HS****Katherine Bowen, Nottoway County Public Schools**

Want your students to use notebooks, but have trouble getting them to keep up with them? Using interactive notebooks puts that worry to rest! Vocabulary, key questions and notes are all in ONE notebook and in order so students can access information easily. Makes studying easy too! Best part- students buy into the notebook and want to keep it! No more begging to find your notebook. Elementary and middle schools have been using them forever, but high school? Yes- we can too!

What Do Mirrors, Skin Color and Spreadsheets Have in Common?**Math in Science, HS****Cheryl Coronado, Woodrow Wilson High School**

Looking for real science data students can understand? Come use inexpensive materials in simple, engaging data collection activities. The HHMI BioInteractive resources for teaching students to use the science process and Microsoft Excel or Google Sheets will be demonstrated. Participants will analyze real data using statistics and the language of science. The activities presented have been tested and suggested by Portsmouth students and samples of their work will be discussed in this session.

The Physics Idea Lab: What's New in Physics Education?**Physics/Physical Science, HS****Timothy Couillard, Virginia Instructors of Physics (VIP)**

Join the Virginia Instructors of Physics for their fall idea session. Hear the latest ideas from physics teachers around the state. We look forward to seeing old friends and new faces. Contact timothy_couillard@ccpsnet.net if you can bring something to share. The Virginia Instructors of Physics is a network of physics teachers dedicated to improving their craft and sharing resources. To join VIP for free today, send a blank email to: virginiainstructorsofphysics+subscribe@googlegroups.com

Environmental Literacy in the EarthComm Curriculum**Earth/Space Science, HS****Gary Curts, It's About Time**

Learn how the American Geosciences Institute's "EarthComm" curriculum and its project-based approach can help educators explore environmental literacy with students. Veteran "EarthComm" teacher Gary Curts will lead attendees in a hands-on investigation of the Earth's changing climate, using modeling clay to represent fossil pollen in layers of deep-sea sediment.

Tattoo Ink in Chemistry.**Chemistry, HS****Stephanie Harry, Kecoughtan High School**

This project which covers SOL's CH. 1, CH. 2 and CH. 3 will explain how research and experiments helped students to make a connection between chemistry and tattoo ink. These series of experiments can be used to reflect upon the importance of chemistry in students' personal lives and decision-making processes. The laboratory experiments conducted, outcomes of the instructional strategies, and future expansions will be discussed. This instructional strategy was funded by VAST/TACT Mini- grant.

Exploring Environmental Issues: Focus on Risk**Environmental Science, HS****Page Hutchinson, VA Dept. of Forestry/Project Learning Tree**

The Exploring Environmental Issues: Focus on Risk module helps students explore the different aspects of environmental and human health risks that affect their everyday lives. Through eight hands-on activities, students analyze, explore, discover, and learn about risk assessment, risk communication, risk perception, and risk management. Critical thinking, problem solving, and decision making are emphasized throughout the module. Participants will receive a copy of this module to take home.

Inquiry on a Budget**Biology/Life Science, HS****Heather LaBelle-Spiller, Spotsylvania High School**

Get kids excited about inquiry through photosynthesis and respiration. Complete real scientific inquiry while delving into photosynthesis and respiration using some basic materials. By performing a floating leaf disc lab, you can learn ways to extend inquiry learning. From investigating pigments by using colored plastic and nail polish remover to using gas probes, you will leave with a variety of fun and authentic experiments that promote a deep understanding of the cell energy cycle.

Assessing Readiness for a Climate Event: Stakeholder Meeting**Environmental Science, HS****Kristen Sharpe, Chesapeake Bay National Estuarine Research Reserve in Virginia****Sarah Nuss, Chesapeake Bay National Estuarine Research Reserve in Virginia**

Join educators from the Chesapeake Bay National Estuarine Research Reserve in Virginia as they highlight how their program is aimed at improving climate literacy within high schools. Attendees will explore the designed student-driven, mock stakeholder meeting, in which local impacts of climate changes are reviewed. Attendees will engage with online NOAA tools including the NOAA Sea Level Rise Viewer and Coastal County Snapshots. Activity resources will be made available.

Everyday Inquiry**General Science, HS****David Slykhuis, James Madison University**

Learn how to make inquiry a part of your everyday classroom routine. We will show ideas using everyday materials and resources to turn your classroom into an engaging learning space where students are excited to be everyday.

The Little Goat That Could

Engineering, HS

Our Engineering Drawing students worked with the Angels of Assisi in Roanoke to design a wheelchair to enable a two-legged goat to walk. Both left legs are missing which made the project a little more difficult since previous examples could not be found. The parts are mainly 3D printed with some assistance from a local business for two metal pieces. The students will demonstrate the stages as the design progressed and discuss the changes they had to make.

Patricia Smith, William Byrd High School

Carbon Cycle Simulation

Environmental Science, HS

Carbon cycles naturally through reservoirs or sinks in the environment over time. What happens to the carbon cycle when there is an excess of carbon in one or more of the reservoirs? This simulation will help students to envision how carbon naturally cycles in the carbon cycle and how the carbon cycle is affected with an excess of carbon. This simulation uses both pre-Industrial Revolution and post-Industrial Revolution information to showcase the natural cycle and the cycle with excess carbon.

Kimberly Swan, NEED Project

Rebecca Lamb, NEED Project

Cross-Curricular Learning in the Science Classroom

Biology/Life Science, HS

This session will present cross-curricular learning experiences highlighting a collaborative learning plan between English and biology. The session will show students engaged in the process and highlight student thoughts on this type of learning strategy. In addition, ideas for cross-curricular lessons will be given and discussed.

Camilla Walck, Princess Anne High School

Carrie Gantt, Princess Anne High School

Applied Integration of Math and Science: Gall Fly Predators

Math in Science, HS-COL

Goldenrod is a native, Virginian perennial that is the host for the goldenrod gall fly or gall fly parasitoids. In this hands-on session, attendees will learn the math progression of calculating ellipsoid volume and subsequently determine volume of goldenrod galls. The galls will then be opened and analyzed for their arthropod inhabitants. This data will be compiled and statistically analyzed. All participants need to bring a graphing calculator and a device with access to Excel.

Gina Craun, Loudoun County Academy of Science

Diana Virgo, Loudoun County Academy of Science

Colleges and Universities Share Session

General Science, HS-COL

Clair Berube, Hampton University

This session is an opportunity for college/university-based science teacher educators and other current/future teacher educators to participate in a professional learning community to encourage each other in developing best practices for preparing elementary, middle, and high school science teachers. Come share how you incorporate inquiry methods into your courses, problem solve, and engage in a lively roundtable discussion.

Suzanne Donnelly, Longwood University

Harold Geller, George Mason University

Jacqueline McDonnough, Virginia Commonwealth University

Being Unicorns: Preservice Teachers & Professional Identity

General Science, HS-COL

Barbara Reisner, James Madison University

Members of the JMU EPIC science education team will share experiences developed for pre-service teachers to explore their identity as emerging science educators. Participants will examine aspects identified as being barriers to careers in science education. Participants will also examine ways in which higher education programs can provide early field experiences and create opportunities for collaboration with local schools to enrich pre-service teacher education.

Robbie Higdon, James Madison University

Kerry Cresawn, James Madison University

Eric Pyle, James Madison University

Must Have AP & IB Chemistry Labs

Chemistry, HS-COL

Are you a new or seasoned Chemistry teacher looking to add some different labs to your AP or IB Chemistry class? Many of the labs being presented fit the criteria for the AP or IB required labs and the others are simply awesome labs that your students will enjoy.

Paula Nottingham, Stonewall Jackson High School

HIV/AIDS WITNESSES: The Reality of the Plague of Century

Biology/Life Science, HS-COL

HIV has been around for 30 years and we have lost many friends and relatives to it. We have hoped for a cure 20 years ago but this virus has not just challenged science, but the lives of the patients and their families and entire communities, economies and governments.

Nsama Okeowo, Prince William County Schools

Ayodele Okeowo, Fairfax County Public Schools

Adventures in the Earth's Critical Zone: The Calhoun Critical Zone Observatory**Environmental Science, HS-COL****Katherine O'Neill, Roanoke College****Holly Morrison, Roanoke College**

Critical Zone science integrates the earth, life, and atmospheric sciences to address processes at the Earth's surface relevant to human society such as land management and ecosystem services. Here, we discuss approaches for using emerging science from the National Science Foundation's Critical Zone Observatory (CZO) network to explore interactions between humans and the landscape in environmental and earth science classes, with examples drawn from the Calhoun CZO in the southern Piedmont.

A Novel Experimental Setup for Acquiring Boyle's Law Data**Chemistry, HS-COL****Steve Smith, Roanoke Valley Governor's School**

Getting good data for a Boyle's Law investigation can be frustrating. Bricks on top of syringes, plastic soda bottles with tire valves in the caps, and many other configurations, while capable of producing data, all have their drawbacks. This design gives incredibly good data, is relatively simple and inexpensive to make, and the lab can be done in under 45 minutes. Come see how it's done, and walk away with a plan, directions, and a list of suppliers for the various components.

Arctic Adventure Learning for Virginia's Gifted**Environmental Science, HS-COL****Krista Stith, Southwest Virginia Governor's School**

How did three gifted high school students fare in the bitter cold winter of the Arctic? This presentation discusses the Spring 2016 expedition of students of the Southwest Virginia Governor's School who traveled to the top of the world to conduct research on sea ice thickness levels. Working as full team members alongside students and faculty of Radford University, the high school students were fully immersed into the dynamic and challenging world of geophysical field research.

GLEEVEC: A Cancer Treatment Success Story!**Biology/Life Science, HS-COL****Sherri Story, King's Fork High School**

Storytelling and clay modeling are methods that can be used to break down complex topics into simple cognitive chunks. We will investigate the relationship between the unregulated kinase, BCR ABL, chromosome translocation, and the onset of chronic myeloid leukemia. Using classroom resources from HHMI Biointeractive, you will model the biochemical events leading to the effective action of the anti-leukemia drug, Gleevec. Free HHMI resources available.

Back to Your Grandmother's Basics**Environmental Science, ALL GRADES****Sheila Barnett, Riverine Virginia Master Naturalist**

Put the commercial cleaners to the test. Can a mixture of baking soda and salt clean as well as a store-bought commercial cleaner? You make the prediction and then test the results. We will also make other cleaners for you to take home so you can continue to put your commercial cleaners to the test and compare them to your store-bought products.

Nanoscience Concepts as a Vehicle in STEM Education**General Science, ALL GRADES****Clair Berube, Hampton University**

This study, which was funded by the NSF, enabled STEM high school students an opportunity to work with professor researchers in order to conduct and to create a nanoscience "textbook" (module) intended to give professors of science education a Manual of Nanoscience Modules to use in the training of pre-service teachers, and ultimately in K-12 classrooms across America. The session will be a presentation and demo of the nanoscience modules.

Integrating Chromebook™ with Vernier Technology**General Science, ALL GRADES****Jackie Bonneau, Vernier Software & Technology**

Learn how to use Chromebooks with Vernier technology in a workshop featuring experiments from Vernier lab books. See how engaging experiments like "Boyle's Law" or "Grip Strength Comparison" teach students about data collection and analysis—practices that promote science inquiry and boost test scores.

SPOTLIGHTS - The Truth Comes Out**General Science, ALL GRADES****Sharon Bowers, National Institute of Aerospace****Craig Freeman, Hampton City Schools/ NIA****Tami Byron, Newport News Public Schools/NIA**

Spotlights are short (<2 minutes) educational videos created by high school students under the guidance of National Institute of Aerospace STEM educators. Each Spotlight explains a STEM concept, targeting student misconceptions and is aligned to national and state standards. The Spotlights are part of an educational package that includes pre and post assessments, engineering design challenges, Marzano's Frayer Model, and NASA hands-on activities. All resources are free and easily accessible.

Innovative SOL Driven STEM Activities**General Science, ALL GRADES****Jill Collins, STEM Academy****Jacob Taylor, STEM Academy****Tommie Evans, STEM Academy**

Learn how hands-on activities that incorporate the VA Standards of Learning can be easily implemented into a STEM activity. The presenters will share lessons and ideas for all grade levels. Attendees will participate in an example activity.

Expand Your STEM Knowledge with NASA Digital Badging**Earth/Space Science, ALL GRADES**

Marilé Colón Robles, NASA Langley Research Center - Office of Education
Kimberly Brush, NASA Langley Research Center - Office of Education
Rosemary Smith, NASA Langley Research Center - Office of Education

Digital badging is an online professional development process for certifying learning. The NASA STEM EPDC Digital Badging System allows you to select from a wide variety of STEM topics, engage in exciting learning opportunities, demonstrate your mastery of the topic, and receive a badge of accomplishment for your work. Discover the variety of opportunities in topic related to Earth/Space Science, Environmental Science, Engineering and more through NASA innovations and hands-on activities.

Viewing Your Content Through a NASA Context**General Science, ALL GRADES**

Marilé Colón Robles, NASA Langley Research Center - Office of Education
Kimberly Brush, NASA Langley Research Center - Office of Education
Rosemary Smith, NASA Langley Research Center - Office of Education

Discover unique ways to teach Earth, Life and Physical Science concepts through NASA's Journey to Mars and discoveries of Earth Right Now. See how NASA engineers, researchers and scientists are applying their knowledge of the water cycle, Earth's atmosphere and farming to grow food on Mars. Also learn about changes to the human body, nutritional needs and protection NASA has learned from astronauts aboard the International Space Station and the One Year Mission.

Crystal Popcorn: Labs, Mini-Projects, and Competitions**General Science, ALL GRADES**

Julia Cothron, MathScience Innovation Center (retired)
Virginia Lewis, Longwood University

Learn the fundamentals of experimental design, data analysis, and making sense of experiments. Brainstorm ideas for additional experiments and refine the ideas through library research. Develop a brief for group mini-projects related to the experimental topic. Learn how mini-project reports can become the basis of science fair displays and/or formal scientific reports. Create the scaffolding needed for students to become effective investigators. Use checklists to assess products. Grades 5-12.

Butterfly Gardening to Raise Caterpillars in the Classroom**Biology/Life Science, ALL GRADES**

Maurice Cullen, Virginia Beach Middle School
Claire Lant, Cox High School

Want to do more with a butterfly garden than just attracting butterflies? This course will present the best nectar and caterpillar food plants. Particular focus will be given to food plants, the species associated with them, and the best ways to raise caterpillars in the classroom. There will also be discussion of predators, parasites, and problems associated with raising caterpillars. The best containers for raising caterpillars, resource books, and mounted specimens will be displayed.

Launching Soon: SAGE III, You Can Celebrate with NASA!**Earth/Space Science, ALL GRADES****Jessica Taylor, NASA Langley**

Kristyn Damadeo, SSAI/NASA Langley
Sarah McCrea, SSAI/NASA Langley

The latest in a string of NASA Earth science instruments, SAGE III, is being launched to the International Space Station soon! There are tons of fun educational activities at all levels that your class can participate in, along with watching the launch live!

Dirty Hands Wash Over Every Environmental Programs' Modality**Environmental Science, ALL GRADES**

Jim Disbrow, Millennium Project
Melinda Bodary VanDevelder, Millennium Project

Up from Plank's length, Food, Energy, Environment, Water, Soil (FEEWS) is a nexus with grounds for biomes' Total Life Cycle strategic goods analyses - including externalities. With hands-in-dirt projects, students will feel FEEWS impacts on each biome. Students can help build their community's gardens by growing (in window-hanging 2-liter chop-top soda bottles) and then planting their biome. Dirty Hands => Finding a Sense of Responsibility for their plants' FEEWS.

For Preservice Teachers: Opportunities through VAST**General Science, ALL GRADES****Arthur Bowman, Norfolk State University**

Suzanne Donnelly, Longwood University
Jenny Sue Flannagan, Regent University
Meredith Kier, The College of William and Mary

Calling all pre-service teachers! As part of its mission, learn how VAST can help you while completing your licensure program and throughout your science teaching career. Local and statewide opportunities await those who are committed to improving Science Education. Come learn how VAST can launch you into your career as a science teacher and score some goody bags and door prizes. Your university supervisors are invited to this session, too!

Best Practices for Lab Activities in the Physical Sciences**Physics/Physical Science, ALL GRADES****Harold Geller, George Mason University**

Attendees will be exposed to activities developed for laboratory sessions or melded lecture/labs. These include activities based upon tactile manipulatives and those dependent upon computer simulations. The pros and cons of both approaches will be exemplified and discussed.

Turning the Labs You Love Into an Inquiry Based Lab**Chemistry, ALL GRADES****Lisa Webb, Christopher Newport University**

What the heck are Inquiry Based Labs? We have all been told that we should be using Inquiry Based Labs, but we like our "old" labs. In this interactive hands-on presentation, we will demonstrate techniques for converting just about any lab into an inquiry based lab.

Craig Doolittle, Dozier Middle School**Christopher Meighan, Christopher Newport University****The Environmental Literacy Model (ELM)****Environmental Science, ALL GRADES****Cindy Duncan, Chesapeake Bay Foundation/ VAST Board****Allyson Gibson, Chesapeake Bay Foundation**

This presentation will walk participants through the Environmental Literacy Model (ELM) which will help to support in the development and curricular integration of Meaningful Watershed Educational Experiences. ELM is a lens with which any subject can be taught to gain a more comprehensive and in-depth understanding of the complex relationships that create our environment and allow for the seamless integration of resources, field investigations and student action projects into the curriculum.

No Teacher, Nor Student, Left Inside - H.E.L.P.**Environmental Science, ALL GRADES****Alexis Tharpe, Phenix PreK-8****Venicia Ferrell, Hampton City Schools Science Department****Betsy McAllister, Hampton City Schools Science Department****Shannon Pohlman, Hampton City Schools Science Department**

This session will be a 'behind the scenes' look at the Hampton City School's Systemic Environmental Literacy Program that is engaging elementary, middle, and high school students. The primary focus of the session will be building teacher capacity to develop MWEs in their classrooms through hands-on activities that can be replicated.

Energy Education for Future Virginia Teachers**General Science, ALL GRADES****Smith Cynthia, George Mason University****Andrew Gilbert, George Mason University****Rebecca Lamb, The NEED Project**

This presentation highlights a pilot program regarding problem-based energy curriculum carried out with ten undergraduate students. This hybrid one-credit course provided experiential understanding of energy generation, measurement and energy flow in an effort to build conceptual understanding of energy. This presentation will demonstrate the hands-on energy modules, describe curricular process as well as provide analysis of student experience and content understanding.

Aquatic Invasion of the Mid-Atlantic States**Environmental Science, ALL GRADES**

Invasive species cost millions to control each year and affect our everyday lives although we may not be aware of them. This session will focus on plant and animal species found in the mid-Atlantic states, how they arrived and how we can prevent their further spread. Participants will receive a copy of the lessons/activities to share with their students.

Suzie Gilley, VA Dept of Game and Inland Fisheries**Use Simulations to Demystify Earth-Moon-Sun Relationships****Earth/Space Science, ALL GRADES****Amanda Gonczi, University of Virginia****Jennifer Maeng, University of Virginia**

Incorporating simulations is a great way to support students' developing accurate understandings of day and night, moon phases, eclipses, and seasons. These important phenomena, caused by earth, moon, and sun relationships, are often a source of misconceptions. In this session we model a conceptual change approach using simulations to teach these concepts. Participants receive resources including lesson plans for the activities presented.

Skeletons in Our Closet: Fossils Tell of Virginia's Past**Earth/Space Science, ALL GRADES****Chris Kaznosky, Shenandoah County Public Schools****Steve Leslie, James Madison University**

Virginia's fossils and rock tell a story of past climates, environments, catastrophes, and change over time that is still occurring today. In this session, you'll use hands-on and technology-based labs to learn about how fossils and rock help us learn about Virginia's geologic past as well as what may be in our future. Take-home materials will be provided.

All for One and One for All: The Importance of Outreach**General Science, ALL GRADES**

The JMU student chapter of NSTA presents their outreach experiences within the diverse community of Harrisonburg City and Rockingham County public schools. Pre-service teacher will describe activities they have done within the community, such as STEM days, and the benefits for both pre-service teachers and K-12 students of getting involved in the local schools. Example demos that many students have grown to love will be shared followed by a Q&A sessions with student members of the NSTA.

Jennifer Kline, James Madison University

Bang for Your Buck: Cross-Disciplinary Work in Science**General Science, ALL GRADES**

In this session, you will gain strategies that allow you to cover a variety of Math, Language Arts and History standards while teaching your Science curriculum. We will discuss how to maximize labs and activities to address a variety of subjects. Participants will receive premade labs along with functional ideas for helping students answer "Why do I need to know this?" questions in other subject areas.

Mark Levy, Roanoke Valley Governor's School**Hydraulic Arm Challenge****Engineering, ALL GRADES**

Looking for a creative Engineering Design Challenge for the next generation of astronauts that promotes critical thinking and teamwork? Want to learn about exciting Virginia Space Grant opportunities for you and your students? In this program you will build a simple hydraulic arm - or a not-so-simple hydraulic arm! You'll learn about the applications of hydraulics in industry, space, and everyday life. Come join us for some engineering excitement!

Kirsten Manning, Virginia Space Grant Consortium**Ian Cawthray, Virginia Space Grant Consortium****3D Printing Technologies and Scientific Modeling****Biology/Life Science, ALL GRADES****Dan Dickerson, East Carolina University****William McConnell, Virginia Wesleyan College****Hilve Firek, Virginia Wesleyan College****Pat Hillard, Nansemond Suffolk Academy**

Although 3D printing technologies are becoming more prevalent across K-12 settings, many science educators struggle to find meaningful ways to incorporate their use in science instruction. Join us to discover how 3D printing technologies can enhance students' spatial abilities and scientific argumentation through students' development and use of 3D printed scientific models.

Using Case-Based Learning in Science Classrooms**General Science, ALL GRADES****Corinne Lindemann, University of Virginia****Frackson Mumba, University of Virginia****Andrew Manning, University of Virginia****Kerry Micheals, University of Virginia**

Case-Based Learning (CBL) increases student understanding of science content knowledge, and inquiry skills. We will demonstrate CBL lessons, and activities we have developed and tested in schools. CBL lessons explicitly address SOLs. Teachers will learn how to write cases, and CBL lessons using the CBL template we have developed. Teachers will also learn how to differentiate instruction using CBL. Teachers will receive CBL template, cases and lessons.

Problem-Based Learning Template, Units and Activities**General Science, ALL GRADES****Jordan Davis, University of Virginia****Frackson Mumba, University of Virginia****Kaitlyn Ray, University of Virginia****Julia DiOrio, University of Virginia**

Problem-Based Learning (PBL) increase student learning and attitude toward science. We will highlight the characteristics of PBL and demonstrate PBL units we have developed and tested in schools. Our PBL units address SOLs. Teachers will learn how to write PBL units, lessons and assessments for their classrooms using the PBL template. Teachers will receive PBL template, and example PBL units and assessments that have been tested in schools.

Are all Hands-on Activities Inquiry Activities?**General Science, ALL GRADES****Sean McClure, University of Virginia****Laura Ochs, University of Virginia****Lelia Troiano, University of Virginia****Toth Csaba, University of Virginia**

Inquiry and hands-on activities increase students understanding of science. What is the difference between an inquiry activity and hands-on activity? Are they synonymous? How would you know which one you are using to engage students in your science classroom? Teachers will be engaged in activities to help them identify similarities and differences between inquiry activity and hands-on activity. Teachers will receive templates for creating ideal inquiry lessons and hands-on activities.

Take the Day Off! Field Trip Adventure Delivered!**Environmental Science, ALL GRADES**

Participants discover a service that provides grant funded*, hands on, authentic science experience for their students! After completion the entire school gets awarded the local watershed service award*! Long term and/or actual field trip options are available! (*Pending approval)

Sarah Pope, Ebbing Tides**Watershed Investigations in a Mud Puddle****Biology/Life Science, ALL GRADES**

Do you think your schoolyard lacks a good place for a Meaningful Watershed Educational Experience (MWEE)? Come find out how to best use the outdoor spaces you have and discover community resources that can help you. We will share with you our school's Cinderella story of a MWEE while providing you with ideas for using the space you have or even developing it into something on a grander scale. In addition to resource suggestions, participants will assemble a mini rain barrel to take with them.

Donna Rowlett, Gate City High School**Dawn Williams, Gate City Middle School**

Citizen Science - Conservation & Stewardship**Environmental Science, ALL GRADES****Sharon Ruggieri, Arlington Mill High School**

This session will focus on two projects that can be integrated across the curriculum for any grade level: Grasses for the Masses and Monarch Way stations. Sponsored by the Chesapeake Bay Foundation, Grasses for the Masses involves growing wild celery from seed and then planting in the James or Potomac Rivers. The Monarch Way station project addresses the threats and conservation efforts to restore the Monarch Butterfly population by increasing reproductive habitat.

Gearing Up with Gizmo Labs in Science**General Science, ALL GRADES****Rebecca Schieber, Explore Learning**

Gizmos are online virtual simulations that can supplement or replace costly and time-consuming labs. Gizmos cover almost all science SOL's from grades 3-12 and allow for teachers to quickly and easily integrate technology in their classrooms. Students and teachers love using Gizmos, which can be used in versatile classroom environments. Come to this session to learn more about using Gizmos in your science classroom!

Effective Teacher Behaviors Promote Robust Learning**General Science, ALL GRADES****Erich Sneller, Harrisonburg High School****Seth Shantz, Harrisonburg High School**

When we teachers are keenly aware of our behaviors with students and choose interactions to consistently promote student engagement, students will develop a sense of belonging and invest themselves in their education. In this session, we will discern what effective and ineffective teacher behaviors look like, how we might enhance our practice, and how these changes can rejuvenate our craft. Please join us to share your ideas and to encourage our collective growth as teachers.

Touring Earth's Big Ideas**Earth/Space Science, ALL GRADES****Rachel Stuart, Eastern View High School****Heather Glick, Eastern View High School**

You will be taken on a world field trip of science topics using Google Tour Builder. Using Google Tour we will emphasize world features that can't normally be seen from a classroom. Exploring everything from the Ring of Fire to river processes and Virginia Geology.

Recognizing Student Achievement in Energy-Related Projects**General Science, ALL GRADES****Kimberly Swan, NEED Project****Rebecca Lamb, NEED Project**

Does your class have outstanding programs in which students learn about energy? The NEED Project conducts the National Youth Awards Program for Energy Achievement to combine academic competition with recognition to recognize those who achieve excellence in energy education in their schools and communities. Come learn about how to get involved!

Become GLOBE Certified Online - Become Citizen Scientists**Environmental Science, ALL GRADES****Jessica Taylor, NASA Langley Research Center****Preston Lewis, NASA Langley Research Center****Tina Harte, NASA Langley Research Center**

Through the GLOBE Program students DO SCIENCE by collecting meaningful and valid environmental data as they conduct their own science investigations, contributing to a database with entries from over 100 other countries! For the first time in 20 years, the GLOBE Program has launched an online teacher training certification! Session attendees will learn how to become GLOBE-trained, discuss practical steps for starting GLOBE in the classroom, and signup for the GLOBE instrument loan program.

Science in the Arctic - Why Should Virginians Care?**Environmental Science, ALL GRADES****Sandra Thornton, Broadwater Academy**

Climate change affects everyone - from coastal to landlocked regions. Learn how to use cutting-edge Arctic research from the Chukchi Sea Borderlands, via PolarTREC and NOAA Teacher at Sea, to enhance student learning. Instructional strategies, lesson ideas, and collaborative opportunities will be provided.

Take One, Action! Student Voices in the Community**Environmental Science, ALL GRADES****Mary Van Dyke, Green STEM Learning**

Planning a year-long civic engagement project? Got actors? My students use the Earth Force process to explore watershed issues. We observe a church garden and identify invasive plants. We practice inquiry, telling stories with story stones and work with puppets (Mr Squirrel, Ms Ribbit) to make science-based films for the congregation. Using this playful collaborative approach, we aim to also grow more native plants, educate, and benefit the ecosystem.

Practical Research Skills and Activities for Teachers**General Science, ALL GRADES****Scott Watson, Liberty University School of Education**

This activity-based presentation will focus on basic quantitative research skills that teachers can utilize to conduct studies in classrooms and schools for the purpose of determining the effectiveness of instructional techniques and curricula. There will also be application of these same skills for teaching students in K-12 settings.

One more session on the next page.

Virginia's Atlantic Slope Mussels – An Imperiled Resource

Environmental Science, ALL GRADES

Brian Watson, Dept of Game and Inland Fisheries

Suzie Gilley, Dept of Game and Inland Fisheries

Virginia's freshwater mussels once carpeted the stream and river beds cleaning water on the way to the Chesapeake Bay, today numbers are greatly diminished. Dept. of Game & Inland Fisheries biologist will share the importance of mussels to the ecosystem and their role in the watershed. Don't plan your Meaningful Watershed Educational Experience without considering freshwater mussels as a water quality indicator and what can be done to protect them.

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Virginia Department of Education Public Hearings

Profile of a Virginia Graduate

Virginia Association of Science Teachers (VAST) is presenting public comment regarding the development of a “Profile of a Virginia Graduate”, and changes to high school graduation requirements and how schools will be accredited in the future with special attention to:

- Implementation of the Every Student Succeeds Act (ESSA) and Virginia’s accountability system.
- Recommendations regarding the Standards of Quality (SOQ).
- Identifying conditions and needs of public education, for updating the Board’s comprehensive plan and annual report to the Governor and General Assembly.

VAST has prepared two responses which follow the schedule below to address these items that will be presented by the following VAST members listed by the location, date, and time of the public hearing. All members of VAST and the public at large are welcomed to attend these public hearings.

Thursday, August 25– Lynchburg

6:30 p.m.

Heritage High School

3020 Wards Ferry Road, Lynchburg, VA 24502

VAST Member: Denny Casey

VAST Member: John Kowalski

Wednesday, August 24 – Abingdon

6:30 p.m.

Southwest Virginia Higher Education Center

One Partnership Cir, Abingdon, VA 24210

VAST Member: Diane Tomlinson

VAST Member: Jill Barkley

Public comments were also sought through public hearings that occurred previous dates with VAST members commenting:

July 14 in Manassas	VAST Member: Susan Bardenhagen	July 19 in Williamsburg	VAST Member: Kyle Hetrick
	VAST Member: Laura Casadorph		VAST Member: Robin Curtis

VAST Statements made at the public hearings by VAST Board Members:

Statement I. Comments to the Virginia Board of Education: focus on #1 the system of support

[Name] [Position] [Date]

My name is _____, and I am speaking today as a [high school/middle/elementary teacher, and member of the Virginia Association of Science Teachers(VAST)/member of the Board of the Virginia Association of Science Teachers (VAST)]. [(optional)I have been a science educator for _____ years.]

The proposed restructuring of options for satisfying the requirements for high school graduation offer an opportunity to provide the support our students need to become contributing citizens in the 21st century. However, the changes proposed must be approached with caution, building upon the strengths of what is already in place in Virginia and also recognizing the diversity of our schools from Fairfax to Wise to Norfolk to Farmville.

Today, I'd like to point out three major areas of concern identified by the VAST Board, along with some suggestions for addressing our concerns. The areas are:

- 1) The system of support underlying the changes laid out in the Profile of a Graduate, including content standards, assessment design, and professional development,
- 2) How the new CTE science courses offered to students under the Profile of a Graduate, the 70-hour half-courses and the other new option, the three year integrated sequence, will incorporate the depth and breadth of science content needed to prepare our high-schoolers for work and life, and
- 3) How the ESSA requirements for verified credit will intersect with the resolve expressed by the Boards of Education and VAST for high quality assessment systems.

I will address the first area of concern, the system of support needed to support the changes proposed. One strength of our system of K-12 science in Virginia is the set of science Standards of Learning developed and revised over the past 30+ years, and under revision currently. These standards have provided a foundation from which all our school districts build their curricula. The Profile of a Graduate calls for a careful revision of these standards to prepare our students with 21st century skills, while not sacrificing increasingly important understandings of science content. Assessments used should be rigorous and varied, requiring the use of higher order thinking skills and applications to real-world situations. The third aspect of the system, professional development, is perhaps the most important. In taking on this ambitious Profile of a Graduate, the Virginia Board of Education must also support a program of professional development that is research-based, includes adequate resources for such professional development, and builds upon the strengths and characteristics of the diversity of school districts across the Commonwealth. How teachers teach remains the single most critical component in a quality education system, and professional development is a key component of developing a population of effective teachers. The ambitious Profile of a Graduate plan will not work unless there are teachers across the Commonwealth who engage with the ideas in the Profile and who are supported by the Virginia Board of Education in the development of their strategies for implementing the vision in the Profile of a Graduate.

We ask that you include in your plans for this revision of our Virginia graduation requirements ample support for the revision of the Standards of Learning, for the development of assessments, and especially for professional development of the teacher workforce that will be at the forefront of these changes. Thank you for your time and attention.

Statement II. Comments to the Virginia Board of Education: focus on #2 & #3, Science credits/ courses and ESSA

[Name] [Position] [Date]

My name is _____, and I am speaking today as a [high school/middle/elementary teacher, and member of the Virginia Association of Science Teachers(VAST)/member of the Board of the Virginia Association of Science Teachers (VAST)]. [(optional)I have been a science educator for _____ years.]

The proposed restructuring of options for satisfying the requirements for high school graduation must be approached with caution.

Today, I'd like to clarify two major areas of concern identified by the VAST Board, along with some suggestions for addressing our concerns. The areas are:

- 1) how the courses offered to students under the Profile of a Graduate will incorporate the depth and breadth of science content needed to prepare our high-schoolers for work and life, and
- 2) how the ESSA requirements for verified credit will intersect with the resolve expressed by the Boards of Education and VAST for high quality assessment systems.

The Board of Education has proposed two options for the sequence of courses that satisfy the science requirements. The first option, is a two-year sequence of four semester courses, one each in the four basic science disciplines of Earth science, biology, chemistry, and physics. It is important for Board of Education members and the public to understand that this semester course is a 70-hour course that is half the time, and probably of necessity half the content of currently offered high school science courses.

There are several problems with this that must be resolved. First, there is the critical choice of what content to cut. For instance, in this increasingly complex technological world, which areas of biology or Earth science in the current standards are those that a literate citizen does not need? Shall we not teach our high schoolers about the environment , or genetics, or about weather, climate, and the ocean?

A second problem is meeting the federal ESSA requirement of a verified credit in science by taking an SOL test. Presumably, the VDOE will need to develop and identify at least one science content area SOL test that will meet the new ESSA requirement for high school science for all students. The students who choose a non-college track in high school, and who have taken half-courses in the science areas, are at a high risk of being ill-prepared to pass an SOL test

in a science area since they only received instruction in half the content. We could have a large population of students in Virginia who fail to meet federal standards for science.

Also, the intended flexibility of the new diploma requirements may not be so flexible after all. Consider this dilemma: if a student chooses to change to a college track or to enter college after graduation with a standard diploma, their science background from high school coursework will be questionable at best, difficult to measure, and may not provide the foundation needed for community or four-year college success.

VAST asks that you include in your plans for this revision of our Virginia graduation requirements careful consideration of the option to offer 70-hour courses, essentially half-courses in science areas. We believe that all our students need complete science courses that prepare our students for adulthood whether they plan on going directly into the workforce or pursuing post-secondary education, upon high school graduation. Thank you for your time and consideration.

Additional Resources on *Profile of a Virginia Graduate*:

http://www.doe.virginia.gov/boe/committees_standing/accountability/2016/02-feb/profile-of-a-graduate-proposal.pdf

<http://www.doe.virginia.gov/boe/meetings/public-hearing-presentation.pdf>

Astronomy, Earth Science Resource

What is CLUSTER?

The University of Virginia's Department of Astronomy is loaning telescopes to educators in Virginia and providing training on how to use them.

Teachers can borrow a kit containing one Meade 8-inch Schmidt-Cassegrain telescope, a tripod, and several eyepieces suitable for viewing a variety of celestial objects. Kits are loaned for three months and can be used to host an evening star party at their school, to conduct experiments with their students, and to enjoy other projects. Thanks to funding from the Friends of McCormick Observatory, the telescopes are now equipped with safe solar filters to allow daytime viewing of the Sun.

CLUSTER is managed by Steve Layman, a long time member of the Charlottesville Astronomical Society. (<http://cvilleastro.org>) From 2010-2013, support for this education and outreach program was provided by the National Aeronautics and Space Administration (<http://www.nasa.gov>) through Chandra award GO0-11097X to Dr. Craig Sarazin of the University of Virginia, issued by the Chandra X-Ray Observatory, which is operated by the Smithsonian Astrophysical Observatory for and on behalf of NASA under contract NAS8-03060. (<http://cxc.harvard.edu>) Current funding is provided by the Friends of the McCormick Observatory. For information on supporting their education and outreach programs, please visit their webpage. (<http://astronomy.as.virginia.edu>)

How To Get Involved

We have **10 telescope kits to loan** out for each session. Each instructor checking out a telescope will be required to participate in a **six hour orientation session** which will be held at the University of Virginia's McCormick Observatory in Charlottesville. The dates and times for these sessions for the next academic year are (all dates are Saturdays):

Sept 10, 2016 4:00 – 10:00 p.m.

Jan 14, 2017 3:00 – 9:00 p.m.

The telescope kits can be transported in the trunk and/or back seat of a passenger car. Telescope kits will need to be returned no later than 3 days prior to the date of the next session.

If you are interested in participating in the project, please send your first and second choice of session dates to Steve Layman by email (slayman2528@comcast.net). To help offset the costs of maintaining the telescopes, there is a \$50 fee to borrow the telescope for the three months.

VAST/TACT Minigrant Award Winner 2015

Stephanie Harry

Kecoughtan High School, Chemistry Teacher

MAT, Chemistry

National Board Certified Teacher

Chemical Investigation Of Tattoo Ink

General Purpose:

More than 20% of the population in the United States has at least one tattoo. A poll study conducted in 2014 showed 1 out of 5 (20%) voters had at least one tattoo. The study also revealed that of the voters with multiple tattoos one-third (34%) were under the age of 30. In 2010, "The Today Show" on NBC stated Richmond, Virginia was ranked as the 3rd most tattooed city. This ranking was based on the high number of tattoo shops per capita in the city. In 2001 the Virginia Beach court overturned an ordinance that was passed after World War II, banning tattoo parlors. Eventually these bans were lifted in other Hampton Roads Cities (Chesapeake, Portsmouth, Norfolk, Hampton etc.) Although it is more common for people to have tattoos the risks associated with tattoos should not be taken lightly. Allergic reactions, skin infections, and blood-borne diseases are some risks that stem from tattooing. Although many risks are the result of insufficiently sterile tattooing procedures sometimes the Tattoo inks present consumers with quite a few risks. The study of tattoo inks helps students to make a connection between chemistry and tattoo. These experiments can be used to reflect upon the importance of chemistry in students' personal lives and decision-making processes.

Goals

At the beginning of the school year students learn "Virginia's Standards of Learning (SOL): CH.1 a-j - The student will investigate and understand that experiments in which variables are measured, analyzed, and evaluated, produce observations and verifiable data."

Students are expected to utilize this SOL throughout the year. The Tattoo Ink Chemistry experiments will be introduced systematically throughout the Chemistry curriculum as inquiry based labs and will be used to help students "CH.1jKa – Make connections between components of the nature of science and their investigations and the greater body of scientific knowledge and research."

Students will experiment with different inks at learning stations and the group data will be entered in a composition bound notebook. Students will be required to "CH.1iSy – summarize their knowledge gained through gathering and appropriate processing of data in a report that documents background, objective(s), data analysis, and conclusions."

Some (but not all) of the SOLs that will be covered from these experiments are:

- **CH.1hSx** – Use appropriate technology for data collection and analysis, including probeware interfaced to a graphing calculator and/or computer and computer simulations.
- **CH.3fSo** – Identify and explain the effect the following factors have on the rate of a chemical reaction; catalyst, temperature, concentration, size of particles.
- **CH.5gSi** – Examine the polarity of various solutes and solvents in solution formation.
- **CH.1a Sf** – Make the following measurements using the specified equipment:
 - Volume: graduated cylinder, volumetric flask, buret;
 - Mass: triple beam and electronic balances
 - Temperature: thermometer and/or temperature probe
 - Pressure: barometer and/or pressure probe.

Before beginning any experiments my students will gather and report on background information about tattoos and tattoo inks. It is my plan for the information to be obtained by interviewing teachers with tattoos, researching the Internet, and informational session from health teacher/professional on tattooing.

SUMMARY

Using the VAST/TACT mini-grant I purchased four(4) different brands of tattoo ink, materials, and equipment to

complete the lab. I had enough ink to create a total of 24 labs groups with 2-4 people in a group. Each group was given a composition book. Students learned how to keep a formal lab notebook and each member of the group was responsible for logging information data into the notebook. Each group was also given four bottles (one for each brand) of tattoo ink. Each group had two different colors for their tattoo ink (Example 2 – bottles were yellow, 2 – bottles red).

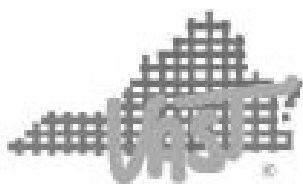
I had to change my plan of my students using teachers and faculty as sources of information about tattoos. Instead I created a “Brief Introduction to Tattoo Ink” and accompanying questions so students to learn how tattoos are done, the parts of tattoo ink (carrier and pigment), safe and unsafe carriers, various types of pigments, and FDA regulations with tattoo ink. Each group had to research the two pigment colors for their tattoo ink.

Students were able to complete four different tattoo ink experiments. The titles for these experiments were: “Flame Test – Tattoo Ink”, “Solubility of Tattoo Ink”, Effect of Tattoo Ink on Living Organisms”, and the “Thermal Stability of Tattoo Inks.” The procedures for each of the lab manual “Experiments with tattoo inks for junior high school chemistry lessons” written by Marc Stuckey and

Ingo Elks, Institute of Science Education (IDN), University of Bremen, Germany. I made adjustments to these procedures to include background information, a purpose, re-writing the procedures, and including analysis and conclusions questions.

It was interesting to see my students making the connection between the tattoo ink experiments performed and Chemistry. Since we used so many different colors and brands we were able to see varying results. I have never worked with tattoo ink before and the entire process was a learning process for me. We ran into problems while trying to perform the flame test on their tattoo ink lab. Although the wooden splints for this part of the lab had been soaking in distilled water for several days before use, the splints would quickly catch on fire while trying to test the tattoo ink. We didn’t experience this problem while performing the tests for dissolved metal salts. One student asked to try a different method for testing the tattoo inks. She took the wet splints added tattoo ink to one end and then wrapped in plastic wrap. She ran a test on these splints during the next class. Although this students test results were the same I was inspired to see my students wanting to expand their research out of the given parameters.

VAST Gift Memberships



Do you know a science educator who isn’t a VAST member? Have you been searching for the perfect gift for a colleague? Now you can give a one year gift membership to VAST! It is simple! Go to [VAST.org](http://vast.org), and click on the Membership page. All you need is your recipient’s name and email address. Both the recipient and you will receive an email from VAST Membership confirming the new VAST membership. You will be supporting your colleague and supporting great science!

Barbara Adcock, Membership Chair

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To sign up online, you will use our online system. Our membership system puts you in control of your membership! You can update your information whenever it changes. The VAST membership database allows you to pay via a secure link using a credit card or you can register and submit payment by mailing in your payment! To register using our secure online system, go to [http:// vast.org](http://vast.org) click on “membership”

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Virginia Space Grant Consortium

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Mission: The Virginia Association of Science Teachers (VAST) is a community of Science educators whose mission is to:



- *inspire students,*
- *provide professional learning opportunities,*
- *build partnerships,*
- *advocate for excellence at the school, local, state and national level.*



Join the VAST community on line. "LIKE" the Virginia Association of Science Teachers so that the latest science educational news will appear on your page. Region 2 has a new Facebook page. Please visit and join our community at:
<https://www.facebook.com/Region2VAST>.

Please send articles, letters to the editor, or labs by the submission deadline, by **October 1, 2016**, for inclusion in the next paper PDI VAST Newsletter.

The Virginia Association of Science Teachers is incorporated in Virginia as a charitable, scientific, and educational organization, is an IRS 501 (c) 3 qualified organization, and is registered with the Virginia Department of Consumer Affairs.

--Menu--