



VAST's Vision:
*Excellence in Science Education
Through Innovation*

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

The Science Educator

Summer 2019

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Vol. 68, No.1

2019 ANNUAL PROFESSIONAL DEVELOPMENT INSTITUTE

November 14-16, 2019

Hotel Roanoke and Conference Center, Roanoke, VA.



Dr. Mike Gil
"How Science Can Save the World"



Dr. Kenneth Wesson
"STEM: If Students Don't Learn the Way We Teach, Then Why Not Teach the Way They Learn?"



Hotel Roanoke, Roanoke, Virginia
The site of the 2019 VAST Professional Development Institute



Dr. Robert Corbin
"STEM Dispositions Create Future Leaders and Innovators"



Dr. R. Miller
"From 23 and Me to Epigenetics Navigating the Ever-Changing Landscape of Science"

The 2019 VAST Professional Institute will focus on the theme: **STEM Starts with Science**. We will examine the role of science in the United States and in public education, and share ways to make your classroom science more engaging and motivating. We will also examine the connections between science and engineering, technology, and mathematics and how to strengthen those connections in our classrooms. We will also prepare teachers to engage with the new 2018 Science Standards of Learning and the skills in the new Profile of a Graduate that are an integral part of

the new standards.

- * Besides presentations related to our theme there will be concurrent session presentations in all subject areas for grades K-12.
- * The general sessions feature speakers who will challenge you with up-to-date scientific discoveries and instructional strategies.
- * Interact with vendors in our Exhibit Hall. Collect samples of new instructional materials and explore cutting-edge technologies.
- * As an added bonus, shop for cool science themed stuff.

Why I Stay in the Classroom

Andy Jackson

Engineering Teacher - Engineering Analysis and Dual Enrollment Engineering

Former Physics and Astronomy Teacher • Science Coordinator

Co-Director of the Governor's STEM Academy • Harrisonburg City Public Schools

Over the last year or two there have been postings on social media of "Why I left the Classroom". Every educator has their reasons for staying or leaving the profession, but after reading a post recently about leaving, I felt compelled to explain why I am staying. Here are some of my reasons for loving this profession 32 years into it with the plan to stay as long as it still feels right.

At the end of my 2nd or 3rd year I made a promise to myself and the kids I hadn't taught yet. If come the end of the year in June, I wasn't excited about how I was going to change things to be better the next year, it was time to find a different job. So here I am with SO many cool ideas for year 33!! I take that promise seriously. There were a couple years I had to reflect and check. But due to a variety of things, I'm just as excited about going back in to year 33 as any other I've taught (just not as nervous!)

Colleagues are a big reason I stay. My colleagues are some fantastic people who have been friends, supporters, and sources of great enjoyment over my three decades of teaching. At first they were friends and mentors. I started with some of the best teachers I've known and they supported me and guided me. Then

they were friends and colleagues and I expanded my network to include people not in my building. There have been great ones I work directly with on a daily basis and there have been others across the state I've gotten to know through organizations of teachers. During my first year a group of physics teachers got together to create a professional learning community and VIP (Virginia Instructors of Physics) was born. We get together twice a year to share strategies and lab ideas and to support each other. As a physics teacher, this gave me a great sounding board for new ideas and a place to ask the tough questions. It has helped shape my approach to teaching as I learned tips and tricks from master physics teachers and exciting newbies at the same meetings. My early colleagues introduced me to the Virginia Association of Science Teachers and I've been a member for at least 30 years - and I've got a life membership. I've served on the executive committee in a few capacities including President. Plugging into this professional organization costs me time away from family and other things I might choose to do, but it has repaid me many times over. The experience enriches me and my students. It's been rare in my career to have missed a VAST PDI and I always am enriched

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From the Executive Director

Have you ever wondered why you do the things you do? I am constantly amazed how time flies and history does not always repeat itself. Sadly, twenty years ago Science was the lead and was receiving all the funding. Those times have changed.

It is now harder than before to get the support you might need to attend a Science PDI. You might have to take personal leave. You might be only able to attend on Saturday. Regardless of the support or the lack of support, you ultimately are the captain of your boat or the pilot of your plane. You make your life the direction in which you choose. So it is important to choose wisely. Support your interests and bring a friend because this year's PDI theme is STEM and together we can lead the way and build cooperation between our colleagues or look at it as a palindrome and go to a METS game. See you in November!

Susan Booth, Ed.S.
Executive Director

PDI Deadlines:



- Oct 15 Last day to register online for the discounted early-bird registration
- Oct 31 Last day to register online and to register for the Donna Sterling Institute, VDOE Thursday SOL Workshops and all ticketed meals. (Sterling Institute, SOL Workshops and ticketed meals are NOT available on site at the PDI.
- After Oct 31 register on site at the PDI

Online Registration: <https://vast.wildapricot.org/Registration-Information>

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Tom Fitzpatrick
VAST President 2019

Fellow VAST members,

Summer is finally here! It is a time to celebrate the success of the past school year, relax and restore our teaching spirit, and plan for next year. Your organization has been working hard and plans are in place for our fall Professional Development Institute- "STEM Starts with Science!" This theme is a great opportunity to help students make connections between subjects and see how what they are learning is all interrelated. We hope to see you all on November 14 to 16, 2019 in Roanoke.

We will start Thursday with the ticketed Donna Sterling Institute and the VDOE workshops followed by Dr. Mike Gil, National Geographic Explorer, NSF Research Fellow, and TED Fellow, who will talk to us about "How Science Can Save the World." Check out Mike at mikegil.com. Mike's talk will be followed by our Regional Challenge and our Night with the Exhibitors. Friday morning, we have the privilege of hearing from Dr. Kenneth Wesson, noted Neuroscientist. Dr. Wesson's talk- "STEM: If Students Don't Learn the Way We Teach, Then Why Not Teach the Way They Learn?" should motivate us to question and improve the way we deliver instruction. Please consider attending the dinner Friday evening, but if you can't make it please come to hear Dr. Ken Miller talk about "From 23 and Me to Epigenetics: Navigating the Ever-Changing Landscape of Science" and stay for the VAST awards. Anyone who has heard of the famous Miller and Levine biology textbook is familiar with Dr. Miller's work. Our final general session on Saturday features Dr. Robert Corbin, Director of Global STEM Initiatives for Discovery Education. Dr. Corbin will speak on "STEM Dispositions Create Future Leaders and Innovators."

During the institute you will also have the opportunity to attend ten breakout sessions from close to 200 choices. From content knowledge to make and take activities to ideas on how to be a better teacher- it's all there and you will come home on Saturday fired up and motivated to get back to your students. And I can also recommend spending three days enjoying the fall colors in the Blue Ridge mountains of Roanoke, Virginia! Plan now to attend. If time away from school is a challenge, we also offer a Saturday only rate which includes four breakout sessions, Dr. Corbin's Keynote, and time with the exhibitors.

Tom Fitzpatrick

Thomas F. Fitzpatrick
Supervisor of Science and Mathematics
Roanoke City Public Schools
President Virginia Association of Science Teachers

**In Facebook search for "Virginia Association of Science Teachers" and "Like" the VAST site.*

and energized by them. I have been privileged to work with school systems who have supported my attendance, but I know colleagues who have chosen to take the personal days and pay the costs themselves to attend. They know the value of connection.

The content keeps me thinking, problem solving and growing.

I love physics and for the first 15 years or so that is essentially all I taught. After year 6 there was a school change and then around year 15 or so I added Astronomy to my course load. Those changes gave me exposure to even



more people as I began to become a seasoned teacher. For the last several years have I turned to teaching what I thought I wanted to be when I grew up- Engineering. Additionally I am a part time teacher and part time administrator as a school division science coordinator and co-director of the Governor's STEM

Academy in Harrisonburg. Every aspect is so engaging for me. As for my classroom, I love seeing my students grow in their ability to work complex problems using cad, simulations, laser cutter, 3D printers, band saws, drill presses, and hand tools. Then to sit back and watch them present what they have accomplished is an amazing feeling. It also put me back in rookie mode and the learning has been fresh and exciting.

The kid connections are the most fundamental reason I choose to stay.

Sometimes I'm allowed to really reach and teach a kid. To be told I've done more for a young lady than her father ever did is both heart breaking and stirring. To hear from PhD's and engineers that my class made a difference to them on the path to their degree is an awesome feeling. To share an inside joke on Facebook with an electrical engineer and a PhD brain researcher about something that happened in my class is a joy I cannot describe. To be greeted enthusiastically by a 2nd grader on a field trip to tell me I taught his Momma - and to know the positive role school played in her and his life makes me KNOW we are doing great things. He was in our school day care as I taught his mother Astronomy. What problems could make me leave? A very troubled girl from my first year introduced herself to me a decade later so excited to tell me she works in a medical lab! Her face was the illustration of pride and accomplishment. The last conversation I remembered having with her was when she was suspended and was explaining to me how her mother made her fight the other girl on the adjacent parking lot to the school.



Her mother drove her there to make her fight. I will always remember her name and face and know that school was what allowed her to be something she didn't think she could ever be.

The stories are endless and most of you probably stopped reading this a while back. My point? For every problem I've faced that made me wonder

about my career choice, I've had a dozen moments I can't imagine having lived without. Yes I have been frustrated by long hours and lower pay than the profession deserves. I've even been occasionally frustrated by decisions made by my superiors in the building, in the Department of Education, in State government, and certainly by the federal government. But those pale in number and cannot even begin to compare in intensity to the positive feelings I've experienced. I've explained my religious views hiking out of the Grand Canyon. I've sat at THE table in Green Bank, WV explaining the Drake equation (where it was originally proposed) to students pondering the mysteries of the universe. I've cried in front of a class after a "wear your seat belt" assembly only a year after losing a student and was comforted by a kid I didn't think cared about anyone's feelings. I've helped a student get a full ride to college when she didn't have any plans on going. She simply knew there was no way she could pay for it. I've questioned why a student was in my class to be later blown away by the insight he showed in spite of, and perhaps due to, his disability. These things happen regularly. There are fantastic teachers I work with who have greater impact on more kids than I do. I hope you are one of them. The goal in my opinion is to make sure every kid in the building has some adult in their corner, looking out for them and cheering them on. I'm working hard to make sure my young friends and colleagues who may see me as a mentor are prepared to keep enjoying the gifts this profession delivers. At some point I may need to step out and I want to know there are two dozen teachers better than me ready carry the torch.



Andy Jackson

ajackson@harrisonburg.k12.va.us

VAST SCHEDULE AT A GLANCE - 2019

Wednesday, November 13, 2019

7:00 p.m. - 8:30 p.m. **VAST Board of Directors Meeting & Dinner**

Thursday, November 14, 2019

Ticketed Donna Sterling Institute *(Separate from PDI)*
"The Power of Problem-Based Learning for Teaching STEM"

8:00 a.m. **Sterling Institute Continental Breakfast and Check in**

8:30 a.m. - 3:00 p.m. **Sterling Institute Presentation and Lunch**

2:30 p.m. - 5:15 p.m. **VAST PDI Registration Desk Open**

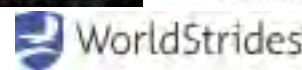
3:15 p.m. - 5:00 p.m. **Ticketed PDI SOL Update Workshops Sponsored by VDOE**
(Separate workshops for ELEM., M.S., & H.S. teachers)

5:30 p.m. - 6:45 p.m. **General Session I – Welcome to the PDI**

Speaker: Dr. Mike Gil, University of California Santa Cruz & NOAA
"How Science Can Save the World"
(Door prize giveaway at the end of the session)

6:45 p.m. - 7:30 p.m. **Regional Science Challenge**

7:30 p.m. - 9:00 p.m. **Night with the Exhibitors**



Friday, November 15, 2019

7:15 a.m. - 5:00 p.m. **Registration Desk Open**

7:30 a.m. **Continental Breakfast in the Exhibit Hall**

7:30 a.m. - 10:30 a.m. **Exhibit Hall Open**

8:30 a.m. - 9:20 a.m. **Concurrent Session 1 Breakout Presentations**

9:35 a.m. - 10:25 a.m. **Concurrent Session 2 Breakout Presentations**

10:40 a.m. - noon **General Session II - Business Meeting**

Speaker: Dr. Kenneth Wesson, Educational Consultant Neuroscience
"STEM Students Don't Learn the Way We Teach, Why Don't Not Teach the Way They Learn?"
(Door prize giveaway at the end of the session)

Noon - 1:00 p.m. **Ticketed Buffet Lunch**

12:30 p.m. - 6:00 p.m. **Exhibit Hall Open**

1:10 p.m. - 2:00 p.m. **Concurrent Session 3 Breakout Presentations**

2:15 p.m. - 3:05 p.m. **Concurrent Session 4 Breakout Presentations**

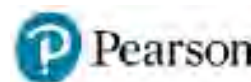
3:20 p.m. - 4:10 p.m. **Concurrent Session 5 Breakout Presentations**

4:25 p.m. - 5:15 p.m. **Concurrent Session 6 Breakout Presentations**

6:15 p.m. - 7:00 p.m. **Ticketed Dinner** *(Cash Bar)*

7:00 p.m. - 8:15 p.m. **Speaker: Dr. Ken Miller followed by Awards Ceremony**
"From 23 and Me to Epigenetics: Navigating the Ever-Changing Landscapes of Science"

8:30 p.m. - 10:00 p.m. **DJ and Auction**



Saturday, November 16, 2019

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

7:30 a.m. **Continental Breakfast in the Exhibit Hall**

7:30 a.m. - 11:15 a.m. **Exhibit Hall open**

8:30 a.m. - 9:20 a.m. **Concurrent Session 7 Breakout Presentations**

9:35 a.m. - 10:25 a.m. **Concurrent Session 8 Breakout Presentations**

10:25 a.m. - 11:15 a.m. **Last Chance to Visit the Exhibit Hall - Exhibitor Door Prizes**
(No other events scheduled, all exhibitors will remain open until 11:15)

11:00 a.m. - 11:25 a.m. **Pickup Ticketed /Box Lunch to eat during General Session III**

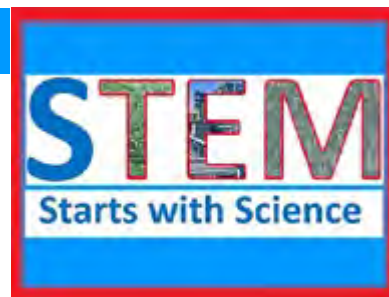
11:30 a.m. - 12:45 p.m. **General Session III - Meet your new VAST officers**

Speaker: Dr. Robert Corbin, Discovery Education
"STEM Dispositions, Create Future Leaders and Innovators"
(Door prize giveaway at the end of the session),

1:00 p.m. - 1:50 p.m. **Concurrent Session 9 Breakout Presentations**

2:05 p.m. - 2:55 p.m. **Concurrent Session 10 Breakout Presentations**

(Giveaways at the end of each presentation of concurrent session 10 are provided by Vernier, Five Ponds Press and Mike Gil.)





COMMONWEALTH of VIRGINIA

DEPARTMENT OF EDUCATION

PO BOX 2120
Richmond, 23218-2120

DATE July 2, 2019

TO: Science Educators

FROM: Anne M Petersen, Ph.D.
Science Coordinator
Office of STEM and Innovation

Myra Thayer and Josh Bearman
Science Specialists
Office of STEM and Innovation

SUBJECT: 2019 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 2019 VAST Professional Development Institute (PDI), STEM Starts with Science, to be held November 14-16, 2019, at Hotel Roanoke and Conference Center, Roanoke, 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 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* as well as Virginia Department of Education initiatives. In addition, presentations will be conducted by nationally known keynote speakers. The VAST PDI Thursday Workshops, conducted by the VDOE Science Team, are designed to provide educators and administrators the opportunity to learn about the changes in the science standards as well as support for the implementation of the 2018 Science Standards of Learning Curriculum Framework.

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 while learning strategies to be used in the classroom.

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.



2019 VAST PROFESSIONAL DEVELOPMENT INSTITUTE

THURSDAY EVENING GENERAL SESSION SPEAKER

Sponsored by National Geographic Learning/Cengage Learning

Dr. Mike Gil

Research Fellow, University of California, Santa Cruz &
The National Oceanic and Atmospheric Administration (NOAA)

“How Science Can Save The World”



Science can save the world, as we know it – for us, for our children, for our grandchildren, for our species. However, science is powerless to protect and enhance the human experience if it is not embraced by the public. In fact, everyday people are the engine that drives science, through public support and through tax dollars. And a critical entry point to captivate the public with a personal appreciation for science occurs during the formative years of K-12 education. I am a marine biologist who went from

hating what I thought science was as a kid to dedicating my life to science, which, I learned firsthand, is an exhilarating, creative process of discovery. In this talk, I will draw from my experiences on an unlikely path to a career in science and in my dual role as a scientist and science advocate to explore ways that we can make the often misunderstood and unjustly-politicized process of science accessible to all.

Bio:

Dr. Mike Gil is a marine biologist, a TED Fellow, and a National Geographic Explorer. He has led research around the world: from coral reefs in the Caribbean, French Polynesia and Southeast Asia, to ‘microislands’ of plastic garbage, teeming with life, in the middle of the Pacific. Mike’s discoveries, covered by various national and international media outlets, are unified by a common goal: better understand how environmental change shapes natural ecosystems, which provide essential services to humankind. In addition to his scientific research, Mike is an award-winning science communicator with broad interests in connecting diverse swaths of

the public with the process of scientific discovery and all that it offers to individuals and to humankind. These interests are fueled by Mike’s own unlikely path from humble roots to a career in science. Thus, he founded and runs the 501(c)3 nonprofit, SciAll.org, which uses unconventional videos to diversify interest in science and STEM careers. By bringing mass online audiences along for the adventures of his career, including encounters with sharks, whales and other underwater wonders, Mike aims to deliver a timely message: science is an exhilarating process of discovery, accessible to all and in the service of all.

FRIDAY MORNING GENERAL SESSION SPEAKER

Sponsored by School Specialty

Dr. Kenneth Wesson

Educational Consultant: Neuroscience

“STEM: If Students Don’t Learn the Way We Teach, Then Why Not Teach the Way They Learn?”



We often hear educators proclaim, “I teach science” (or other content areas). However, more correctly stated, we do not teach subjects, we teach students, who arrive at our classroom doors with an ever-increasing range of personal backgrounds. Futurist Alvin Toffler was fond of saying that we must “learn, unlearn and re-learn” to survive, but instructional effectiveness in the

21st century classroom is also governed by this survival strategy. We frequently have a binary choice: Teach students how we were taught to teach or teach our students the way they learn. While we cannot choose the students we want, but we can choose the methods by which we actively engage the students we get every year.

Bio:

Dr. Kenneth Wesson is a former faculty member and administrator in higher education. He delivers keynote addresses on the neuroscience of learning for educational organizations and institutions throughout the United States and overseas. His audiences range from early childhood specialists to college and university-level educators. His international audiences have included educators and administrative officers from six of the world’s seven continents. His research is frequently published and referenced in Parents Magazine, HealthNet, and the journal Brain World. He is

an active member of Scientists without Borders and serves on the advisory boards for the Korean Institute of Brain Science, Kids at Science, and the International Association of STEM Leaders. He can be seen on PBS specials on human learning and the teenage brain. In 2017, Wesson was selected to receive the Marquis Who’s Who Lifetime Achievement Award.

He has been a keynote speaker/featured speaker for many diverse national organizations.



2019 VAST PROFESSIONAL DEVELOPMENT INSTITUTE

SATURDAY MORNING GENERAL SESSION SPEAKER

Sponsored by Discovery Education



Dr. Robert Corbin

Director-Global STEM Initiatives,

Discovery Education Associate Professor at the University of North Carolina at Charlotte

“STEM Dispositions Create Future Leaders and Innovators”



Collaboration, Communication, Creativity and Critical Thinking do not come easily for any group from “Pre-K to Gray”. People rarely describe scientists, and technicians, artists and engineers as “people like me”. In this session participants experience how STEM dispositions engage and empower students affectively, cognitively and kinesthetically and consequently prepare them to solve the world’s most vexing problems. We often hear educators proclaim, “I teach science” (or other content areas). However, more correctly stated, we do not teach subjects, we teach students, who arrive at our classroom

doors with an ever- increasing range of personal backgrounds. Futurist Alvin Toffler was fond of saying that we must “learn, unlearn and re-learn” to survive, but instructional effectiveness in the 21st century classroom is also governed by this survival strategy. We frequently have a binary choice: Teach students how we were taught to teach or teach our students the way they learn. While we cannot choose the students we want, but we can choose the methods by which we actively engage the students we get every year.

Bio:

Robert Corbin is a Doctor of Philosophy in Curriculum and Instruction with an emphasis in Science Urban Education and a National Board Certified Science Teacher serving as Director of Global STEM initiatives for Discovery Education. Robert served as Vice President of Learning Experiences at the Discovery Place Science Center in Charlotte, NC between 2007 and 2016. He served the Charlotte Mecklenburg School system as Earth Science Academic Content Coach from 2005 through 2007. He is a North Carolina Science Leadership Fellow, North Carolina LASER (Leadership Assistance for Science Education Reform) faculty member, NSRC (National Science Resource Center) faculty member, a founding member of the Bank of America Teaching Fellows and Affiliates program and science facilitator for the National Board Teacher Support Program for Charlotte

Mecklenburg Schools. Robert also serves as a Facilitator for the NSF funded eMSS (E-mentoring for Student Success) science and math teacher support program Robert has taught a variety of technology and science courses in a variety of public high school, middle school and university settings for about 20 years. He currently serves as associate professor at the University of North Carolina at Charlotte and adjunct professor at Wingate University. He is an Arts and Science Council Lifetime Achievement Award recipient, Christa McAuliffe Fellow, North Carolina Science Leadership Fellow, Duke University Sawyer Fellow, Time Warner Cable All Star Teacher, Ben Craig Award recipient, Omnicron Psi Outstanding Science Teacher, Whitehead Educator of Distinction, and NAGT Outstanding Earth Science Teacher of the Southeastern United States.

Journal of Virginia Science Education (JVSE) News

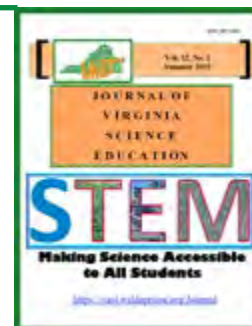
Look for the summer 2019 JVSE that includes six great articles, each of which takes a unique look at ways to increase student participation in STEM education. You can download this issue on the journal homepage.

It is still not too late to submit an article for the winter 2020 issue. The deadline for submission has been extended to July 31st. *Computer Simulation Used for STEM Education* is the theme

Get ready to start writing! The theme for the summer 2020 issue is “The outdoor science classroom.” JVSE is looking for articles that describe lesson activities, research or a literature focused look

at how outdoor science classrooms can solve a challenge in education. An outdoor classroom includes any location outside that is used to teach students about science including a butterfly garden, formally designated outdoor classroom space, field site and many others. We really want to know how you are using the outdoors to enrich your science instruction!

Please visit the Journal webpage (VAST.org>Publication>Journal) for publication and review guidelines and email your questions and manuscripts to journal@vast.org.





Donna Sterling Institute

Hotel Roanoke
Thursday, November 14, 8:00am - 3:00pm



The Donna Sterling Institute is pleased to announce plans for the Sterling Institute to be held at the Hotel Roanoke on November 14, 2019 from 8-3. You may have heard about Virginia Initiative for Science Teaching Achievement-VISTA. Donna Sterling was instrumental in her vision of problem-based learning as a means of teaching not only science but integrating science with math, engineering and technology. Students also learn to use language arts skills to communicate their findings with one another and in some cases school boards or town councils. Here is your chance to learn how to implement this powerful teaching vision and to become excited about your teaching.

The cost is \$100, (includes breakfast and lunch). You can register online at www.VAST.org
Registration closes on October 31. NO onsite registration.
The VAST VDOE SOL Workshops and VAST PDI follow the Sterling Institute.

Note: Registration for the Sterling Institute does not register you for the VAST PDI and, nor does registration for the VAST PDI entitle you to attend the Sterling Institute.

Title: *The Power of Problem-Based Learning for Teaching STEM*

Description: Frank Niepold, teaching climate lead for NOAA's Climate.gov web portal will speak on climate resiliency. This will model how to identify a current problem. Using a current science topic, climate science, the leaders will next demonstrate how to develop a problem-based learning unit that is adaptable for elementary through high school. Engineering, mathematics, and reading in the content area are all essential to PBLs - we won't break them out; we'll embed them! You'll find that PBLs strongly support the 5 C's: Critical Thinking, Creativity, Communication, Collaboration and Leadership, and Character. There will also be an example of a developed PBL.

In the afternoon, teachers will begin developing their PBL on a topic of their own choice. Teachers may work in groups or solo. Participants will be assisted by veteran PBL teachers. Participants may have the opportunity to have their PBL published.



VAST PDI WORKSHOPS ON THE 2018 SCIENCE STANDARDS OF LEARNING AND THE 2019 SCIENCE CURRICULUM FRAMEWORK

**Sponsored by the Virginia Department of Education Thursday November 14,
3:15pm – 5:00pm**

October 18, 2018, the Virginia Board of Education approved the 2018 Science Standards of Learning. The Standards of Learning are a critical communication with the citizens of the Commonwealth, parents, the business community, and higher education, because the standards convey expectations and intended outcomes for K-12 education. Equally as important, the standards and the frameworks serve as the key guidance for instructional leaders and teachers of science (elementary, middle, high school) in planning science curricula and science programming. The 2018 Science Standards of Learning include significant edits to enhance clarity, specificity, rigor, alignment of skills and content, and a reflection of the current academic research and practice.

The purpose of these workshops is to inform teachers of the changes to the 2018 Science Standards of Learning and the 2019 Science Curriculum Framework. In addition, the presentations are designed to provide teachers with an understanding of the instructional shifts needed to implement the standards and to support Deeper Learning. Classrooms that support the

implementation of the 2018 Science Standards will focus on conceptual understanding versus an emphasis on terminology. Teachers will need to include opportunities in their instruction for students to engage in Science and Engineering Practices and to engage in common experiences in order to build conceptual understanding.

There will be three separate workshops for elementary school teachers, middle school teachers, and high school teachers. The three workshops will meet at the same time shown above in different rooms.

Each workshop is limited to a maximum of 50 teachers.
No cost

A teacher must be registered for the VAST PDI in order to register for one of the VDOE workshops. Online registration opens on March 15 and closes on October 31.

Online workshop registration is required by October 31.
On site registration will not be available.



FRIDAY EVENING AWARD CEREMONY SPEAKER

Ken R. Miller, Ph.D.
Professor of Biology at Brown University.
Coauthor of a High School Biology Textbook.



Dr. R. Miller
"From 23 and Me to Epigenetics
Navigating the Ever-Changing
Landscape of Science"

"From 23 and Me to Epigenetics Navigating the
Ever-Changing Landscape of Science"



Science refuses to stand still. In the life sciences, CRISPR, gene editing, and epigenetic analysis are upending the way in which we think about Biology, and similar changes are afoot in other fields. How do we meet these challenges and prepare our students for a lifetime of dynamic scientific change?

Kenneth R. Miller is Professor of Biology at Brown University. He is life sciences advisor to The News Hour on PBS and coauthor of the nation's leading high school biology textbook. In addition to his research work in cell biology, he has written extensively on evolution, and in 2005 he served as lead witness in the Kitzmiller v. Dover trial on evolution and intelligent design. His books include *Finding Darwin's God: A Scientist's Search for Common Ground between God and Evolution* (2009), *Only a Theory: Evolution and the Battle for America's Soul* (2008), and most recently, *The Human Instinct: How we evolved to have Reason, Consciousness, and Free Will* (2018).

Among his honors are the Public Understanding of Science Award from AAAS, the Stephen Jay Gould Prize from the Society for the Study of Evolution, the Gregor Mendel Medal from Villanova University, and the Laetare Medal from Notre Dame University.



"Gene Editing" by National
Institutes of Health (NIH) is
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Auction, DJ and Celebration

2019 VAST Exhibitor Booth Raffles Teachers: Fill out raffle tickets at the exhibit booths on Thursday evening, Friday, and Saturday in the exhibit hall. Winning tickets will be drawn on Saturday morning and posted in the Exhibit Hall at 10:25am. Winners must pick up their prize by 11:15am on Saturday. VAST Bucks–Scratch Dent Auction.

VAST BUCK \$\$\$\$\$ Are used for the Friday Night Auction. Everyone 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. Where else have you had the chance to burn through hundreds and thousands of other people's money?

HOW TO EARN VAST BUCKS \$\$\$\$

Exhibitors will handout VAST bucks during the open hours of the Exhibit Hall on Thursday and Friday.

HOW ABOUT AN AUCTION?

There is seldom a better floorshow 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! Real money isn't good at the auction, only

VAST bucks! Auction items include donations from vendors and teacher attendees.

PLEASE DONATE

A FEW RULES TO FOLLOW FOR THE AUCTION:

- **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!

Hotel Roanoke and Conference Center

110 Shenandoah Ave NE, Roanoke, VA, 24016; phone: 540-985-5900



The Hotel Roanoke VAST room block was full as of June 19. You may still click the Hotel Roanoke link on the PDI page of the VAST website to try to make a reservation. If someone cancels the VAST reservation the block will re-open.

Contact Susan Booth if you would like to be on her list for possible rooms at the Hotel Roanoke (susan.science@gmail.com). Go to the VAST web PDI page to access the 2019 Hotel Roanoke reservation page. The Hotel Roanoke Room rate is \$129.00+tax=\$146.16 (single or double) For phone reservations please dial: 1 (540) 985-5900 with reference to group name: Virginia Association of Science Teachers. Be sure to tell them the reference group name in order to get the VAST group rate.

Hotel Roanoke WiFi information:

Free wifi is available throughout the hotel for registered guests of the hotel. Others attending the PDI can purchase a daily wifi plan by logging in to the hotel website.

Parking:

- Self-parking is available in the hotel pay lot (corner of Williamson Road and Wells Ave). Valet parking is available at the main hotel entrance.
- Handicap parking is available at the Wells Ave. hotel entrance.
- The Gainsboro public pay garage is located at 25 Shenandoah Ave NW two blocks from the Hotel Roanoke

- The Tower public pay garage is located at 10 S. Jefferson St., directly across the pedestrian bridge connecting the Hotel Roanoke to the downtown area.
- Street parking is available around the hotel (be sure to read the signs for restrictions).

2019 VAST PDI Overflow Hotel Reservation Information:

Booking information for **Courtyard by Marriott - Airport**
Courtyard by Marriott, Roanoke Airport – Group name: 2019 VAST PDI

Booking information for the **Holiday Inn-Tanglewood**
Holiday Inn - Tanglewood - Group name: 2019 VAST PDI

Check the VAST PDI webpage for updates on hotels.

2019 PDI Meal Menus may be found on the VAST PDI webpage.

Contact Executive Director Susan Booth if you have questions or wish to be on a wait list at executive.director@vast.org.

Resource Opportunity:

Start a FREE Girls Who Code Club Today!

Join students and educators across the country by partnering with **Girls Who Code** to bring computer science opportunities to elementary, middle, and high school girls in your community! **Girls Who Code Clubs** (<https://girlswhocode.com/clubs/>) are FREE after-school programs for 3rd-5th or 6th-12th grade girls to join a sisterhood of supportive peers and role models and use computer science to change the world. Learn more by checking out our **Clubs Overview** or by joining an upcoming **Girls Who Code webinar**.
Ready to join the movement? Complete a Clubs application on-line!

Have questions? Contact Amy Layman at amy.layman@girlswhocode.com

Environmental Science: Sustaining Your World

G. Tyler Miller, Scott Spoolman



First Edition ©2017
9781305637429


Elevate Environmental Science instruction with the only high school program built with National Geographic content, images, and Explorers.

- Promote scientific understanding of environmental issues and show how science and engineering practices are used to solve real-world environmental problems
- Address the Next Generation Science Standards by integrating 3-dimensional learning
- Comprehensive Engineering Design Projects meet STEM needs
- Special National Geographic features include a live-data biodiversity survey in the Okavango Delta in Africa, citizen science projects, and the contributions of nature museums and preserves

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Expert content and National Geographic imagery for Environmental Science



SCIENCE FOCUS 3.3

WATER

Without water, Earth would be a barren planet. Water's unique properties make it one of nature's most extraordinary compounds. Here are a few of the reasons why water is so essential.

Water exists as a liquid over a wide range of temperatures. At the global scale, water isn't too important, but what if liquid water had a narrower temperature range for being liquid and boiling? Life as we know it wouldn't exist.

Most water has a high heat capacity. In other words, water can absorb a large amount of thermal energy. It takes a lot more energy to raise the temperature of water than it does to raise the temperature of most other liquids. This property of water helps regulate temperature and is essential for life.

Water expands when it freezes. This is unusual because most substances contract when they freeze. Water expands because of its unique hydrogen bonding, which creates a crystalline structure that is less dense than liquid water.

Water is essential for life. It is the only substance that exists in all three states of matter (solid, liquid, and gas) on Earth. It is also the most abundant molecule in the universe.

The Carbon Cycle

Carbon is the basic building block of the carbohydrates, fats, proteins, DNA, and all other organic compounds required for life. Carbon is found in every cell of your body. It is part of the carbohydrates molecules produced through photosynthesis and water is a byproduct of this process.

Global Warming

Global warming is the increase in the average temperature of the Earth's atmosphere and oceans over the past century. This is caused by the greenhouse effect, where greenhouse gases trap heat in the atmosphere.

Water Resources

Water is a finite resource, and its distribution is uneven across the globe. Freshwater is only about 2.5% of the total water on Earth, and most of it is locked in ice or deep underground.

Water Pollution

Water pollution is the contamination of water bodies by harmful substances. This can be caused by industrial waste, agricultural runoff, and household sewage.

Water Conservation

Water conservation is the practice of using water efficiently to reduce consumption. This can be achieved through simple measures like turning off the tap while brushing your teeth and using water-saving devices.

Impactful National Geographic images

Encourage critical thinking skills

Reader-friendly content and scientific vocabulary

Frequent in-chapter and end-of-chapter questions support student understanding

Learn more at:

NGL.Cengage.com/SustainingYourWorld

2019 VAST PROFESSIONAL DEVELOPMENT INSTITUTE DRAFT CONCURRENT SESSION PRESENTATIONS LIST

November 14-16, 2019
Hotel Roanoke, Roanoke, Virginia

(Draft as of June 24th)

COMMERCIAL EXHIBITOR PRESENTATIONS

PBL Project, DOK 3-4 Strategies, & the VA Science Standards

ALL GRADES, General

Ben Bache, PBL Project

FREE BOOKS! This session examines how PBL Scenarios and Critical/Creative Thinking Exercises (STEM Challenges, Deductive Reasoning Tasks, etc.) can be used to promote 21st Century Skills, while also reinforcing the content outlined in the VA Science Standards. Attendees will receive free strategy guides appropriate for their grade level. (commercial exhibitor)

Collisions and Friction - Smithsonian Science for Grade 5

ELEM, Physics/Physical Science

Erik Benton, Carolina/Smithsonian Science for the Classroom

Knans Griffing, Carolina/Smithsonian Science for the Classroom

We will engage participants in the Smithsonian's new module "How Does Motion Energy Change in a Collision?". Using Bumper Cars participants will experience first hand how students: plan & carry out an investigation using a fair test, represent data on distance moved of a stationary object to identify cause & effect relationships, construct an explanation that faster objects have more motion energy and whether the texture of a surface affects the motion of a sliding object. (commercial exhibitor)

Quick and Easy Experiments Using the Latest Technology

ALL GRADES, General, STEM

Jackie Bonneau, Vernier Software & Technology

Participate in fun, engaging, hands-on STEM activities using a variety of Vernier sensors that will teach students about data collection and analysis—practices that promote science inquiry, improve science literacy, and boost test scores. Help prepare students to meet state standards through lessons and experiments that support three-dimensional learning. (commercial exhibitor)

Science and Engineering Practices is not a Stand-alone Unit

ELEM-MS, General

Kim Dye, Delta Education/FOSS

Diana Velez, Delta Education/FOSS

The Science and Engineering Practices describe behaviors that scientists engage in as they investigate the natural world and that engineers use as they design and build models and systems. Regular use of the practices strengthens student thinking and helps apply them to new contexts. Experience a FOSS investigation that authentically incorporates the practices while learning science content. (commercial exhibitor)

AccuSTEMize your Students to Perseverance in STEM Tasks

ELEM-MS, Engineering, General

Margo Dye, Houghton Mifflin Harcourt - HMH

Hands-on explorations with engineering tasks that follow a learning progression, building on applied knowledge. The integration of 3-D learning, specifically the SEPs, make this immediately applicable to your K-8 classroom. Participants to need to come ready to interact, create, and most importantly, have fun! Make it – Take it! (commercial exhibitor)

Science First...Reading and Writing Will Follow

ELEM-MS, General

Kim Dye, Delta Education/FOSS

Diana Velez, Delta Education/FOSS

Hands-on science experiences provide three key factors not provided by traditional reading programs. Hands-on experience is motivating, is the fastest way to build background knowledge, and provides context for language for students who struggle with reading and writing. When we flip the instructional sequence, so the hands-on experience comes first, all students have a common experience from which to build content, an authentic way to acquire language, and a purpose for reading and writing. (commercial exhibitor)

Teaching STEM design practices that stick!

MS, General

Kim Dye, Delta Education/FOSS

Diana Velez, Delta Education/FOSS

Engage as a student learner with the new FOSS Variables and Design course to consider the roles of scientists and engineers, learn about variables and experimental design. In this hands-on session, we explore rubber-band powered trolleys along a line to think critically about motion. (commercial exhibitor)

Science for All Students—Access and Equity

ELEM-MS, General

Kim Dye, Delta Education/FOSS
Diana Velez, Delta Education/FOSS

Providing equitable learning opportunities for all students requires knowing the curriculum, understanding the diverse needs of students, and responding effectively to those needs. Join us for a closer look at how the FOSS program provides both universal access and targeted instruction for your most vulnerable students. (commercial exhibitor)

Think Like and Engineer with Phenomenal Science Instruction!

ELEM-MS, Engineering, General

Tom Gantt, Amplify Education

Teachers will learn how student driven engineering internships can incorporate all aspects of the new Science & Engineering Practices from the 2018 Virginia Science Standards of Learning while encompassing the “Five C’s” competencies. This session will engage educators with hands-on activities, digital tools, active reading and dynamic discussion with the purpose to integrate phenomena-based science instruction around real-world problem solving. (commercial exhibitor)

Unpacking VA Science Standards with Phenomenal Instruction

ELEM-MS, General

Tom Gantt, Amplify Education

Teachers will learn how phenomena-based science instruction designed around real-world problem solving can incorporate all aspects of the VA Science Standards while blending the “Five C’s”. Teachers will unpack the content strands as they relate to the six critical components for achieving science literacy. This session will engage educators with hands-on activities, active reading and dynamic discussion with the purpose to design instruction with 3-Dimensional Learning Statements. (commercial exhibitor)

National Geographic Learning’s Panorama Science

ELEM, Biology/Life Science, General

Sara Heindorf, National Geographic Learning/ Cengage

In this session, we’ll explore National Geographic Learning’s newest ELA and Science program: Panorama Science. By looking at the benefits of its online learning platform, MindTap School, attendees will see the interactive tools for K-5 students and how our digital platform helps Science come to life. (commercial exhibitor)

Cengage’s OWL Platform for Chemistry Courses

HS-COL, Chemistry

Sara Heindorf, National Geographic Learning/ Cengage

Cengage offers a multitude of Chemistry courses, from on-level to AP. In this session, we’ll explore OWL, our online digital platform specifically designed by Chemistry teachers. We’ll provide an overview of the platform, including the interactive eBook, the engaging assignments, and the multimedia activities. (commercial exhibitor)

Engaging Students in Authentic Science Experiences

ALL GRADES, General

Kelsey Hogan, Discovery Education

In a student-centered learning environment, we want students to ask deep, meaningful questions, collaborate with their peers, arrive at meaningful conclusions and solve real world problems. Join us to learn about a variety of resources and instructional strategies to engage all students in authentic science experiences. (commercial exhibitor)

Differentiate instruction with Britannica LaunchPacks

ALL GRADES, General

Nick James, Britannica Digital Learning

Available for science, Britannica LaunchPacks makes it easier for teachers to differentiate instruction and for students to understand core Pre-K-12 topics. Britannica LaunchPacks are integrated with Kahoot! the popular learning games and trivia quizzes platform, for fun learning. (commercial exhibitor)

Improve Student Achievement through STEM Teacher Actions

ALL GRADES, General

Pam O’Brien, STEMscopes/Accelerate Learning, Inc.

Earning a STEM Teacher Certificate will refine and demonstrate your understanding of 15 STEM Teacher Actions. These effective, engaging, and evidence-based STEM instructional strategies will transform your students’ outcomes and energize your campus. (commercial exhibitor)

Let’s Use the 5-Es to Provide Equity for All Students

ALL GRADES, General

Pam O’Brien, STEMscopes/Accelerate Learning, Inc.

The 5-E model of lesson design can drive equal access and opportunities for all students to succeed in STEM. STEM education strives to promote equity so that bias does not occur with gender, culture, and background. Come learn how to provide more equitable opportunities for students. (commercial exhibitor)

Using Argumentation to Discuss Phenomena

ALL GRADES, Environmental Science, General

Pam O’Brien, STEMscopes/Accelerate Learning, Inc.

Reduce teacher talk and increase purposeful student talk as we model consensus building through argumentation around intriguing science phenomenon. ELA skills and the 21st Century Skills of communication and collaboration are a must in the STEM classroom. (commercial exhibitor)

UnBEElievable PBL and PBA in the Biology Classroom

HS, Biology/Life Science

Jackie Orgain, Pearson

Scott Skene, Pearson

Teachers will participate in a real-world PBL where they will investigate colony collapse disorder with bees. Teachers will simulate a bee colony that is being forced to meet many of today's challenges (increasing usage of pesticides, fungicides and growing numbers of parasites). Participants will learn why large numbers of bees choose to leave and never return. Finally, teachers will learn about global impacts of declining bee colonies on agriculture, environments and world economies. (commercial exhibitor)

Experience Chemistry through a PBL Approach

HS, Chemistry

Jackie Orgain, Pearson

Scott Skene, Pearson

Chemistry is everywhere in today's world. How do your students approach the world in which they live? Chemistry should be an experience not isolated to the chemistry classroom. Chemistry should be relevant, engaging, and learned in a hands-on environment. Come experience easy-to-implement Problem-Based Learning strategies in this interactive workshop that you can take home to your classroom. (commercial exhibitor)

Finding the Keys to Science Engagement

ALL GRADES, General

Jackie Orgain, Pearson

How can you inspire your students to explore science in an unexpected way? Give students the keys to unlock the clues in this escape room session. This workshop will encourage students to have inquiry, use the tools, and persevere to be successful. Be prepared to engage in an immersive Science experience with real-world take-aways. (commercial exhibitor)

Game On: Game-Based Learning with Legends of Learning!

ELEM-MS, 3rd-8th grade SOL aligned

Sean Reidy, Legends of Learning

Aryah Fradkin, Legends of Learning, Sandy Roskes, Legends of Learning

Legends of Learning employs original research to drive student performance using SOL-aligned games. Our Netflix-style game-based learning platform delivers a wide range of lessons and drives content proficiency for stronger subject mastery and classroom engagement. Participants will receive first hand experience of what collaboration and achievement can look like through our hands on game-based learning platform. Come ready to collaborate, compete, learn and have a whole lot of fun! (commercial exhibitor)

Hello Science, Meet Art

ELEM, General, Early Elementary Science

Perri Robinson, ExploreLearning

Walk away with early education, multi sensory, hands-on art activities that can be used to help students make connections and deepen their understanding of science concepts. (commercial exhibitor)

PBLs & PBAs in the Virginia Middle School Science Classroom

MS, Physics/Physical Science, General

Scott Skene, Pearson

Jackie Orgain, Pearson

This workshop will help Virginia Middle School teachers understand how PBLs help students acquire a deeper knowledge through active exploration of real-world scientific phenomena. Students explore a phenomena by working for an extended period of time to investigate and respond to a complex question, challenge, or problem. PBL contrasts with teacher-led instruction that presents established facts by instead posing questions, problems or scenarios. (commercial exhibitor)

Personalized Learning in the AP Honors & Electives Classroom

HS, AP, Honors or Electives

Scott Skene, Pearson

Jackie Orgain, Pearson

Teachers will learn about Pearson's Learning Catalytics which allows for real-time formative assessments. Adaptive Follow-Ups allow teachers to automatically assign personalized remediation assignments. Adaptive Follow-Ups are customized to remediate individual students' area(s) of weakness. Adaptive Follow-Ups automatically assign personal remediation work in the format that the Adaptive Follow-Ups engine has determined is most effective in the way that each student learns. (commercial exhibitor)

Wanna Teach STEM? We Have an Explorer for That!

ELEM-MS, Life, Earth & Physical Science

Amy Strong, National Geographic Learning

National Geographic Explorers use STEM daily to answer questions about the world around us. Learn exciting ways to make life, Earth and physical science content engaging and relevant in your classroom. This session will show you how to connect standards-based content to exciting real-world research and exploration. (commercial exhibitor)

STEM in Action with National Geographic Explorers

HS, Life, Earth & Physical Science

Amy Strong, National Geographic Learning

Learn how to integrate the research and exploration of the National Geographic Explorers into all high school science classes. Get hands-on experience in bioengineering using a real-world case study on coral reefs and research from National Geographic Explorer Mike Gil. (commercial exhibitor)

Engagement Unlocked! Using Learning Games for STEM.

ALL GRADES, Engineering, General

Dan White, Filament Games (Sponsored by McGraw-Hill)

STEM learning is important for equipping students with transferable 21st century skills, but how do we make sure students are engaged with that content? In this session you will learn the ways that game-based learning shines when it comes to teaching STEM concepts. (commercial exhibitor)

NOT-FOR-PROFIT EXHIBITOR PRESENTATIONS

Buzzers Up: Competition Sparks Marine STEM Learning

HS, marine science competitions

Carol Hopper Brill, Virginia Institute of Marine Science

Celia Cackowski, Virginia Institute of Marine Science

Pit your marine science knowledge head-to-head with VAST colleagues in the 2019 mock VAST Ocean Science Bowl, and bring home the gold! The multidisciplinary nature of marine science hits every aspect of STEM. Teachers can motivate STEM learning with academic competition, providing experiences students crave and presenting opportunities for building content mastery, team and leadership skills. Blue Crab Bowl, Virginia's Regional Competition of the National Ocean Sciences Bowl, is a case study. (Not-for-Profit Exhibitor)

Shifting Sands, Moving Mud: Earth Science Stories & Research

MS-HS, Earth/Space Science, Environmental Science

Carol Hopper Brill, Virginia Institute of Marine Science

Celia Cackowski, Virginia Institute of Marine Science, Anne Markwith, Chesapeake Bay National Estuarine Research Reserve-VA Sediment deposits tell earth science tales. What can layers of sand on the beach reveal about hurricane frequency? Where does mud go and how long does it stay there? Graduate students at the Virginia Institute of Marine Science have translated their research into hands-on STEM activities for K-12 science classrooms. This session shares inventive activities with real-world connections. Participants receive these lesson plans and have on-line access to others at <https://tinyurl.com/VASEA-Lessons>. (Not-for-Profit Exhibitor)

Bridge DATA: Hold the Anchovies

MS-HS, Biology/Life Science, Environmental Science

Celia Cackowski, Virginia Institute of Marine Science

During El Niño years, warm water piled up in the western Pacific flows toward the east bringing, heavy rains with it. However, scientists have begun examining historical climate and oceanography data back 100 years and are finding indications of a much larger climate swing in the Pacific. In this DATA exercise, participants will use Microsoft Excel to graph Pacific atmospheric and fisheries data over time and look for evidence of this larger shift and its connection to fish abundance. (Not-for-Profit Exhibitor)

An Acid-Base Project Derived from an Industrial Procedure

HS-COL, Chemistry, All STEM Devotees

Kenneth Chapman, American Chemical Society, VA Section

Acid-base chemistry is critical for many segments of chemical industry products, including industrial cleaning compounds. Acid-base chemistry provides a methodologically simple foundation for quality control of such products and their raw materials. A student team project for developing both wet and instrumental procedures for real quality control is described. Students address acid-base chemistry, titration methods, experiment design and report preparation. Some STEM careers are addressed. (Not-for-Profit Exhibitor)

Engaging Secondary Students in Authentic Research – Year 3

MS-HS-COL, STEM Inquiry & SOL.1

Julia Cothron, Virginia Junior Academy of Science

Debbie Neely-Fisher, Virginia Academy of Science

Annually, the Virginia Academy of Science (VAS) and its Junior Academy (VJAS) meet at a university. Over six hundred secondary students present STEM research. Scientists and their college students present and/or give poster sessions. In 2020, VAS will support 20 teachers to attend and interact with students, judges, presenters, and experienced teachers. Learn about prior professional development and how you can participate. Acquire resources to help you get started with authentic research. (Not-for-Profit Exhibitor)

ASM Material Science Teacher Camps - A Snapshot of the Week

MS-HS-COL, All Science, & Engineering

Roger Crider, ASM International - Education Foundation

AN ENGINEERING WORKSHOP FOR TEACHERS

This week-long, lab experience shows educators how to use applied engineering techniques in their classroom. Engage with science and engineering practices of NGSS through real-world applications of engineering and hands-on activities you can incorporate in your curriculum. This is an excellent opportunity to meet volunteers from industry and build connections to benefit your students. (Not-for-Profit Exhibitor)

Field Investigation Equipment on a Budget

ALL GRADES, Biology/Life Science, Environmental Science

Suzie Gilley, VA Dept of Game and Inland Fisheries

Page Hutchinson, Virginia Dept of Forestry

Interested in going outside to conduct field investigations but think you can't afford basic equipment? This session will explore some basic equipment that can be made by you or your students and how to create a simple field investigation kit to take outside. Field investigations are best done over time and in all seasons. We will explore methods and materials needed. Handouts and instructions will be provided. Teachers will make a seed wand and research grid to take back to their class. (Not-for-Profit Exhibitor)

When Engineers and Educators Collide...To Teach Engineering

ELEM, Engineering

Kristie Gutierrez, Old Dominion University, Jennifer Kidd, Old Dominion University
Stacie Ringleb, Old Dominion University, Orlando Ayala, Old Dominion University

Elementary education students and engineering students, both from Old Dominion University, collaboratively designed and taught engineering lessons to local 4th and 5th grade students using the 5E instructional model. In this session ODU students and faculty will share more about the engineering/education partnership, provide attendees with innovative lesson plans meeting the revised VA Science SOLs, and guide attendees through a sample engineering lesson for upper-elementary classrooms. (Not-for-Profit Exhibitor)

Infusing Culturally Sustaining Pedagogy in Secondary Science

MS-HS-COL, General

Kristie Gutierrez, Old Dominion University
Jori Beck, Old Dominion University, Kelly Rippard, Old Dominion University
Yonghee Suh, Old Dominion University

Secondary science education students from Old Dominion University designed and taught lessons in their middle/high school field placements using the 5E instructional model, with a Culturally Sustaining Pedagogical lens. In this session ODU students and faculty will share ways to integrate CSP into science lessons, provide attendees with innovative activities/lesson plans meeting the VA Science SOLs, and guide attendees through specific components of their CSP-focused lessons. (Not-for-Profit Exhibitor)

Sun, Earth, Moon STEM Activities & NASA eClips Resources

ELEM-MS, Earth/Space Science, General

Joan Harper-Neely, NASA eClips/NIA-CISE

Participants will engage in hands-on STEM activities that explore the unique characteristics of Sun, Earth, and Moon as well as the relationships between them. Learn how NASA's heliophysics and planetary science divisions study Sun, Earth, and Moon from space and how the information is collected, analyzed and shared with the public. Participants will be introduced to the variety of citizen science campaigns in which their students can participate. (Not-for-Profit Exhibitor)

Wildlife Habitat and Native Plant Conservation

ALL GRADES, Biology/Life Science, Environmental Science

Carol Heiser, VA Department of Game and Inland Fisheries

Natural resources are an important component of the Science SOLs, but students seldom learn real-world examples about how to conserve or restore wildlife habitat and use native plants to protect aquatic resources. In this session we'll review the factors responsible for habitat loss and wildlife species decline, such as invasive plants and degraded water quality, then we'll highlight conservation landscaping practices that can improve habitat diversity on school grounds or other properties. (Not-for-Profit Exhibitor)

ST eMediaVA - The Beginning and the End of Instruction

ALL GRADES, General

Lindsey Horner, eMediaVA - WHRO Education

Jane James, eMediaVA - WHRO Education

STEM starts with Science and ends with eM – eMediaVA. eMediaVA is a repository of over 160,000 learning objects (videos, interactivities, lesson plans and more), all searchable by SOL and all FREE to Virginia students and teachers. See how you can enrich instruction and build student engagement in areas like environmental science, biology, chemistry, physics (and the list goes on). Content comes from trusted sources like NASA, The Science Museum of Virginia, NOVA, and more. (Not-for-Profit Exhibitor)

Global Connections: Forests of the World

MS-HS, Biology/Life Science, Environmental Science

Page Hutchinson, Virginia Department of Forestry

No matter who you are or where you live, you depend on forests. This module will help students explore a range of topics about the world's forests giving them a realistic view, a global perspective and a richer understanding of the concerns that affect natural resources. The activities help students develop the skills to participate meaningfully in public dialogue and decision-making processes concerning forests. Come participate in some of the activities and receive this Project Learning Tree Module. (Not-for-Profit Exhibitor)

Students Can Explore the World with ArcGIS and Google Earth

ALL GRADES, Environmental Science, General

Joyce Kuberek, Virginia Space Grant Consortium

Joyce Corriere, Virginia Space Grant Consortium

Are you looking for free resources to enhance student learning? Are you tired of PowerPoint after PowerPoint? Setup your free account in Esri ArcGIS and through your account students can create and store their Story Maps. This can be used across curriculum for grades 5- 12. You will be provided information about features Google Earth has to offer and how to incorporate images and data into your ArcGIS Story Maps. (Not-for-Profit Exhibitor)

An Introduction to VDGIF's Angling/Aquatic Education Program

MS-HS-COL, Biology/Life Science, Environmental Science

Alex McCrickard, Virginia Department of Game and Inland Fisheries

This presentation will be an introduction and overview of the Virginia Department of Game and Inland Fisheries angling and aquatic education program. The program focus is on angling and aquatic education with activities that promote Meaningful Watershed Educational Experiences, Virginia SOLs, Trout in the Classroom etc. Aspects of the program not only cover aquatic SOLs but introduce students to angling opportunities in the commonwealth. (Not-for-Profit Exhibitor)

Renewable Energy for Your School: From Systems to Challenges

ALL GRADES, Environmental Science, Engineering Remy Pangle, Office for the Advancement of Sustainable Energy at JMU
Come try your hand at designing a solar structure or a wind turbine. Or learn how to develop a wind or solar installation at your school. From teacher workshops to children's books and curricula resources, there are lots of FREE resources available to teach renewable energy in the classroom and these Challenges are great culminating group projects for your students. (Not-for-Profit Exhibitor)

Science, Math, & Programming with Sensors (Grades 3 - 10)

ALL GRADES, Circuits & Programming Angela Parsley, Virginia Department of Transportation
Christina Martin, Giles County Public Schools
Sensors are everywhere! Come explore the different types of sensors used in the transportation industry. Create your own sensor and program it using Scratch. Utilize this and our other free technology-rich lessons in your classroom to show students up-to-date applications of science and math. Bring a laptop or device to connect to the Internet. (Not-for-Profit Exhibitor)

Keys for Kids

ALL GRADES, Biology/Life Science Ellen Powell, Virginia Department of Forestry
Identification keys are an important tool for natural history field studies. Students may have an easier time learning to use keys if they first understand how a key is designed. Participants will practice using different keys and learn to create their own keys to identify a set of objects. (Not-for-Profit Exhibitor)

Empower Students Through Innovative Teaching Practices

ELEM-MS, Math in Science, General Mike San, National Inventors Hall of Fame
The Invention Process builds a new relationship for teaching and learning, affording the learner to direct their own learning pathway. In a complex world, the foundational nature of education is to foster children's ability to invent their own lives, explore their passions and prepare a pathway for lifelong learning. This workshop reveals how the power of the Invention Process engages learners. Experience the Invention Process through hands-on activities that can be replicated in your classroom. (Not-for-Profit Exhibitor)

NSTA Press K-12 Programs 2019

ALL GRADES, General Debra Sawyer, Ph.D., NSTA
Integrating science and literacy, NSTA offers popular core programs correlated to VDOE Science Standards. Picture Perfect Science and STEM K-5 include science lessons, Read-Alouds, and hands-on activities with manipulatives. The Eureka! K-5 books' lessons connect science content to trade-book biographies of scientists and engineers. Argument-Driven Inquiry 3-12 engages students in scientific practices; thus, students learn more from labs by practicing curricular areas in the context of science. (Not-for-Profit Exhibitor)

Explore Solar Energy: A Bright Alternative

ELEM-MS, Chemistry, General Kimberly Swan, The NEED Project
Come investigate with UV beads, build a solar oven, and see how photovoltaic (PV) cells work! These hands-on activities let you see just how solar energy can be used in many different ways! You'll leave with a better understanding of radiant energy to share with your elementary and middle school students. (Not-for-Profit Exhibitor)

Ooh's & Aah's of Energy Transformations!

MS, Chemistry, Physics/Physical Science Kimberly Swan, The NEED Project
Explore six, hands-on stations: motion, sound, thermal, radiant, electrical and chemical energy! Using items encountered in our daily lives – glow sticks, hand warmers, batteries, etc. – but often have little understanding of the science behind how they work. Leave feeling confident to teach energy forms & transformations to your middle school students. (Not-for-Profit Exhibitor)

“Galaxy Explorers: An Enhanced Field Trip Experience”

ELEM, Utilizing Community Resources Hannah Weiss, Science Museum of Western Virginia
Jordan Thayer, Science Museum of Western Virginia, Ashley Sloan, Science Museum of Western Virginia
Join educators from the Science Museum of Western Virginia as they discuss methods for maximizing the benefits of science center field trips with a special focus on the Galaxy Explorers field trips which the Science Museum developed in conjunction with Roanoke City Schools. This workshop will detail the field trip experience, how to meet both teacher and student goals, how the Galaxy Explorers field trip meets these needs and additionally suggestions for working with local science centers. (Not-for-Profit Exhibitor)

Engaging with Earth Resources Via National Competitions

ELEM, Earth/Space Science, Engineering Hannah Weiss, Science Museum of Western Virginia
Jordan Thayer, Science Museum of Western Virginia, Ashley Sloan, Science Museum of Western Virginia
Designing programming which addresses both the characteristics of the Profile of a Virginia Graduate and Science and Engineering Practices can be daunting, let alone tying this to an SOL. However, the Science Museum of Western Virginia educators have done just this with the Earth Resources Strand by challenging students to compete in the KidWind Challenge. Join educators as we discuss the successes and failures of this program. Session will include a hands-on exploration of challenge tools. (Not-for-Profit Exhibitor)

STEM Majors in Sustainability, Environment, & Conservation

HS, General, All Disciplines Covered

John Gray Williams, Virginia Tech - College of Natural Resources and Environment

Natural resources rarely come to mind when students hear the term STEM. But when you stop and think, virtually all consumer products, from the most basic to the most innovative, use materials that can ultimately be tied back to a natural resource. Come learn about the “other” STEM majors at Virginia Tech and how you can connect students interested in biology, chemistry, physics, technology, and engineering to career options in the environment, sustainability, and conservation. (Not-for-Profit Exhibitor)

ATTENDEE PRESENTATIONS

Taking Your Students to the World -Virtually!

ALL GRADES, Earth/Space Science, General

Michele Baird, Norfolk Public Schools

Using iPads or Chromebooks and Google Expeditions and Tour creator, take your students on 3D virtual field trips. Download amazing tours of the wonders of the natural world, or create your own! No special tools required! VR goggles are nice, but not needed! Share your adventures through your Google Classroom!

Speed Dating for Science APPS!

ALL GRADES, General

Michele Baird, Norfolk Public Schools

Angela Lewis, Norfolk Public Schools, Analisa Santillan, Norfolk Public Schools

Come and engage with 5 powerful apps in a speed-dating setting. TinkerCad, Phet, Google Expeditions, HP Reveal and Google Science Journal. Interact with these amazing science apps on both Chromebooks and Ipads and then take them back to your classes to spark excitement and engagement in your classes!

Purposeful STEAM Integration Weaves Science into Instruction

ELEM, STEM + the Arts & Humanities

Susan Bardenhagen, VAST Region IV Director

The 2018 consensus study of the National Academies of Science, Engineering, & Medicine, indicated that in higher education programs with integration of arts with sciences, engineering, and medicine are associated with positive learning outcomes. It is the presenter's contention that purposeful planning in K-6 with STEAM-infused approaches increases critical and higher order thinking. The previously-labeled “1s” in Science SOLs can be infused into STEAM activities and will be modeled.

Using Drones in the Science Classroom

ALL GRADES, Engineering, Math in Science

Tammy Bartlett, Dinwiddie Middle School

This presentation will highlight ways to integrate drone technology into the science classroom. Fly through some simple obstacle courses and see how the activity can be connected to math, science and computer science. Work together to create dynamic, cross curricular lessons students will love.

Halifax Co. Herpetology and Marine Biology Center

ALL GRADES, Biology/Life Science, Chemistry

Nelson Baskervill, Halifax Co. Middle School

Highlight how student ambassadors from the middle school lead classes through the center, focusing specifically on their teacher's learning goal. This allows students to see, touch, and feel their way through science, make real-world connections, and truly interact with what they are learning to gain a deeper understanding, thus increasing test scores county wide.

Integrating Computer Science into Science K-5

ELEM, Computer Science

Joshua Bearman, Virginia Department of Education

Timothy Ellis, Virginia Department of Education

Teaching science provides many natural opportunities to integrate technology and computing skills. In this presentation, we will delve into the Whys, Hows, and Whats of computer science (CS) in the science classroom. We will focus on the value of computational thinking throughout K-5 and introduce programs and activities that reinforce scientific concepts while building CS skills. Teachers will have opportunities to take home lessons and information that can be utilized in their classrooms.

Integrating Computer Science into Middle School Classroom

MS, Computer Science

Joshua Bearman, Virginia Department of Education

Timothy Ellis, Virginia Department of Education

Teaching science provides many natural opportunities to integrate technology and computing skills. In this presentation, we will delve into the Whys, Hows, and Whats of computer science (CS) in the science classroom. We will focus on the value of computational thinking throughout 6-8 and introduce programs and activities that reinforce scientific concepts while building CS skills. Teachers will have opportunities to take home lessons and information that can be utilized in their classrooms.

Stellarium: Bringing the Universe to YOUR Classroom

ELEM-MS, Earth/Space Science, General

Randy Bell, Oregon State University

Learn ways that the excellent (and free!) planetarium program Stellarium can enhance science teaching and learning for astronomy learners of all ages. With Stellarium, students can view and manipulate the sky from anywhere on earth, the moon, or any other planet in our solar system. In this session, you will experience a series of inquiry and model-based lessons that make use of the powerful features of Stellarium to teach phases of the moon and other important astronomy topics.

Collaborative Teaching in the Science Lab

MS-HS, Biology/Life Science, General

Kathryn Bender, Albemarle High School

Collaborative teaching can be an incredible tool for differentiating instruction for students and increasing engagement through opportunities for connection between teachers and students. In the science lab there are specific concerns for planning and carrying out activities that can make collaborative teaching a challenge. In this session, we will discuss some of the foundational components to successful collaborative teaching to maximize learning potential of all students.

STEM-ulating Activities on Human Ecology

MS, Environmental Science

Michael Bentley, University of Tennessee-retired

Discover innovative ways to teach middle schoolers about human-environmental interactions, while also building STEM skills through problem solving, mathematical modeling, interactive technology and more! Presented activities cover a range of human ecology topics including human population and natural resource use trends, and their resulting impacts on ecosystems, biodiversity, climate and the availability of fresh water. Receive electronic lesson plans matched to SOLs.

State of the Earth: Educating for Adaptation

ALL GRADES, Environmental Science, General

Michael Bentley, University of Tennessee-retired

Scientists warn that civilization may collapse if Earth's mean global temperature rises above the Paris goal of 1.5C, with catastrophic species losses and millions of climate refugees. How do educators prepare students? Living in this future will require "deep adaptation." Implications for science educators will be considered and resources shared.

Introducing Research Methods to Pre-Service STEM Teachers

MS-HS, Research in Secondary STEM

Clair Berube, Hampton University

Many secondary teachers cannot implement research studies in their own classes. This study seeks to ensure that teachers can understand, and implement research methods in their classrooms. I will describe how we taught graduate level research methods to pre-service secondary STEM NOYCE scholars at Hampton University, who then co-constructed modules/lesson plans that incorporated this knowledge and designed T Test studies for use in their classrooms and finally, what outcomes they experienced.

Improving Science Reading Comprehension

ELEM, General

Ashanda Bickham, Norfolk Public Schools

During this session, educators will explore strategies for linking science and literacy that support students' abilities to read, write, and discuss in the context of science and inquiry-based learning using fiction and nonfiction texts. Hands-on examples of how science supports literacy and literacy supports science will be used.

Sprouting Success with Agriculture in the Classroom

ELEM, General

Lynn Black, Agriculture in the Classroom

The things we can learn from a cow and a worm! Join Agriculture in the Classroom for an engaging and hands-on session where you will find out what these two animals have in common. We'll examine nature's ultimate recyclers and explore ways that the earth's resources can be conserved and used efficiently. Highlighted elementary science topics will include Earth Resources, Living Systems, and Interrelationships in Earth Systems. Participants will receive curriculum and classroom resources.

Cultivating the Past While Growing the Future

ALL GRADES, General

Tekita Blackwell, Roots for A-STEM, LLC

Cultivating the Past While Growing the Future is designed to equip educators with essential tools for engaging African American learners in STEM. Participants will explore culturally appropriate teaching and behavioral strategies for motivating African American students during STEM lessons.

Crash Boom Chemistry

ELEM-MS, Physics/Physical Science

Angelo Bonilla, Roanoke City Public Schools

Brian Kreppeneck, Roanoke City Public Schools

Simple class room demonstration in Middle School Chemistry and Physics to engage and ignite wonder in today's student. All demonstrations are aligned with the VDOE Science Standards. Emphasis on a hands-on learning environment.

From Ordinary Worksheets into Exciting Hands-On Activities.

ELEM-MS, General

Arthur Bowman, Norfolk State University

Kianga Thomas, Norfolk State University

This session will show how any non-neuron stimulating STEM worksheets can be easily converted into a variety of hands-on activities that are aligned with teaching standards, the 5Es model of instruction, and in consideration of Culturally Responsive Teaching (CRT). How the worksheets can also be used as a basis for developing authentic scientific investigations will be discussed.

Phenomena, STEM, and Culturally Responsive Teaching (CRT).

ALL GRADES, Environmental Science, General

Arthur Bowman, Norfolk State University

Kianga Thomas, Norfolk State University

See how blending natural and anthropogenic phenomena, NGSS Core Disciplines, and Culturally Responsive Teaching can provide more effective STEM instruction all learners. This presentation addresses the need to invite more students from underrepresented groups to develop a liking for STEM disciplines that can lead to the pursuit of STEM in a manner that could possibly allow them to seriously consider a STEM career. Phenomena are key to engagement, and CRT allows connecting with learners.

CER: For Critical Thinking, Communication and Collaboration

ALL GRADES, Any Laboratory Science

Kathryn Brock, Varina High School

The Claim, Evidence, Reasoning (CER) framework can increase critical thinking, communication and collaboration in science class. CER works well at all levels of instruction and of classes. It is easily tailored to the depth that you need and can prompt your students to think and analyze quickly. This session will provide practical examples and resources to get you ready to use this framework to increase student engagement and the quality of scientific explanations your students are developing.

From Newbie to Pro: Evolution of “Hybrid” Biology Notebooks

MS-HS-COL, Biology/Life Science

Ashley Burke, Gate City High School (Scott Co.)

Donna Rowlett, Gate City High School (Scott Co.)

A twist on interactive notebooks: These “hybrid” notebooks offer a valuable resource for review and study while providing an all in one location for notes. The design provides short bursts of knowledge followed by modeling of the topic which makes students pause, interact, and process the information. This technique allows access to different learning styles, ability to make connections between ideas, and allows an outlet for creativity. Free sample lesson plan.

Beat the Chemistry Blues with Indigo Dye

HS, Chemistry

Gretchen Cessna, Harrisonburg High School

Are you looking for a highly engaging project that also reinforces chemistry content? One that is flexible enough to adapt for general up to AP level courses? This presentation will describe an indigo synthesis and tie-dye project inspired by the author's trip to West Africa. Key concepts demonstrated in the visually beautiful chemistry include: evidence for chemical reactions; solubility and polarity; oxidation/reduction; exothermic vs endothermic reactions; and stoichiometry and percent yield.

Environmental Science investigations in Geosciences

ALL GRADES, Earth/Space Science, Environmental Science

John Chermak, Virginia Tech Geosciences

This presentation will discuss the Environmental Science curriculum and career opportunities for students offered through the Department of Geosciences at Virginia Tech which is also available in other Geosciences departments in Virginia as well as in other States. The interdisciplinary nature of Geosciences allows students to be well-trained to solve complex real-world problems. With a geology degree, students have the opportunity to obtain professional certification and licensure.

Level of Organization Museum PBL for Biology

HS, Biology/Life Science

Denise Coleman, Jefferson Forest High School

A PBL designed to allow students the opportunity to demonstrate their understanding of the levels of organization taught in biology within a biome. Students create a “museum” room filled with models and presentation depicting the levels of organization for their organisms. This project is not only about demonstrating mastery of content but encouraging creativity, collaboration, resource acquisition, problem solving, and time management.

A Year Behind Bars: Teaching Juvenile Offenders.

MS-HS, General

Dennis Cooke, Department of Juvenile Justice

Personal experiences of a master teacher of 20 years as he goes from the classroom to the Department of Juvenile Justice. What changes and what stays the same? Presentation will focus on what really works in a classroom of some of the toughest students you've ever met.

Middle School Science Review Trifecta

ALL GRADES, Middle School Science Review

Laura Davenport, Bailey Bridge Middle School

Debbie Vasco, Bailey Bridge Middle School

Increase student understanding and engagement during SOL review by having your students create their own games, books, and posters. Three techniques of review will be presented, along with the rubrics and strategies to implement these methods.

Using Technology to Create Interactive & Engaging Worksheets

ALL GRADES, General

Pernell Denson, Norfolk Public Schools

Danesha Bazemore, Norfolk Public Schools

Wizer.Me is an education platform that allows teachers to create quick, easy and fun digital worksheets, that can be with students and fellow teachers allowing tracking of student performance. The Wizer worksheet builder compliments teachers' experience and creativity by allowing quick creation of a wide variety of question types: open questions, multiple choice, matching pairs, fill in the blank, fill on an image, tables adding video, audio, images, and etc.

Game Making : Light Faster Than Light! => The "BIG" Why!

ALL GRADES, Environmental Science

Jim Disbrow, Retired

This Game Making precedes computer variations - leveling classes and engaging all participants - this is not gaming - it is game-making. We'll make games no one's ever heard of, e.g., Imagine teams challenged to identify a picture of light going faster than the speed of light: 3 minutes. Imagine teams doing predator-prey analyses, based on dice rolls, involving actions/events across time, around six tightly entangled strategic goods - by ecosystem & species: 3 minutes history => future.

Demos and Activities to Engage Students in Science

MS-HS, Physics/Physical Science

Craig Doolittle, James Blair Middle School

Erin Watson, York Co. Schools

In this session you will see and participate in various teacher demos and student activities that will grab your students attention and increase engagement in the lesson for the day.

Technology and Collaboration in Math/Science Projects

MS-HS, Engineering, Math in Science

Michelle Douglass, Central Virginia Governor's School

Jeff Steele, Central Virginia Governor's School

Calculus students in teams used a 3D design software to create a 3-dimensional shape. Using calculus, the students estimated the volume of their design. Then the students 3D printed their shapes and measured the volume through a water displacement testing and compared their estimated to actual volume. While this was occurring, another class in Japan did a similar project and school teams interacted through Google Drive to get to know each other and share their designs and results.

The Environmental Literacy Model and a MWEE

ALL GRADES, Environmental Science

Cindy Duncan, 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.

Engaging Inquiry: Pre-service Teachers Share Tested Lessons

MS-HS, All Science Content Areas

Elizabeth Edmondson, Virginia Commonwealth University

VCU MT Students

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.

Real Science: Science Teachers in Research Labs

MS-HS-COL, Biology/Life Science

Elizabeth Edmondson, Virginia Commonwealth University

Julianne Codd-Toce, Richmond City Public Schools, Katharine Goins, Chesterfield Co. Public Schools

Andrea Bryant, Richmond City Public Schools

The National Institute of Health funded project Health Education Research Opportunities for Teachers (HERO-T) offers secondary science teachers an amazing opportunity to be mentored and work with a VCU research scientist for two consecutive summers. Three Region I teachers, from the summers of 2018 & 2019, will share their experience working at VCU.

Mousetrap Cars: A How-to Guide to Teaching Forces and Motion

MS, Physics/Physical Science

Carolyn Elliott, Goochland Middle School

Are you looking for an efficient and challenging way to teach forces and motion? Consider having your students build a car powered by the snap of a mousetrap. Friction, Newton's Laws, acceleration and speed all must be considered in construction of the car. This is an ideal way to teach forces and motion using a performance-based approach.

VA STEM Inventory: What is happening in STEM Education?

ALL GRADES, STEM

Charles English, State / Science Museum of Virginia

Tina Manglicmot, Virginia Department of Education

Dr. Tina Manglicmot, VDOE STEM Director and Chuck English, VA STEM Coordinator are looking to collect and share stories of STEM programming; good and bad. This is a start in identifying what is working, what should be avoided and initiating an inventory so we can better support each other's work. The more we explore the STEM landscape the more we realize that there is a wide range of how people are interpreting STEM education and we need to start sharing these rich and inspiring stories.

Virginia STEM: Your Role in the State's Plan

ALL GRADES, STEM

Charles English, State / Science Museum of Virginia

Tina Manglicmot, Virginia Department of Education

Dr. Tina Manglicmot, VDOE STEM Director and Chuck English, VA STEM Coordinator will talk about VA STEM and the State STEM Plan. We will discuss the State's unified vision for STEM and how it impacts the lives of not just students, but all Virginians. The plan includes goals aimed at PK-12 education hoping to inspire the next generation of innovative STEM leaders. How can science education become more engaged in STEM, leading others towards a better understanding of STEM as a pedagogy?

Engaging Science Through Culturally Responsive Teaching

ALL GRADES, General

Sharday Ewell, Rippon Middle School

In this session, participants will learn how to leverage the skills of interpersonal and intra-personal awareness, learning partnerships, and community building in order to create an engaging, rigorous science classroom. Participants will walk away with strategies that can be used immediately in the classroom.

Beyond Balsa: Building Competencies with Card Stock Bridges

ALL GRADES, Physics/Physical Science, Engineering

Mike Florek, Glenvar High School

This hands-on session will walk through a model bridge project from computer simulation to fabrication to weight testing. Colorful card stock takes the place of balsa wood, allowing for unique bridge elements and more creative designs. Card stock also introduces new challenges to the classic concept. Students utilize all five competencies (the 5 C's) in this detailed STEAM project. Attendees will try out folding and gluing for themselves, then handle actual student bridges.

Exploring Virginia's Snakes Using Non-Fiction & Mathematics

ELEM-MS, Biology/Life Science, General

Emily Ford, University of Virginia/Blandy Experimental Farm

Leah Chaldares, University of Virginia/Blandy Experimental Farm

Explore a language arts, mathematics, and science-integrated activity based on A Guide to the Snakes and Lizards of Virginia (DGIF). While modeling the activity, we use a science text, examine how it addresses VA SOL, and discuss incorporating other VA resources into your teaching. Designed for upper elementary but adaptable for middle school, the lesson develops use of non-fiction texts, expands perceptions of misunderstood organisms, and deepens understanding of graphing & measurements.

Flora of Sicily: Communicating Through Scientific Names

ALL GRADES, Biology/Life Science

Kathy Frame, Papillion Education Services, LLC

Follow the presenter to observe the flora of Sicily via scientific names and how these names link to the flora communities of Virginia. This will be translated into a hands-on lesson plan easily adapted to other flora communities that shows the importance of scientific names to our health, the environment, biodiversity, and the herb, food, and floral industries.

An Ancient Mass Extinction with its Roots in Virginia

HS-COL, Earth/Space Science, Chemistry

Benjamin Gill, Virginia Tech

201 million years ago, massive volcanic eruptions caused one of the most severe mass extinctions in the history of Earth. Some of these volcanoes were located in Virginia. These eruptions injected large amounts of greenhouse gases into the atmosphere, producing prolonged global warming, climatic instability, and widespread acidification and deoxygenation in the oceans. In this session, we will discuss how geoscientists reconstruct these past changes on Earth and the evidence found in Virginia.

Get Involved with the Journal of Virginia Science Education (JVSE)! There is Room for Everyone!

ALL GRADES, General

Amanda Gonczi, Michigan Technological University

Jennifer Maeng, University of Virginia

Did you know that publishing an article can be used toward teacher re-licensure points? Or that when you review a journal article submission you can include this on your resume as professional service? This session will help all members get involved with VAST's journal by publishing their own work or reviewing submitted manuscripts. Session attendees will brainstorm an idea for an article and work with the journal editors in developing an outline for their own publication.

Retention in a STEM Scholars Program

HS-COL, General

Deirdre Gonsalves-Jackson, Virginia Wesleyan University

Margaret Reese, Virginia Wesleyan University, Gabriela Martorell, Virginia Wesleyan University

Initial high levels of interest, followed by high attrition, and subsequent low enrollment in the STEM disciplines are documented challenges. This is especially problematic for low income students, women and minorities. To address low numbers of STEM majors, VWU developed a scholarship/mentoring program for undergrads with funding from the NSF S-STEM Program. This study presents results and profiles of students in the program to share insight on successful strategies for retention in STEM.

An Environmental Institute to Increase E-STEM Diversity

MS-HS-COL, Environmental Science

Deirdre Gonsalves-Jackson, Virginia Wesleyan University

William McConnell, Virginia Wesleyan University

Many female students enter high school having an interest and history of high performance in science only to turn away from these interests before entering college. Research reveals that exposing female students to mentor scientists and authentic science experiences can sustain their interest and success in STEM. In this presentation we share findings from a university-based institute where female students engaged in authentic environmental science experiences with science mentors.

Arguing a Socioscientific Issue in a Secondary Classroom

MS-HS, General

Mindy Gumpert, Old Dominion University

Bill McConnell, Virginia Wesleyan University

Participants will be provided with tools to enable them to facilitate socioscientific argumentation in their classroom. Instruction on making a claim and locating/identifying credible evidence to support the argument will be offered. Scaffolds will be presented to illustrate how to differentiate instruction for diverse learners. Attendees will learn practical strategies to use in their classroom when teaching students to engage in argumentation.

Fun with Cells: No More Boring Worksheet

MS-HS, Biology/Life Science

Erika Hackworth, Woodrow Wilson Middle School (Roanoke City)

Are you tired of using the same worksheets year after year to teach the students about cells? We all know that kids learn better by doing. This PD session will provide attendees with various take home activities and ideas that they can incorporate into their classroom to engage students on a completely new level. Students will learn by doing while also addressing all learning styles. Students will make connections and have fun, thus gaining a better understanding of cells.

Gas Laws Rotation Labs

HS, Chemistry

Stephanie Harry, Albert Einstein Fellow

Mini Gas Law Rotation experiment is a compilation of nine gas law demonstrations that I combined into one big experiment. As students rotate between each experiment they obtain a deeper understanding of the various gas laws. This PDI will explain the experiments and a few of the experiments will be demonstrated with attendees.

Tips & Tidbits for the Novice Chemistry Teacher

HS, Chemistry

Julie Heffron, Madison Co. High School

This session is intended for the novice chemistry teacher. Included will be helpful strategies, demonstrations, manipulatives, lab ideas and classroom practices which have been helpful to me throughout the years.

Strategies to Help Struggling Readers with Science Content

ALL GRADES, Biology/Life Science, General

Stephanie Henderson, Norfolk Public Schools

This presentation is intended to equip teachers with strategies to help motivate students with poor reading skills to build their science content knowledge. Participants will be engaged in strategies to help students analyze visuals, graphs, and test questions, and build scientific literacy skills to make practical responses during science instructional time.

Developing Student-Specific Targets: Why Initiative Matters

HS-COL, General

McKinley Herndon, Monticello High School

The need for students to master 21st-Century skills is pivotal. Attendees will take on the role of students to complete a task and use a factor chart to rank their initiative. Attendees will then learn about the literature behind initiative and how self-directed learning promotes self-efficacy. To conclude, attendees will complete another task using self-directed learning. We will compare the outcomes and discuss how initiative can be used to promote student success in and out of the classroom.

The Great Marble Run: Project-Based Assessment

MS-HS, Physics/Physical Science

McKinley Herndon, Monticello High School

Tired of the same boring lessons for Newton's laws? The Great Marble Run project gets students engaged, collaborating and thinking critically and creatively. Students will use recycled materials to create the slowest track possible! Learn how to use this project-based assessment in your classroom. Project guidelines and rubric will be provided.

Strategies for Actively Engaging Students in Every Lesson

MS-HS-COL, General

Robbie Higdon, James Madison University

Join pre-service teachers as they present ways to get every student in your classes actively involved within the learning process. Drawing from drama-based pedagogy, formative assessments, and learning cycle models, this presentation will provide simple strategies that can be implemented seamlessly into any lesson in any content area. Participants in this session should be prepared to actively engage with us and discover ways to “hook” all students in learning science concepts.

Designing Blended STEM Lessons Using Career-based Scenarios

ELEM, General

Cheryl Hinzman, Prince William Co. Schools

Kathy Keesee, Prince William Co. Schools

Please join us as we present several strategies for integrating meaningful digital tools into lessons that will enhance the engineering process. Problem-based scenarios using STEM concepts will be the basis for the lessons. We will explore several digital learning tools and their complement to design thinking skills for students.

More Fun Chemistry Projects and Labs

HS, Chemistry

Paula Irwin, Stonewall Jackson High (Prince William Co. Schools)

This is a follow-up to last year's session and will provide more fun and hands-on projects, laboratory experiments and activities to reinforce the VA Chemistry SOL essential knowledge and skills? This is a session that both new and tenured teachers will not want to miss.

The Integration Between Science and Engineering Instruction

HS-COL, Bio, Chem & Engr Integration

Andrew Jackson, Governor's STEM Academy at Harrisonburg High School

Myron Blosser, Governor's STEM Academy at Harrisonburg High School

Co-directors of the HHS Governor's STEM Academy will be sharing successful projects and strategies for integration of science and engineering instruction through biology and chemistry in partnership with engineering courses. These lessons will be presented in a fashion that attendees will be able to import directly into a biology or chemistry class in the form of a PBA or utilize in conjunction with an engineering partnered course.

Science Safety - Covering Your Assets

MS-HS, General

Andrew Jackson, Harrisonburg City Public Schools

This session is an overview of safety requirements and expectations in science teaching. We will utilize case studies to discuss legal outcomes as well as damages to property and person. An emphasis will be made on knowledge and maintaining a safe environment while documenting your attention to safety. If your PD portfolio doesn't already contain proof of safety training, let this be the first entry. If it does, then let this be another piece of your protection.

Physics Fights: A Rigorous Oral Exam for 9th Grade Science

ALL GRADES, Physics, but Works for *All*

Greg Jacobs, Woodberry Forest School

Alex Tisch, Woodberry Forest School

In lieu of a final exam, 9th grade conceptual physics classes participate in a tournament of “physics fights.” During the 3-week preparation period, participants produce experimental evidence to answer college-level problems. AP students serve as mentors to help the conceptual students prepare. Each fight consists of a 1-2 minute presentation, followed by 5 minutes of questioning by an external jury - think of a miniature thesis defense. This approach is not physics- or high school- specific.

Growing Primary Roots in STEM

ELEM, General

Angerina Jones, Chesapeake Public Schools

Growing Primary Roots in STEM aims to encourage and empower primary educators to deliberately plan STEM activities and lessons that intentionally engage African-American students. Participants will explore culturally specific learning styles and literature they should consider when planning STEM lessons.

Where Kids and the Environment Meet: Starting a GLOBE Club

ALL GRADES, Earth/Space Science, Environmental Science

Elizabeth Joyner, NASA Langley Research Center

Angela Rizzi, NASA Langley Research Center, Nina Valdivieso, Northern Shores Elementary School (Suffolk Public Schools)

Do you have a passion for engaging students in authentic environmental science but are not sure where to start? Learn from two sets of teachers who have started GLOBE (Global Learning Observations to Benefit the Earth) Clubs in the extended day hours in elementary and middle schools. Topics include how to start a club, the activities and goals, NASA resources to support your students, and international and regional science research symposia for students to present their research!

Earth Data At Your Fingers: Increasing Access to NASA Data

MS-HS, Earth/Space Science, Environmental Science

Elizabeth Joyner, NASA Langley Research Center

Angie Rizzi, NASA Langley Research Center

TWO HOUR PRESENTATION - Do you want to use authentic Earth data in your lesson but you get bogged down by complicated user interfaces and funny naming datasets? Attend this double My NASA Data session to learn how to use tools, like the Earth System Data Explorer, NASA Worldview, and NASA Earth Observer (NEO) to extract maps, graphs, videos, and more! You will also learn tricks for engaging students in a variety of Earth data and phenomena. Fully-charged laptop and your WiFi-enabled Bluetooth device required.

Increase Student Success with Socrative

ALL GRADES, General

Teresa Justice, Nelson Co. High School
Elizabeth Tyree, Northside High School

Do you think you'd be more successful if you could duplicate yourself? Do you ever look around the room and see several students with their hands up? If so, Socrative is the app for you. With this app, you can make electronic worksheets or quizzes with instant feedback and grading AND let students retake them until they've reached mastery. In this session, you will learn how to create a free account with Socrative, take a Socrative quiz, create worksheets and quizzes, and view grades.

Applications of ADI in the Biology Classroom

HS, Biology/Life Science

Ashley Karunaratne, Princess Anne High School

Katie Liakos, Princess Anne High School, Jason Tomik, Princess Anne High School

Argument-Driven Inquiry is a research-based method to develop critical-thinking, analysis, and evidence-based argument skills. ADI provides valuable experiences for students to engage in scientific reasoning and discourse with others while covering course standards. This presentation will give examples of how ADI is used to cover different topics of biology. Presenters will provide classroom-tested examples of how ADI can enhance students' science proficiency at various learning levels.

Teach an Old Dog with a New Trick: Fossils & Rock Meet Tech

ALL GRADES, Earth/Space Science

Chris Kaznosky, Central High School (Shenandoah Co.)

Steve Leslie, James Madison University Dept. of Geology and Environmental Science

Fossils and rocks are referenced in SOLs at all three Virginia public school levels as well as in college courses, but are often taught about in a fragmented manner. Attendees of this session will discover why specific fossils and rocks are found in Virginia's five physiographic provinces as well as the processes behind why they're there. Technology-based lessons will be shared, and it's suggested that you consider bringing a computer or tablet. Also, samples and resources will be provided.

The WoW Club: Making Animal-Inspired Robots After School

ELEM-MS, Engineering, General

Jennifer Kidd, Old Dominion University

Samuel Sacks, Old Dominion University, Krishna Kaipa, Old Dominion University

The "WoW Club" combines an educational technology course at Old Dominion University with an after-school club at a public school in Norfolk, VA. The club is designed to introduce both pre-service teachers and 5th/6th grade students to engineering, coding, and robotics in a low-stakes environment. The club culminates in the creation of animal-inspired robots. We will present lessons learned, share ideas for starting a technology club, and direct attendees through a coding/crafting activity.

Bridging Science and Engineering to Social Justice Problems

MS-HS, Physics/Physical Science, Engineering

Meredith Kier, College of William and Mary

Secondary science preservice teachers will model how science and engineering can be used in tandem to break down social justice problems in the Tidewater Region, and be tools to facilitate racial and socioeconomic equity.

Planet Interiors: the Mars InSight Mission and Model Cakes

ALL GRADES, Earth/Space Science

Scott King, Virginia Tech Geosciences

Llyn Sharp, Museum of Geosciences, Virginia Tech

Come learn the latest about planetary interiors from a member of the Mars InSight mission team! (The mission that landed on Mars last November.) In addition to showing the latest results from Mars, this presentation will discuss using models to understand the inner working of planets. We will make our own model of a planet's interior. Out of cake! This naturally introduces the concepts of using models, measuring, and chemical reactions (changing the batter by baking). Recipes included.

Dinosaurs, Volcanoes, and Supercontinents in Virginia

ALL GRADES, Earth/Space Science, Biology/Life Science

Ben Kligman, Virginia Tech

Jonathan Prouty, Virginia Tech

Virginia's rift basins run north to south across the Piedmont. They contain sedimentary, metamorphic, and igneous rocks formed over 200 million years ago during the Triassic and Jurassic periods. The sedimentary rocks preserve globally important fossils of plants, insects, mammals, lizards, and dinosaurs. The igneous and metamorphic rocks record cataclysmic volcanic eruptions and the breakup of the supercontinent Pangea. These basins provide a glimpse of part of the Commonwealth's ancient past.

Stories Through Stratigraphy

HS-COL, Earth/Space Science, Environmental Science

Russell Kohrs, Massanutten Regional Governor's School

The Paleozoic history of Virginia is represented well in the Valley and Ridge. These rocks tell stories of environmental change, the movement of continents, evolution and extinction, and so much more. In this session, we will look at sets of rocks assembled to represent the three cratonic sequences of the Paleozoic and explore how such sets can bring earth history to life. Development of these kits was supported by the AIPG Russ Wayland Mini Grant to Improve Teaching of Geology.

Tectonics and Tomography: New Insights into Plate Tectonics

MS-HS-COL, Earth/Space Science, Environmental Science

Russell Kohrs, Massanutten Regional Governor's School

Plate Tectonic Theory has always presented us with a fabulous story of science at work, from Wegener's Continental Drift to today's seismic tomography. In many ways, the theory is reaching a new paradigm shift. Come and learn new things about what today's researchers are discovering about the Earth's interior, the evolution of Plate Tectonics on Earth, and how you can connect these processes to biogeochemical cycling and life!

Tools for Tackling Tough Topics--Teaching Climate Change

ALL GRADES, Climate Change

Melinda Landry, Patriot High School/NCSE

There is no scientific controversy when it comes to the basics of climate change. We must help our students understand climate change, the evidence for climate change, and the fact that scientists find the evidence convincing. Utilizing NCSE lessons and tools, teachers will be introduced to the 5 characteristics of science denial and how to provide students with the ability to discern logical fallacies and bolster their climate resilience.

Enhancing Math and Science with STEM for Students at Risk

ELEM-MS, Math in Science

Marilyn Lanier, Fayetteville State University

Cynthia Wooten, Fayetteville State University

This presentation illustrates best practices for enhancing student success in Elementary and Middle School science and math classrooms with STEM engagements. The outcome will provide participants with a clear picture of what good teaching looks like when an empowering, experienced teacher implements pragmatic elements of third space theory and culturally responsive pedagogy to reduce the probability for at-risk behaviors in students from urban environments.

Schoolyard Surfaces: an Interdisciplinary Land-Based MWEE

ELEM-MS, Environmental Science, Watershed Science

Lillian Ledford, UVA/Blandy Experimental Farm

Emily Ford, UVA/Blandy Experimental Farm, Leah Chaldares, UVA/Blandy Experimental Farm

Engage in a place-based investigation using inexpensive and easy-to-create materials and satellite imagery to map and calculate the area of permeable and impermeable surfaces of a schoolyard. Designed as the engage or explore portion of a Meaningful Watershed Educational Experience (MWEE), this lesson integrates mathematics and scientific evaluation of how water moves in and around the schoolyard and opens the door to engineering action projects. No body of water required for this MWEE!

"A Beginner's Guide to Bioinformatics"

HS-COL, Biology/Life Science

Mark Levy, Roanoke Valley Governor's School

We frequently hear about genomic sequencing and the numerous opportunities these data provide to researchers – but did you know that many of these resources are freely available to you and your students? This session will equip you with some fundamental concepts, tools, and resources necessary to learn more about bioinformatics techniques to bring them into your classroom and student research projects. Bring your laptop so you can follow along with the activities!

FPV Racing Drones - STEM Competition Team Grant Initiative

HS, STEM Education

Daniel Lewandowski, Portsmouth Public Schools (Office of Science)

Paul Sarandria, Portsmouth Public Schools (Office of Science)

What begins as a hobby may grow into a career! Portsmouth Public School students are building, programming and flying their own drones. Flying in First Person View (FPV) mode; meaning the student does not see the drone, rather they are seeing the streaming video imagery the drone transmits to the pilot's headset goggles. This program incorporates skills and knowledge from each of the four disciplines in a STEM education. In this session we will share our story into this journey.

Google Tools For Science Assessment Made EASY!

ALL GRADES, General

Angela Lewis, Norfolk Public Schools

Analisa Santillan, Norfolk Public Schools, Michele Baird, Norfolk Public Schools

Throw away boring paper-pencil assessments and let Google technology do the work for you! Increase your knowledge of technology based assessments and virtual labs with grading programs that integrate with Google classroom. Then explore Google classroom and/or create science technology-based formative and summative assessments using multiple platforms for science content in your classroom. Keep your students engaged in your assessments independently and collaboratively all year!!

Where Should the Wind Turbine Go?

MS-HS, Earth/Space Science, Engineering

Melani Loney, Old Dominion University

Joanna Garner, Old Dominion University

In this session, science teachers will examine and complete portions of a field-based lesson that helps students understand the science behind wind and air currents (natural world) and their role in the placement of a wind turbine (designed world). Teachers will leave the session with a copy of the wind turbine investigation, strategies for differentiation, and ideas for incorporating the lesson into their curriculum.

Inquiry - Simple Electrical Circuits

ELEM-MS, Physics/Physical Science, Engineering

Janet Lundin, Mary Ellen Henderson Middle School

An inquiry based electrical circuit lab that is suitable for upper elementary and middle school students. This session will demonstrate how to make very low cost light bulbs and holders, an effective strategy for organization of lab materials, and a grading rubric for students to show understanding of electrical circuits. This inquiry is based on Unit 15 Electrical Circuits of INQUIRY PHYSICS: A Modified Learning Cycle Curriculum by Granger Meador.

Designing Solutions: Using Roof Models to Explore Run-off

ALL GRADES, Engineering, Math in Science

Candace Lutzow-Felling, UVA/Blandy Experimental Farm

Lillian Ledford, UVA/Blandy Experimental Farm

Use simple materials to design, engineer, test, and redesign a roof model to investigate the impacts of surface water run-off from a roof and onto the ground. Explore ways to further refine your design to reduce erosion caused by water flowing from your roof. This activity combines science and math content with science and engineering practices. It is easily scalable and suitable for upper elementary, middle, and high school grade levels.

Designed to Align: Design Briefs in the Science Classroom

ELEM-MS, Engineering to Learn Science

Liz Lynch, Martinsville City Public Schools, Greg Hackenberg, Martinsville City Schools

Lizzy Fulcher, Martinsville City Schools, Chanda Prillaman, Martinsville City Schools

The updated VA Science SOLs have placed a greater emphasis on the design process, an easy way to integrate engineering into science is by using design briefs. During this workshop presenters will share multiple aligned design briefs for upper elementary school and middle school. Presenters will share tips and tricks for individuals who would like to start integrating design briefs, an opportunity for hands on exploration, and time for participants to share ideas for design briefs.

Periodically Speaking

HS, Chemistry

Jennifer Maguire, Virginia Tech

Join us for an interactive demonstration where we'll look at an alternative way to creatively and meaningfully teach about the periodic table, chemical properties, atomic structure, and periodic trends.

Shine Bright Like a Diamond

ALL GRADES, Earth/Space Science

Jennifer Maguire, Virginia Tech

Is the luster of your mineral lessons a little dull or earthy these days? Join us for a demonstration where we'll consider how to construct mineral activities that are investigative. Shine up those lesson plans and make them sparkle!

Did Your Turtle Survive?

ELEM, General

Anne Mannarino, Regent University

Come join the fun to see how you can use real world data and simple activities to teach environmental concepts. We will explore this using turtles as our means to teach predictions, data analysis, graphing, environmental impacts, life cycles and literacy strategies. This is a hands-on session. So let's see if your turtle survives!

Describing What You See: Develop Vocabulary with Rocks

MS-HS, Earth/Space Science

David Matchen, Madison Co. High School

Rocks and minerals provide teachers with an opportunity to develop the observation and descriptive skills of students, while allowing them to develop a deeper scientific vocabulary. This session will explore methods of incorporating observation, inquiry, and critical thinking to a unit on earth materials. Session participants will model a hands-on activity using rocks and minerals to form their own descriptive classifications.

Scaffolding Problem Solving as a Gateway to Science

ALL GRADES, General

Hannah Mawyer, Henrico High School

Struggling learners are often unwilling to participate and take risks for fear of failure. It is difficult to teach these students to fully partake in the scientific method if they struggle with problem solving. In this session we will practice non-science based problem solving activities that scaffold the communication, collaboration, critical thinking, and character building skills needed for the successful science classroom.

Algae, Nutrients, and Our Environment

ELEM, Environmental Science

Bill McConnell, Virginia Wesleyan University, Maury Howard, Virginia Wesleyan University

Emily Purdin, Virginia Wesleyan University, Christy Hendricks, Virginia Wesleyan University

Science lessons in K-12 schools are rarely inspired by contemporary research, yet scientists are investigating local environmental issues all the time. Through an EPA funded grant, educators took part in a research apprenticeship that inspired an interactive and engaging environmental science lesson. Through the use of varied technologies, join us to solve the algal mystery present in our stormwater ponds.

Environmental Science - Lessons Learned

HS, Environmental Science

Peter Mecca, George Mason High School

During the 2018 - 2019 Academic Year, a new course - Environmental Science - was implemented at the high school. Enrollment in the new science course included special education students and English Language Learner students. The presenter will share information on curricular, instructional, and assessment (CIA) issues related to course implementation. Proposed CIA changes for the 2019 - 2020 Academic Year will be discussed.

Measurement & Geometry in Origami

ELEM, Engineering, Math in Science

Kimberly Moore, Coleman Place Elementary School

Explore measurement and geometry by creating origami paper boats. This engineering lesson encompasses subdividing, measuring and classifying angles. We'll measure and differentiate among perimeter, area and volume. Culminating our lesson by exploring force and motion with the amazing boat race!

Evolution for Middle & High School Educators

MS, Biology/Life Science

Christopher Moran, The Teacher Institute for Evolutionary Science

Therese Wolak, The Teacher Institute for Evolutionary Science

The Teacher Institute for Evolutionary Science helps teachers teach evolution with confidence. Teachers will be guided through a free classroom presentation embedded with all of the content, bell-ringers, hands-on activities, videos, and online games needed to cover their evolution unit without a hitch! Our goal is to make sure teachers have everything they need to cover Virginia's evolution curriculum standards, all in one place.

Develop Scientific Literacy Using Current Events

MS, General

Rebecca Musso, Gayle Middle School

Attendees will leave with materials to implement immediately in the classroom to develop student's scientific literacy through the use of current events and case studies. The use of current events and case studies in science promotes depth of knowledge and understanding of the intricacies of issues about which people have to make decisions.

Tying It All Together - STEM, Engagement, and the SOLs

HS, Earth/Space Science, Environmental Science

Angie Mutter, Twin Valley High School

Science classrooms should be in discovery mode not just lecture. Come by and receive information about using STEM, STEAM, and engagement with your Earth Science SOLs. You will receive information about student-led projects for each standard. Don't let tests stand in your way! Bring your classroom alive and raise achievement at the same time.

Using Google to Generate Graduates with 21st Century Skills

MS-HS, Biology/Life Science, Environmental Science

Natasha Neagle, Stafford Co. Public Schools

Stacey Ludington, Stafford Co. Public Schools

Using Google for Education products to engage students while developing the 5Cs to generate graduates with 21st century skills. Excellent for blended learning or flipped classrooms and all learning levels.

Exceptional Education and Hands on Learning for All

ELEM, General, Active/Hands on Science K-5

Nicole Nielsen, Henrico Co. Public Schools

This presentation will have examples of hands-on activities with lesson plans for specific science SOLs for grades K-5. This presentation is designed to help engage students with disabilities in science lessons. It should help educators incorporate more hands-on /active learning in their science practice. This will not only benefit your special education students but your typically developing students as well.

VDOE Update

ALL GRADES, General

Anne Petersen, Virginia Department of Education

Myra Thayer, Virginia Department of Education, Josh Bearman, Virginia Department of Education

This session will provide information on current state initiatives, the Science Curriculum Framework, and updates on both the state and national levels of science education.

Have You Considered PAEMST?

ELEM-MS, General

Anne Petersen, Virginia Department of Education

The Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST) are the highest honors bestowed by the United States government specifically for K-12 science, technology, engineering, mathematics, and/or computer science teaching. This years award recognizes K-6 teachers have both deep content knowledge of the subjects they teach and the ability to motivate and enable students to be successful in those areas.

VAST Colleges and University Share Session

HS-COL, General

Anne Petersen, Virginia Department of Education

Jennifer Maeng, University of Virginia

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. We will begin the session with brief updates from each institution and then Dr Anne Petersen, Science Coordinator will provide an update on K-12 initiatives. A discussion will ensue concerning how VDOE and institutes of higher education can further support each other with our different missions.

Integrating 3D Printing into Science Instruction

ALL GRADES, Biology/Life Science, Physics/Physical Science

Ellen Peterson, Smithfield Middle School

Learn how to incorporate 3D design and printing into regular science instruction. A brief overview of various 3D design software will be presented followed by project ideas and examples of using 3D printing to increase and strengthen science instruction and learning.

Digital Classroom-Interactive Notes, Lab Notebooks, & More!

ALL GRADES, General

Michelle Plunkett, Riverside High School

Welcome to the digital age of teaching! If you are struggling to get started with interactive notebooks that are completely digital, having students submit lab notebooks digitally, including coding into your lab experiments, or just setting up a digital classroom then please stop by! Resources will be shared to all who come/ask.

Getting the Best Out of VAST - A Presentation for First Timers

ALL GRADES, First Timers

Michael Pratte, Stafford Co. Public Schools

VAST PDI first timers are invited to join us for an engaging opportunity to network and set their professional development goals for this year's PDI. This interactive forum will preview general sessions and help with planning a sequence of concurrent session presentations to meet attendee's interest and learning needs. VAST must-sees like our Night with the Exhibitors, Regional Challenge, DJ, and Dance will be highlighted.

Surveying and Geodesy in Colonial America: 18th Century STEM

MS-HS-COL, Earth/Space Science, Math in Science

Eric Pyle, James Madison University

Colonial America, especially Virginia, represented a chance for immigrants from Europe to actually own property. Land had to be measured, and when many maps were inaccurate, the work of surveyors, astronomers, and mathematicians defined the "shape" of the Earth leading to a precision of measurement unseen before. This demonstrative session will share how this work was done and how the instruments of scientific measurement relied on the elegance of classical mathematics.

NSTA's Position Statement on the Teaching of Climate Science

ALL GRADES, Earth/Space Science, Environmental Science

Eric Pyle, James Madison University

NSTA has recently released a position statement that represents the best thinking on how to support teachers of science in their delivery of evidence-based science instruction. This document speaks not just to science teachers, but offers advice to school administrators, and to all those who would support quality teaching on climate science in general and climate change in particular. Come sampling the resources NSTA and other organizations provide for teaching about our changing climate.

Teaching Science in an English Classroom

MS-HS, Cross Curricular Applications

Jennifer Robinson-O'Brien, North Stafford High School STAT Program

Cathleen Pessolano, North Stafford High School STAT Program, Amy Verhaalen, North Stafford High School STAT Program
Want to build your own monster? Wipe out the world in a wave of zombies? Bow before our robotic overlords? Welcome to English in the Stafford Academy for Technology. By erasing traditional boundaries between English and Science classes, our program encourages student involvement by tapping into pop culture and literature to provide a framework for scientific concepts. Come gain ideas for your tool kit on integrating science and literature, or how to start a school wide STEAM day.

Gene Editing & Bioethics: How & Why to Integrate

HS-COL, Biology/Life Science

Donna Rowlett, Gate City High School (Scott Co.)

Jinx Rasmussen, Virginia High School (Bristol City)

Given advancements in genome editing and rise of CRISPR-Cas9, students must be introduced to and explore implications of these. Similarly, today's youth will face issues such as management of pandemics and climate change. This session will supply teachers with activities, resources, and access to free resources with which they can provide students with opportunities and tools to evaluate "risk assessment" as they identify benefits & harms and the stakeholders in potential real life situations.

Assessing English Learners: How to Assess Content Knowledge

ALL GRADES, General

Alexis Rutt, University of Virginia

Assessment is a critical tool used by teachers to determine the extent of their students' content understanding. Unfortunately, many science classroom assessments end up assessing English Learners' (ELs) mastery of English, not their mastery of the science content. In this session, we will discuss ways to adapt classroom assessments to provide ELs the opportunity to fully express their content understanding, regardless of their current English ability.

Simulation Labs in STEM Classrooms

HS, Biology/Life Science, Chemistry, Physics

Vidhya Sankaranarayanan, Woodson High School

With increasingly high expectations set for our kids, it becomes crucial to allow them to explore their inquisitiveness in a rapid and safe learning environment that also meets their adolescent need to be intertwined with technology. We will see how the use of simulation labs integrated with target-based, game-based and project-based science instruction serves as an effective platform for visual modeling of natural phenomena through an eco-friendly, safe and engaging learning environment.

STEM Starts with Science and Ends with LIFE

HS-COL, Biology/Life Science

Kristin Scheible, Massaponax HS (Spotsylvania Co. Schools)

The aim of the workshop is to share the story of the LIFE Project designed for use in my Advanced and AP courses. LIFE stands for Literacy, Inquiry, Freedom and Enrichment. Through this year-long project students investigate a current real world problem of their choosing and ultimately defend a solution to that problem visually, in writing, and through oral presentations. The goal is to encourage other science teachers to consider facilitating LIFE Projects with their students.

Tales from the Field--Grosvenor Teacher Fellows Tell All

ALL GRADES, Environmental Science, General

Becky Schnekser, Cape Henry Collegiate

Jennifer Burgin, Arlington Public Schools, Judith Painter, Megan Jefferson,

Join four National Geographic and Lindblad Expedition Grosvenor Teacher Fellows as they talk about their expeditions to Galapagos, Antarctica, and Alaska. They will share about their expeditions, using the expeditions in their classrooms, resources they created, and how YOU can be in the next cohort of Fellows!

Bringing Expedition and Field Science to the Classroom

ALL GRADES, Environmental Science, General

Becky Schnekser, Cape Henry Collegiate

Empower and excite students through field and expedition science experiences that truly put them in the center of the action. Discover how to plan, implement, and dive deep into citizen, field, and expeditions with students of all ages, especially elementary.

National Geographic Educator Certification Phase 1

ALL GRADES, Formal and Informal Educators

Becky Schnekser, Cape Henry Collegiate

Do you believe in empowering students to think like explorers? In inspiring students to be global thinkers who can change the world? If so, you are invited to become a National Geographic Certified Teacher! We seek to inspire educators to teach students about the world in innovative and interdisciplinary ways. Come join the community of National Geographic Explorers, Educators, and Innovators! This session will provide you with Phase 1 of the certification process.

Sharing Field Experiences in Your Classroom with Virtual Reality

ALL GRADES, General

Matthew Scott, Douglas Freeman High School

We will use Google Cardboard & other apps in tandem with panoramic video technology to view field experiences in the comfort of your own classroom. We will explore public apps & custom videos made by the presenter. You can then design your own field trip experiences to share with students! There will be giveaways of Google Cardboard sets so you can make your own virtual trips. (Attendees may need Internet capabilities, a smartphone, & the ability to download apps to get the best out of this experience.)

ReGifted: Differentiating for Your High-ability Students

ALL GRADES, General

Alex Shafer, James Madison University, Greg Hackenberg, Martinsville City Schools

Amber Sanders, James Madison University, Robbie Higdon, James Madison University

Russ Kohrs, Massanutten Regional Governor's School

Perhaps you've experienced this: a student who seems like a bit of a know-it-all, or maybe a student who defies every rule, but clearly knows their stuff. If this sounds all too familiar, it is likely that you have a bored, but gifted student in your class. Join us for an interactive discussion on common issues in gifted education, and simple differentiation solutions that can be used in any class. Leave empowered with knowledge that will help you give better work to gifted students.

Exclusively for Pre-service Teachers - What YOU Need to Know

ALL GRADES, Preservice Teachers

Alex Shafer, James Madison University

Jennifer Maeng, University of Virginia

Calling all pre-service teachers! Join us for lunch and learn how VAST can launch you into your career as a science teacher. Whether this is your first time attending VAST or your third, this session has something for you! Make connections with fellow preservice teachers and others that can support your career whether just you're beginning a teacher preparation program or graduating in May! (sponsored by the Virginia Space Grant Consortium)

Chemistry Templates for Interactive Notebooks

HS-COL, Chemistry

Jennifer Sharp-Knott, Floyd Co. High School

Chemistry is an advanced science offered in high school, and most published resources for Interactive Notebooks are geared toward lower level sciences and/or younger students. In this presentation, teachers will be given the templates for more advanced topics included in Chemistry I, such as: Nomenclature, Organic Chemistry Nomenclature, Colligative Properties, Gas Laws, Acid/Base Models, Macromolecules, Radiation Types, and more.

Connecting Current Events, Critical Thinking, & Science

ELEM, Environmental Science

Heather Shuler, Old Donation School

Janice Clark, Old Donation School, Kathryn Davey, Old Donation School

Both erosion and watershed pollution are topics threaded throughout Virginia science standards that can be approached from multiple perspectives. Through the use of Paul's Reasoning Model, participants will learn how to guide students through identifying stakeholders in real world problems stemming from scientific concepts as well as identifying assumptions, implications, and solutions. Attendees will look at how this strategy can enhance critical thinking skills and boost the level of rigor.

Inspiring NASA's Future Workforce Through STEM Engagement

MS-HS, Earth/Space Science, Engineering

Rosemary Smith, NASA Langley Research Center

Lindsay Thornton, NASA Langley Research Center, Adeline Dinehart, NASA Langley Research Center

NASA is engaging its future workforce through three pilots providing unique learning experiences for students focusing on current NASA missions. Join us as we discuss best practices for integrating STEM concepts and technology into your classroom, explain what you will need to get started, and immerse you in a NASA journey without ever leaving the classroom!

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Teaching About Variables as a Basic Component of Research

ALL GRADES, General

Scott B. Watson, Liberty University

This activity-based presentation will focus on teaching the use of variables in science. Use of variables is both a basic component of research methods and an essential integrated science process skill.

Table Top Physics Demos and Activities

MS-HS, Physics/Physical Science

Tony Wayne, Albemarle High School

Drop by the showroom of physics demonstrations, activities, and ideas. Walk around the room as a collection of physics teachers show off physics resources that have worked for them or see new ideas invented and perfected by classroom professionals. Engage in meaningful discussions with others who share your passion for teaching physics. More info can be found at www.vipphysics.org/vast2019

Physics Idea Shareathon

MS-HS, Physics/Physical Science

Tony Wayne, Albemarle High School

Teachers from the Virginia Instructors of Physics (VIP) will share proven ideas, demonstrations, and resources for teaching physics. This will appeal to the middle and high school teacher. Everything from the simple to the high tech will be presented. This is an open session. If you have something to share bring 20 handouts and share with us. We want to hear from you too. More information can be found at www.vipphysics.org/vast2019.

Dive in: Linking Ocean Exploration to Your Class

MS-HS, Biology/Life Science, Physics/Physical Science

Cassi Weathersbee, Patriot High School

95% of our world is unexplored & waiting to inspire future scientists, engineers, & creative thinkers. The Ocean Exploration Trust's E/V Nautilus explores the world below the waves & can connect your students with on board scientists. Discover how Nautilus's rich hands-on resources supports your biology, physical science & engineering curricula. PRACTICE three STEM modules available from OET. Learn about the exciting PD opportunities for educators on board the Nautilus & win door prizes!

Academic Controversy to Enhance Conceptual Understanding

HS, General

Angela Webb, James Madison University

For students to be scientifically literate, it is imperative they understand, know how to apply, and critically examine key science concepts and practices. This can be fostered in science classrooms via debate; yet not all debated topics are scientifically controversial (e.g., climate change). In this session, preservice secondary science teachers from James Madison University will model and share ideas for introducing students to debate via constructive, cooperative, and academic controversy.

NASA Digital Badging Resources

ALL GRADES, General

Anne Weiss, NASA Langley Office of STEM Engagement

This session will provide an overview of the latest online NASA education resources, specifically digital badging. While primarily designed for professional development of STEM educators and district administrators (e.g., curriculum leads), this workshop will also introduce digital badges for student STEM engagement.

Communicating Through Science: Disciplinary Literacy

MS-HS, General

Jillian Wendt, University of the District of Columbia

Maya Barlev, Washington Latin Public Charter School

In this session, presenters will define linguistic concepts related to oral proficiency and discuss the importance of these ideas in the science classroom, with a focus on teaching linguistically and culturally diverse students. Participants will engage in hands-on activities to learn approaches for developing the academic oral language of English learners in the science classroom and how to bridge speaking and listening skills into the traditional academic domains of reading and writing.

Online Simulations Bring Science to Life

MS-HS, Earth/Space Science, Biology/Life Science

Leah Whetzel, Mattawoman Middle School

This session highlights a simulation that has the participant engage and learn about food chains. In this simulation, the ecosystem consists of hawks, snakes, rabbits, and grass, the population of each species can be studied as part of a food chain. Disease can be introduced for any species, and the number of animals can be increased or decreased at any time, just like in the real world. This session will also showcase the simulation's ability to collect data from multiple trials.

Severe Weather in Virginia

ALL GRADES, Earth/Space Science

Chris White, Regarding Weather LLC

Severe weather occurs much more often across Virginia than is generally recognized. Large hail, strong straight line winds, tornadoes, lightning, and flooding all pose threats to life and property. This presentation will illustrate the factors involved in formation and prediction of severe weather, what such phenomena look like, and recommended actions to take in response to watches and warnings issued by the National Weather Service.

Shadow Art: How Light Interacts with Different Materials

ELEM, Physics/Physical Science

Cathy Whitesell, Rockbridge Co. Public Schools

Stephanie Tuttle, Rockbridge Co. Public Schools, Joe Hawes, Rockbridge Co. Public Schools

How do we create shadows? In this session, you will create shadow art using an assortment of crafting materials and junk! You will use your knowledge of light, opacity, transparency, translucency and reflection to create works of art that look nothing like their shadows. Using photographs of the shadows cast, see if you can match the photograph with the art.

Letting STEM Bloom in Your Classroom With Paperwhite Bulbs

ELEM-MS, Engineering, Math in Science

Laurie Witt, Albert Harris Elementary School

During the winter when few plants are growing, students can easily learn to force Paperwhite bulbs in your classroom. Forcing Paperwhites is a wonderful way to learn how STEM starts with Science. Teachers learn to begin with a big idea and grow their lessons to integrate Technology, Engineering, and Mathematics. New ideas start to germinate on how to incorporate technology into lessons. An engineering design brief will be shared, as well as real-world math activities related to plant growth.

Free Evolution Resources at Your Fingertips!

MS, Biology/Life Science

Therese Wolak, The Teacher Institute for Evolutionary Science

Christopher Moran, The Teacher Institute for Evolutionary Science

The Teacher Institute for Evolutionary Science helps teachers teach evolution with confidence. This session will focus on a hands-on activity and online resources. This Lab is for the Birds is based on the famous research of Peter and Rosemary Grant in the Galapagos Islands. We will also look at dozens of free resources organized by content standard at www.tieseducation.org. This session complements "Evolution for Middle School Educators."

Flipped Classroom Model--How to Make it Work

ELEM-MS, General

Melonie Yielding, Ellis Elementary School (PWCS)

Heather Meek, Ellis Elementary School (PWCS)

In the flipped classroom model, students begin learning the material before teacher instruction is provided. Student achievement increases because student engagement increases. Despite its benefits, the flipped classroom model can seem impossible to implement if students do not have computers at home. This session will provide strategies to incorporate elements of the flipped classroom model into your science instruction. Bring your own device.

Aquaponics on a Budget

ALL GRADES, Biology/Life Science, Environmental Science

Tabatha Zarkauskas, Forest Park High School

In this session, I'll present low-cost, space-saving ways to bring the aquatic world into your classroom. Learn how to build interest and curiosity while teaching biodiversity, ecosystems, aquaculture, agriculture, symbiotic relationships, photosynthesis, and more.

Sites of Future VAST Professional Development Institutes

2020	DoubleTree by Hilton Hotel, Williamsburg, Nov. 12 - 14
2021	Hotel Madison and Shenandoah Valley Conference Center, Harrisonburg, Nov. 17 - 20
2022	DoubleTree by Hilton Hotel, Williamsburg, Nov. 11 - 13



Night Sky Network

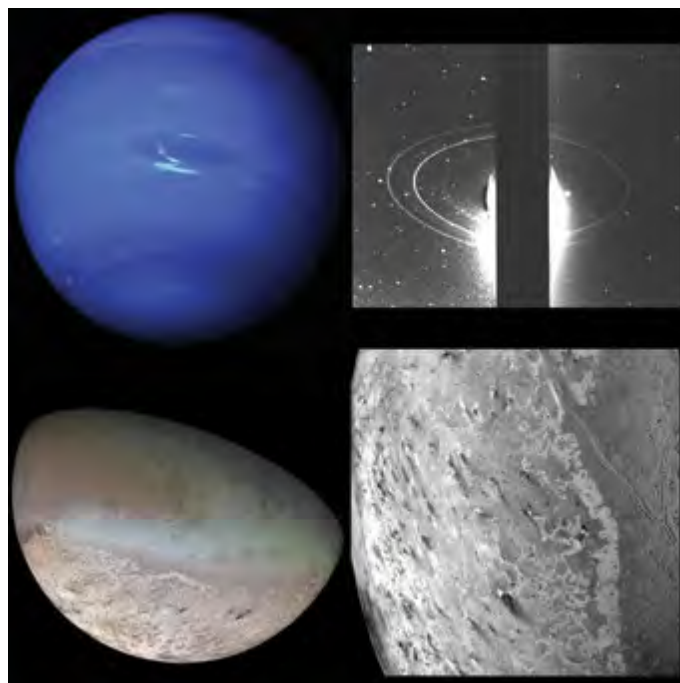
Chill Out: Spot an Ice Giant in August

David Prosper

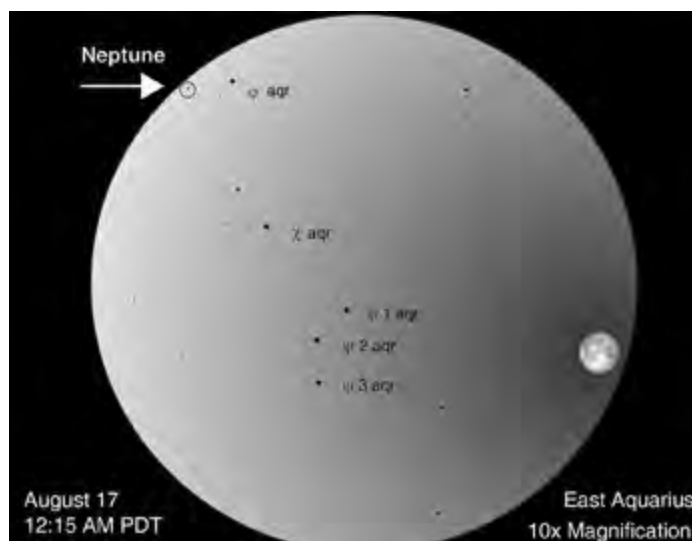
Is the summer heat getting to you? Cool off overnight while spotting one of the solar system's ice giants: Neptune! It's the perfect way to commemorate the 30th anniversary of Voyager 2's flyby.

Neptune is too dim to see with your unaided eye so you'll need a telescope to find it. Neptune is at opposition in September, but its brightness and apparent size won't change dramatically as it's so distant; the planet is usually just under 8th magnitude and 4.5 billion kilometers away. You can see Neptune with binoculars but a telescope is recommended if you want to discern its disc; the distant world reveals a very small but discernible disc at high magnification. Neptune currently appears in Aquarius, a constellation lacking in bright stars, which adds difficulty to pinpointing its exact location. Fortunately, the Moon travels past Neptune the night of August 16th, passing less than six degrees apart (or about 12 Moon widths) at their closest. If the Moon's glare overwhelms Neptune's dim light, you can still use the its location that evening to mark the general area to search on a darker night. Another Neptune-spotting tip: Draw an imaginary line from bright southern star Fomalhaut up to the Great Square of Pegasus, then mark a point roughly in the middle and search there, in the eastern edge of Aquarius. If you spot a blue-ish star, swap your telescope's eyepiece to zoom in as much as possible. Is the suspect blue "star" now a tiny disc, while the surrounding stars remain points of white light? You've found Neptune!

Neptune and Uranus are ice giant planets. These worlds are larger than terrestrial worlds like Earth but smaller than gas giants like Jupiter. Neptune's atmosphere contains hydrogen and helium like a gas giant, but also methane, which gives it a striking blue color. The "ice" in "ice giant" refers to the mix of ammonia, methane, and water that makes up most of Neptune's mass, located in the planet's large, dense, hot mantle. This mantle surrounds an Earth-size rocky core. Neptune possesses a faint ring system and 13 confirmed moons. NASA's Voyager 2 mission made a very close flyby on August 25, 1989. It revealed a dynamic, stormy world streaked by the fastest winds in the solar system, their ferocity fueled by the planet's surprisingly strong internal heating. Triton, Neptune's largest moon, was discovered to be geologically active, with cryovolcanoes erupting nitrogen gas and dust dotting its surface, and a mottled "cantaloupe" terrain made up of hard water ice. Triton is similar to Pluto in size and composition, and orbits Neptune in the opposite direction of the planet's rotation, unlike every other large moon in the solar system. These clues lead scientists to conclude that this unusual moon is likely a captured Kuiper Belt object.



Clockwise from top left: Neptune and the Great Dark Spot traced by white clouds; Neptune's rings; Triton and its famed icy cantaloupe surface; close of up Triton's surface, with dark streaks indicating possible cryovolcano activity. Find more images and science from Voyager 2's flyby at bit.ly/NeptuneVoyager2 Image Credit: NASA/JPL



Finder chart for Neptune. This is a simulated view through 10x50 binoculars (10x magnification). Please note that the sizes of stars in this chart indicate their brightness, not their actual size. Moon image courtesy NASA Scientific Visualization Studio; chart created with assistance from Stellarium.

Discover more about Voyager 2, along with all of NASA's past, present, and future missions, at nasa.gov.

This article is distributed by the **NASA Night Sky Network**, a coalition of hundreds of astronomy clubs across the US dedicated to astronomy outreach. Visit nightsky.jpl.nasa.gov to find local clubs, events, stargazing info and more.



Donta the Dragonfly Explores the Dominion



Donta the Dragonfly – *Odonata infraorder*

Like most classroom teachers, Donta is spending the summer exploring the Dominion. She will be back in October with fantastic places to share. Happy Summer and GET OUTSIDE!

Cindy Duncan



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



Please send articles, letters to the [editor](#), or labs by the submission deadline, October 1, 2019, for inclusion in the next digital PDI VAST Newsletter.



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