



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

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[VAST.Org](http://VAST.Org)

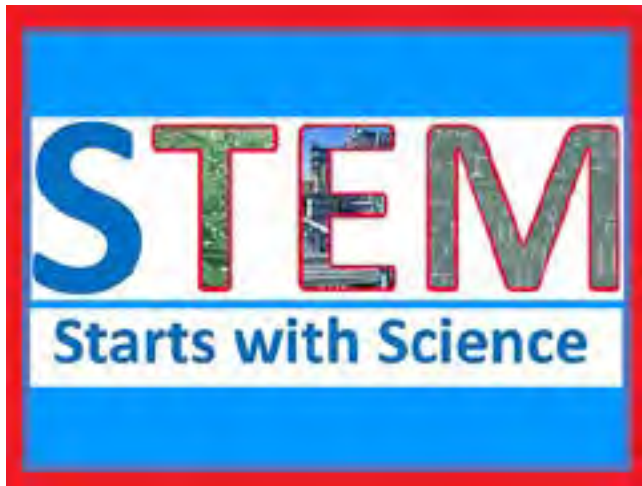
Check the web for news, conference updates, registration, and forms.

# The Science Educator

Fall 2019

A Publication of VAST, The Virginia Association of Science Teachers

Vol. 68, No.2



## PDI Registration

### Register online for the PDI at:

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

Information about the 2019 Online Registration Form and Fees for PDI attendees, exhibitors, and Donna Sterling Institute is found at this link.

- Online Early Bird Discounted registration closes October 15.
- Online registration closes October 31. Oct 31 is the 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.
- Two lunches and the Awards Banquet must be registered online by October 31st.
- On-site Registration is available at the registration desk in the Hotel Roanoke on November 14-16.



## Teaching the Nature of Science Using the 2018 Science Standards of Learning

By: Anne Petersen and Tyler Waybright

"Nature of science (NOS) refers to the "values and assumptions inherent to the development of scientific knowledge" (Lederman and Zeidler, 1989), the epistemic and ontological stance with which scientists approach investigations of the natural world (Matthews, 1994), and how society impacts and is impacted by science (Clough, 2006)." (Kruse & Wilcox, 2011)

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**Astronomy to Zebra Swallowtails:  
Teachers Engage in Science Content, History, and Regional Culture "from A to Z" During Annual Workshop**

See page 18



Freshly pressed apple cider from Appalachian Cider Co.  
[Session presenter: Kaden Kilgore (center) with the press and Scott County teacher and Virginia Master Gardner and park volunteer, Lowell Fowler, (left) assisting.]



**Donta the Dragonfly  
Explores the  
Dominion and Explores the  
Claytor Nature Center**

**Danielle Racke and Cindy Duncan**  
Go to page 21



## From the Executive Director

Don't Miss VAST 2019 and leave others asking...  
Where were you?

Have you ever thought about going somewhere and not gotten there?

Have you ever made up every reason why you did not need to go:

It will take too much time.

I don't have the time to afford to go.

I can learn it elsewhere.

I won't miss anything.

We all have done this before and have had regrets afterwards.

SO, don't be the one that thought about going and didn't....

Be the one that came and...

was glad you used your time wisely for VDOE updates,  
was glad that you learned something new,  
and glad you will be able to go back and share it.

See you in November!

*Susan Booth, Ed.S.*  
**Executive Director**

## Make a Plan

Before you come to the PDI it is best to plan what you want to attend. The PDI program includes a planning guide for you to use. You need to choose which sessions you wish to attend. You should also think about when you will explore the Exhibit Hall, how you will get to the General Sessions and meals on time. Will you have a personal theme that you want to learn more about? Do you have a Professional Development Goal you wish to achieve? With more than 180 breakout sessions and so much else you want to do, you are going to need a plan.

For a PDF of the [My VAST PLanner \(pdf\) Click here.](#) Use the [Breakout session lists also a pdf](#) and plan your personal Professional Development Institute.

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*Tom Fitzpatrick*  
VAST President-elect

From the desk of the President:

## Professional Development Institute President's 2019 PDI Invitation



You are invited to our 2019 Professional Development Institute!

It seems appropriate that we gather to celebrate and investigate *Stem Starts With Science* in the city of Roanoke. The development of the city of Roanoke has always been linked to STEM- Science, Technology, Engineering and Mathematics. From the early years as a settlement around a salt lick that attracted the local animals (hence the original name of Big Lick) to the incorporation of the city in 1884 after the coming of the railroad, STEM has always driven life in this part of Virginia. The beautiful and historic hotel that is home to our conference was built to attract railroad riders to the scenic Blue Ridge Mountains. Across the highway from the hotel are Roanoke shops where the railroad built state of the art steam locomotives into the 1950's.

STEM is certainly a buzz word in education. Whether we call it STEM, STEAM, or STEM-H, they all start with Science. Science is the driving force in making Technology and Engineering work. A rocket built without an understanding of Newton's Laws of Motion is not going to be a success. A computer chip made without an understanding of Chemistry and Physics is not going to power your phone. Underlying it all is Mathematics - the language of Science. This institute will be a great

opportunity for you to see how they all work together and must be taught together.

Remember that the mission of our organization is to inspire students, provide professional learning opportunities, build partnerships, and advocate for excellence at the school, local, state, and national level. Spend time at the keynotes and breakout sessions learning more about science, technology, engineering and mathematics. Visit the exhibits and learn what new tools and opportunities are available to improve your instruction. We can only inspire our students when we ourselves are inspired, so look for inspiration from our speakers, breakout presenters, and that fired up teacher that you sat next to at lunch or a session! Finally, your students will be waiting for you on Monday. Take some time to refresh and renew your spirit so that you can go to work on Monday reinvigorated. Cross the pedestrian bridge into the downtown area and visit the museums in the Center in the Square and the Virginia Museum of Transportation, visit the oldest farmer's market in the Commonwealth, come to the Friday night auction and "Science Party" and enjoy the mountains in their fall color.

Never forget that the work you do every day changes lives. Someone you teach will go into the STEM field and it will be totally because of your work and inspiration.

**VAST is your professional organization.**

*All the best,*

***Tom Fitzpatrick, VAST President***

### VAST PDI 2020 Theme

## SCIENCE Content, Courses, and Career Pathways

**Nov. 12 - 14, 2020**

**DoubleTree by Hilton Hotel, Williamsburg**

The Why behind many a science educator passion is to teach and provide learning opportunities for students to critically open their minds to the exciting world around them. Through inquiry, investigation, modeling, and collaboration many of our students experience the phenomenon-based wonder of our natural world and STEM innovations that spark their trajectory as a post graduate. Please consider what you can contribute as a presenter and joining us as a learner at the 2020 VAST PDI. Join us as

we focus on science contents, skills, and courses in a student's science educational continuum and how they lead to STEM career pathways. Sessions will emphasize both the teaching and learning skills of engagement and innovative science instruction supporting the 2018 Science standards and embracing the Virginia Profile of a Graduate. I look forward to welcoming each of you next fall.



Michael Pratte

**Science for All Learners, no exceptions.**

*Take care,*

***Michael Pratte, VAST President-elect***

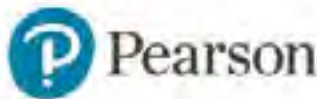
[president.elect@vast.org](mailto:president.elect@vast.org)

# PDI Sponsors: Supporting Science Education



The 2019 VAST PDI is brought to you by the hard work of many people and the generous contributions of individuals and organizations. Our sponsors contribute to the success of VAST by their presence, financial support, and resources.

The VAST Board of Directors would like to recognize the organizations listed below for their generous donations and contributions.



Thank  
You



*Don Cottingham  
Retired VAST President*

Please take a few moments to offer a special  
"Thank You!"

to the representatives of each of these organizations!

In addition to these organizations, please extend a special thanks to the people who make up the VAST PDI Planning Committee. This group of individuals makes VAST a reality and gives many hours to develop and makes the VAST PDI happen each year.



# VAST SCHEDULE AT A GLANCE - 2019

Wednesday, November 13



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

Thursday, November 14

8:00 a.m. Ticketed Donna Sterling Institute *(Separate from PDI)*  
 "The Power of Problem-Based Learning for Teaching STEM"  
 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** *(after General Session I in Roanoke AB)*  
 7:30 p.m. - 9:00 p.m. Night with the Exhibitors



Friday, November 15

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

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.)*





# Donna Sterling Institute

PDI- Thursday

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



## The Power of Problem-Based Learning for Teaching STEM

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-VIS-TA. 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. Attendees will learn how to implement this powerful teaching vision and to become excited about your teaching.

**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.

**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, 3:15 pm – 5:00 pm**

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 workshop registration is required. On site registration will not be available.**



PDI- Thursday

## 2019 VAST PROFESSIONAL DEVELOPMENT INSTITUTE

### PDI Speaker

THURSDAY EVENING GENERAL SESSION I SPEAKER,

5:30 pm

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.

## Thursday Night - 2017 PDI

**November 15, 7:30 p.m. - 9:00 p.m.**

Enjoy complimentary snacks sponsored by WorldStrides and a cash bar

See you  
There

## Night with the Exhibitors

&

## Meet Your Regional Director

**Region I:** Carolyn Elliott  
**Region II:** Becky Schnekser, Camilla Walck  
**Region III:** Dr. Dianne Clowes  
**Region IV:** Susan Bardenhagen  
**Region V:** Tammy Stone

**Region VI:** Jill Collins, Dr. Patricia Gaudreau  
**Region VII:** Donna Rowlett  
**Region VIII:** Katherine Bowen, Dr. Ben Campbell



**WELCOME to the Thursday night Exhibitor Reception. Earn those VAST bucks to prep for the Auction. Meet your regional director as you roam the exhibit hall. There you can also learn about the regional building event competition.**

Contact Regional Directors:

<https://vast.wildapricot.org/Board-Information>

## FRIDAY MORNING GENERAL SESSION II SPEAKER

10:40 am

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

21<sup>st</sup> 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. An active member of

Scientists without Borders and Wesson 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.

## 10:40 a.m. - noon **General Session II - Business Meeting** **Vote for VAST Board members and officers**

**Speaker: Dr. Kenneth Wesson, Educational Consultant Neuroscience**

*(Door prize giveaway at the end of the session)*



## **2019 VAST PROFESSIONAL DEVELOPMENT INSTITUTE** **FRIDAY EVENING AWARD CEREMONY SPEAKER**

Sponsored by Pearson

Ken R. Miller, Ph.D.

7:00 pm



**Professor of Biology at Brown University. Coauthor of a High School Biology Textbook.**

### **“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.



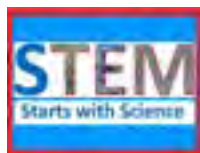
**Dr. R. Miller**



## Are You a First Timer?

We are so happy you are here and hope you will come again and again.

We have a session just for you!



Grade Level: ALL GRADES, Content Area: First Timers

Session 1, Room: Roanoke AB

Michael Pratte, Stafford Co. Public Schools

Title: *Getting the Best Out of VAST - A Presentation for First Timers.*

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 Auction will be highlighted.

## Students and Pre-service Teachers



This session is for YOU!

Exclusively for Pre-service Teachers

What YOU Need to Know

Friday • Lunch time • Noon – 1:00 p.m. • Pocahontas AB

Jennifer Maeng, University of Virginia, Chair of Colleges & Universities Committee

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!

Door prizes! • Goodies • Drawings for \$50 PDI Scholarships!

Free subscription to GIZMOS • Free subscription to Science4us (K-2)

Your university supervisors are invited to attend the session, too!



## Friday Night PDI - Auction and DJ

November 15, 8:30 pm - 10:00 pm

Roanoke AB right after the awards presentations



**Plan to enjoy the Auction and DJ on Friday night.** You will want to have as many VAST bucks you can collect to bid on auction items. The best way to get **VAST Bucks** is to visit the **Exhibitors Thursday** night and during the day **Friday**. **DJ, Ron Shaneyfelt** will entertain and challenge your POP Culture knowledge. He may provide winners with more **VAST Bucks** as he plays popular tunes.

[See more page XXX](#)

## Future PDIs

2020 DoubleTree Hotel, Williamsburg, Nov. 12 - 14

2021 Hotel Madison and Shenandoah Valley Conference Center, Harrisonburg (JMU), Nov. 17 - 20

2022 DoubleTree Hotel, Williamsburg, Nov. 11 - 13



**SCIENCE MUSEUM**  
of WESTERN VIRGINIA



The Science Museum of Western Virginia welcomes VAST participants.

Bring your VAST badge on November 13-17 to enjoy  
FREE admission to the museum!



One Market Square SE, Suite 4 | Roanoke, VA 24011 | 540.342.5710 | [www.smwv.org](http://www.smwv.org)



# VAST 2020 Slate of Officers

PDI- Saturday

## 2019 Slate of Board of Directors Officers

### President Elect; Russ Kohrs

**Russell (Russ) Kohrs** is running for President-elect of VAST. He currently teaches Environmental Science and Geology at Massanutten Regional Governor's School and Lord Fairfax Community College. Holding a BA in Geology with minor in Archaeology from the College of Wooster (Wooster, OH) and an MS in Geology from the University of Cincinnati, he has cultivated a love of science since he took his first steps as a child that has culminated in career that includes professional research in the geosciences and a love of sharing his excitement about the geoscience wonders all around us as a committed science educator. Currently a VAST Life Member and serving as the Earth Science Chair for the VAST board of directors, he is also President of the Virginia Earth Science Teachers Association (VESTA) and a member of the American half of the Board of Directors for Nasaruni Academy, an American/Kenyan partnership that supports the development of a school for Maasai girls near Narok, Kenya. He was also formerly the Mid-Atlantic Regional Director for NESTA, the National Earth Science Teachers' Association. Russ was the 2013 NAGT Outstanding Earth Science Teacher of the Year for Virginia and the Eastern Section and was also honored with a "Programs that Work" award from the Virginia Mathematics and Science Coalition for the Astronomy course program he designed while at Broadway High School. A National Board Certified science educator since 2012 and a secondary and community college educator for 16 years, Russ has served on numerous SOL review committees, content-area trainings offered through NSF-funded opportunities (including one summer serving as an NSF-RET teacher at the National Radio Astronomy Observatory in Green Bank, WV) participated in the 2019 GIFT (Geoscience Information for Teachers) Workshop offered by the European Geophysical Union in Vienna, Austria, among others. These experiences have provided numerous opportunities to present posters, share orally and through workshops about science education topics germane to the work of VAST and in support of science education in Virginia, and to network with science educators across the nation and beyond. Currently, Russ is a member of the Geological Society of America (GSA), the National Science Teachers Association (NSTA), The National Association of Geoscience Teachers (NAGT), as well as VAST and VESTA.

### Treasurer: Matt Scott

I have served as the VAST Treasurer for the past three years and I'm committed to serving for another term. I have attended all Board meetings and functions of VAST during this time and performed all my duties as treasurer. I also have exhibited and presented at the VAST PDI. I am very engaged in my field of Earth Science and actively involved with NASA summer programs. I have taught a full load of Earth Science classes at Douglas Freeman High School in Henrico for the past five years.

### Regional Director 1: Carolyn Elliott

It has been a pleasure to serve as director for Region One for the past four years and to contribute to VAST through communications with the membership, helping with PDIs, and working with the legislative committee. If elected, I will continue to focus on improving our communications network among the Region One membership to provide a forum for sharing teaching strategies and ideas for K-12 science. We also have plans to continue pursuing partnerships with local science venues.

I have worked in the field of public education for 21 years. My experience includes teaching science at both the high school and middle school levels in Virginia. I have served on the Item and Test Review Committee for the 8th grade SOL, developed school curricula middle school science, and been a presenter at VAST PDIs. My other experience includes working as host and producer of the public radio program, *With Good Reason*, and working as a freelance health writer. My undergraduate degree is from Miami University in Biology Education and my MEd in Exceptional Education from James Madison University.

### Regional Director 3: Margaret Greene

I am submitting my name for nomination for Region 3 Director. Recently I have been active in VAST as the Earth Science/VESTA representative. I have been active in VESTA since it was started, even though I did not attend the first meeting. I was in the same city but attending the VIP meeting which was at the same time. Later I was selected to be Vice-President and then President of VESTA. Over the years I have been a member of VAST, NSTA, VIP, VESTA, and NAGT. In 2000-2001 I was selected Teacher of the Year at Victory Academy in Gloucester County. Even though it is not associated with schools, I am active in the Middle Peninsula Master Naturalist group. As part of that group, I have helped with the Watershed Education SOL for 4th graders in Gloucester County. I feel that I have been a science educator longer than I was a paid science teacher. When I was an at-home mom with my young children, I volunteered at the nearby elementary school helping to provide teachers with hands on science activities and an after-school enrichment program called Young Astronauts.

### Regional Director 5: TBD



### Regional Director 7: Donna Rowlett

As region director, Donna says it has been an honor and a pleasure to serve Region VII. She coordinated regional workshops including Project WILD, WILD about Elk, and Project Learning Tree, for science teachers. She developed a working relationship with Virginia Tech Southwest Virginia Center's Director, Penny McCallum, as well as Natural Tunnel State Park in order to better serve the region's science teachers.

Donna has been a member of VAST for ten years, serving as Region VII Director for the past two years. An active member of Virginia Science Education Leadership Association (VSELA), she serves on the program committee. She also serves on the Cove Ridge Education Council at Natural Tunnel State Park, Duffield, Virginia. She is a facilitator for Project WILD and Project Learning Tree. In 2012-13, she completed the VISTA New Science Coordinators Academy at George Mason University. Donna is a mentor teacher at Gate City High School and has served as department chair for her school and district. This fall, she will serve as a member of the CIP Environmental Science team, representing Scott County.

She was the 2017 recipient of VAST's RISE Award for Biology. She was honored with the 2016-2017 Project WILD State Facilitator of the Year for Virginia. As current VAST Region VII Director, Donna wishes to be considered for re-election so she can continue serving the science teachers of Southwest Virginia.

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Election of officers will be held at the Friday 10:40 am business meeting during the PDI. At that time nominations from the floor will be accepted. Each attendee will receive a ballot that can be completed and turned in by 6 pm Friday night. The ballot box will be at the registration desk. Members not attending the PDI will be able to complete the ballot in the newsletter and return to VAST Secretary Robin W. Curtis, 4127 Wiffet Way, Williamsburg, VA 23188 by mail or email [secretary@vast.org](mailto:secretary@vast.org).

For 2021 VAST will be seeking a President-Elect, Secretary, Regional Directors for 2,4, 6, and 8. Please consider seeking one of these positions!

### Katherine Mangum Wins the Donna Sterling Exemplary Science Teaching Award (K-6)



Katherine Mangum is the VAST 2019 winner of the Donna Sterling Exemplary Science Teaching Award for K-6. Katherine currently teaches fifth grade science at St. Catherine's School in Richmond, Virginia. She is also the FIRST LEGO League robotics coach and has taught first and second grades as well. In addition, Katherine serves on the Board of Directors with the Virginia Children's Engineering Council and is their Past President (2018-2019). She has participated with the NASA eClips Teacher Advisory Board and presented at conferences such as VMI STEM conference, VCEC Convention, and ITEEA Conference.

Katherine's inquiry-based project "Bee Friendly" and coaching the FIRST LEGO League robotics brings her tremendous joy as students excitedly take ownership of questions they want to solve. "Bee Friendly" originated from the girls researching about ways animals and humans interact. They discovered a podcast describing bees dying from pesticides used to prevent the spread of mosquitos thought to carry Zika Virus. Once the students read that seven types of bees were added to the endangered species

list, they decided to develop a solution to support bees.

Tonya Walker, Director of Middle School at St. Catherine's School said of Katherine;

"Because all teaching is relational (especially at a girls' school), Katherine creates a supportive classroom where her students recognize the importance of teamwork.

Her group projects stoke the imagination of her girls and set the bar high academically. Her young scientists understand that the process is more important than the product in her classroom and in the world of science."

Katherine plans to focus on Transforming Matter and Energy (SOL 5.9) and NGSS crosscutting concept, Energy and Matter (4-ESS3-1) for her professional development by traveling to Iceland on a National Geographic Family Journey in the summer of 2020 to deepen her understanding of geothermal energy. She then plans to create a student driven study of geothermal energy and its use around the world.



## SATURDAY MORNING GENERAL SESSION SPEAKER



Sponsored by Discovery Education

Dr. Robert Corbin

11:30 am

Director-Global STEM Initiatives,

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



Dr. R. Corbin

### “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 21<sup>st</sup> 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.

## Why come to the PDI on Saturday?

After the 7:30 am continental breakfast in the Exhibit Hall, you may explore the exhibits to discover new ideas, resources and tools to enhance your classroom and enrich your curriculum. The hall will be open until 11:15. Starting at 10:25 exhibitors will be offering door prizes to those present at their booths.

At 8:30 and 9:35 concurrent sessions 7 and 8 begin. Be sure to plan ahead what sessions to you want to attend.

At 11:00 you can pick up your boxed lunch to eat during General Session III where we will meet our new officers

for 2020. Dr. Robert Corbin, sponsored by Discovery Education, will discuss “STEM Dispositions, Create Future Leaders and Innovators”. If you are there you will be eligible to win a door prize giveaway at the end of the session.

Two more concurrent sessions are available on Saturday afternoon for you to choose to attend. We hope you will stay until the end because each concurrent session 10 will be giving away prizes provided by Vernier, Five Ponds Press and speaker Dr. Mike Gil.



## Virginia Finalists Selected for Presidential Math and Science Teaching Awards

Two Virginia secondary science teachers have been selected as state finalists for the 2019 Presidential Award for Excellence in Mathematics and Science Teaching. The award — regarded as the nation's top honor for mathematics and science teachers — recognizes teachers who develop and implement high-quality instructional programs that improve student learning in mathematics and science.

The following teachers are the 2019 Virginia state finalists:

- **Myron Blosser**, a Biology and Biotechnology teacher at Harrisonburg High in Harrisonburg
- **Timothy Colin Bouchillon**, an Environmental Science and Capstone Research teacher at Manassas Park High in Manassas Park

The finalists were selected by review committees convened by the Virginia Department of Education. Nominees were required to provide evidence of deep content knowledge and exemplary teaching skills.

“These great teachers provide engaging instruction that combines the rigor of the commonwealth's mathematics and science standards with the essential life skills known as Virginia's 5 C's: critical thinking, creative thinking, collaboration, communication, and citizenship,” Superintendent of Public Instruction James Lane said. “I look forward to personally congratulating these five outstanding teachers on this much-deserved honor.”

The two Virginia finalists will be recognized this fall by the state Board of Education on October 25, 2019.

The Presidential Award for Excellence in Mathematics and Science Teaching program is administered by the National Science Foundation on behalf of the White House. The award alternates annually between teachers in grades K-6 and teachers in grades 7-12.

A national review committee will review the applications of the 2019 finalists and the winners of the 2019 Presidential Award for Excellence in Mathematics and Science Teaching will be announced by the White House in 2020. Awardees each receive a \$10,000 unrestricted award from the National Science Foundation, a presidential certificate and a trip to the nation's capital for a series of recognition events and professional development activities.

For more information about the PAEMST program or to nominate a teacher, please visit [www.paemst.org](http://www.paemst.org) or contact Anne Petersen ([anne.petersen@doe.virginia.gov](mailto:anne.petersen@doe.virginia.gov)).

Link to Virginia's 5 C's - <http://www.virginiaisforlearners.virginia.gov/media-library/>

The 2019 PAEMST finalists will be honored at the VAST PDI Awards ceremony Friday, November 15, 2019 during the VAST Professional Development Institute (PDI).



**VAST**  
**Recognizes and Congratulates the**  
**Virginia Junior Academy of Science Recipients of the**  
**VAS Franklin D. Kizer**  
**Teacher Development Fund Awards**  
**The Franklin D. Kizer Science Teacher of Tomorrow Award:**  
**Kristin Gogal Swanson Middle School**

This award recognizes an outstanding Virginia science teacher and provides an opportunity for professional development through attendance at the annual VAST meeting. Criteria: The recipient is a teacher with a maximum of 5 years of teaching experience. The recipient will have sponsored student participation at the VJAS annual meeting. The recipient is nominated and chosen by the VJAS Committee. This award will be used to support the professional development of the recipient by providing the funds needed to attend the annual VAST meeting. The maximum amount of the award is \$500.

**The Franklin D. Kizer Fund Distinguished Service Award in Honor of E. C. L. Miller:**  
**Dawn McCoart Washington-Lee High School**

This award recognizes the exceptional contributions to VJAS of a STEM teacher. Criteria: The recipient will be a teacher who has contributed to the VJAS by sponsoring student research projects, serving as a reader, judge, and/or member of the VJAS Committee. The teacher will be nominated and chosen by the VJAS Committee. The award of up to \$500 will be used for professional development, and the recipient will propose a professional development activity to the Director of the VJAS. Examples of acceptable proposals include attendance to a professional meeting, tuition for a science/math course, or software to enhance their teaching effectiveness. This years recipient has chosen the VAST PDI.

**VJAS would also like to recognize and thank Robin Curtis, VAST Secretary for her DISTINGUISHED SERVICE to the VJAS.**



**Science  
MATTERS**



**Using the power of media to inspire our community to  
value science and understand its importance to our future**

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**Hot Shots & Hot Jobs** in STEM fields

**Green Kids** encouraging Environmental Stewardship

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# EXHIBITORS 2019



American Chemistry Society (ACS) Virginia Section  
& American Assoc. of Chemistry Teachers (AACT)

Amplify Education

ASM Materials

AstroCamp Virginia

BIOZONE

Britannica Online Learning

Carolina Biological Supply Company

Discovery Education

Dominion Energy

EAI Education

eMediaVA - WHRO Education

ExploreLearning

Five Ponds Press

Forestry Suppliers Inc.

Hand2Mind

Houghton Mifflin Harcourt

Inventors Hall of Fame

James Madison University

Legends of Learning

McGraw Hill Education

Microscope Solutions, Inc.

NASA eClips/NIA-CISE

National Geographic Learning/ Cengage Learning

National Institute of Aerospace, Center for

Integrative STEM

National Academies of Sciences, Engineering, and  
Medicine

National Inventors Hall of Fame

National Energy Education Development (NEED)

National Science Teachers Association (NSTA)

O'Brien Associates, Inc.

Office for the Advancement of Sustainable

Energy at James Madison University

Old Dominion University

PASCO Scientific

PBL Project

Pearson

School Speciality

School Speciality Science Delta Education

FOSS

School Speciality Science Frey

Science Museum of Virginia

Science Museum of Western Virginia

STEMscopes

Success Matters

SmartSchool Systems

Texas Instruments

TWIG Education

Vernier Software & Technology

Virginia Association for Environmental  
Education (VAEE)

Virginia Association of Science Teachers

Virginia Department of Aviation

Virginia Department of Education

Virginia Department for Environment

Virginia Department of Forestry

Virginia Department of Game and Inland Fisheries

Virginia Department of Transportation (VDOT)

Virginia Institute of Marine Science

Virginia Junior Academy of Science (VJAS)

Virginia Living Museum

Virginia Lottery

Virginia Science Olympiad

Virginia Space Grant Consortium

Virginia Tech College of Natural Resources

Virginia Tech College of Science

Virginia Transportation Construction Alliance

WorldStrides

Don't forget to ask for VAST Bucks!





## Astronomy to Zebra Swallowtails: Region VII Teachers Engage in Science Content, History, and Regional Culture “from A to Z” During Annual Workshop

Natural Tunnel State Park and Daniel Boone Wilderness Trail Interpretive Center in Duffield, Virginia, hosted Region 7 teachers during a two-day workshop, September 13-14, 2019. The annual C.R.E.A.T.E. (Cove Ridge Educational Alliance for Teaching Experientially) workshop is coordinated by the Education Council of the Cove Ridge Advisory Board of Natural Tunnel State Park. Approximately 50 teachers representing nine school divisions signed up for the annual event. Several community merchants and organizations as well as educational vendors contributed either monetarily or with merchandise to support and ensure the success of the workshop.



New annual participant t-shirt with Daniel Boone Wilderness Trail Interpretive Center Logo.

Primary goals of the workshop are to familiarize teachers with the SOL-based instructional resources available to them through both the park and the interpretive center as well as to encourage teachers in all content areas at all grade levels to teach and learn in an outdoor setting. The presenters and/or topics change each year in order to provide diversity and “new” experiences for both C.R.E.A.T.E. alumni and “newbies” alike. As always, presenters made excellent efforts to reach all content areas while emphasizing science and encouraging outdoor learning experiences.



Friday evening Appalachian music, history and story-telling with Ron Short



Art & Painting Session



Creative Writing Across the Curriculum

This year, we were honored to have a guest participant from outside the region. VDOE Science Specialist, Josh Bearman, joined us for the event along with his family. In addition to participating in the sessions, Josh, was available to answer questions and discuss the VDOE’s available resources, especially regarding the new science standards of learning.

The event kicked off with UVA-Wise astronomy instructor, Bob Van Gundy, treating participants to telescopic views of the sun and an evening of star-gazing and astronomy lessons later on Friday evening. During Friday evening’s activities, park and Interpretive Center volunteer, Ron Short provided Appalachian music, history, and storytelling.

Participants chose three out of five possible sessions during Saturday’s offerings. Sessions included “Art & Painting”, “Math in the Mountains” (UVA-Wise), Virginia Master Naturalist programs, “Virginia Vintage Apples, Pomology, and Cider-Making” by Appalachian Cider Co. owner, Kaden Kilgore and “Creative Writing Across the Curriculum”.

The event culminated with an impromptu musical performance by Josh Bearman and Kaden Kilgore!



Kaden Kilgore and Josh Bearman, VDOE Science Specialist, treat participants to an impromptu Appalachian/Bluegrass picking session after the workshop.

## Secondary Teachers (6-12): Apply for the 2020 Donna Sterling Exemplary Science Teaching Award



Donna Sterling was a visionary science educator with a passion for working with science teachers and developing habits of inquiry-based teaching. Most recently, her leadership in the Virginia Initiative for Science Teaching and Achievement (VISTA) focused on elementary and secondary teacher professional development. This award recognizes that exemplary teachers engage in continuous improvement, and is designed to support a professional development plan for the improvement of science teaching. The award alternates between elementary and middle/secondary. In 2020, the award will be given to an exemplary secondary teacher. To qualify for the 2020 secondary award, a 6th grade teacher must be teaching in a secondary setting.

The awardee will receive a total of \$4000. In addition, travel costs will be reimbursed to attend the 2020 VAST PDI to receive the award and to the 2021 VAST PDI to present a session on the professional development experience and outcomes. The awardee will receive \$3000 at the VAST PDI in 2020. The remainder will be awarded after the awardee presents at the next VAST PDI and also submits an article to either the newsletter The Science Educator or the Journal of Virginia Science Education.

**Deadline for applications: July 15, 2020**

### To apply:

1. In your cover letter, include information on yourself, including your preferred name, your home and school addresses, and phone numbers and email address(es) where you can be reached. Tell us how many years you have taught, where, and what grade levels.
2. In no more than two pages, single-spaced, describe an inquiry-based science unit that you taught. Describe how your unit is student-centered and includes community engagement. Give evidence that the unit was effective. Evidence documents such as student work can be submitted separately, and will not count toward the two-page limit.
3. In no more than two pages, single-spaced, describe your plan for professional development, using the funds received through the Sterling award. These plans may include summer courses, attendance at workshops, study abroad opportunities, instructional materials development under the guidance of experts on-site, etc. Feel free to be creative in your plan. Submit the professional development description with anticipated outcomes, including plans for a presentation at the 2021 VAST PDI. Tell how this award will help you become a better teacher of science and will support the development of leadership skills. Tell about your plans for writing an article about your experiences.
4. Submit three letters of recommendation based on direct observations of teaching. One letter must be from the science supervisor or someone serving in that capacity, a second letter must be from the principal, assistant principal, or instructional leader, and a third letter must be from a fellow teacher or a parent. Letters should address the following: Why is this teacher a good candidate for this award? What qualities do they exhibit as teachers that make the recommender think they will use the funds from the award to improve their practice as teachers of science?

All materials must be submitted by 5 pm on **July 15, 2020**.

Submit applications and letters of recommendation to Dr. Juanita Jo Matkins, [jjmatk@wm.edu](mailto:jjmatk@wm.edu)



## **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](http://www.vast.org) or contact Susan Booth, Executive Director at [susan.science@gmail.com](mailto:susan.science@gmail.com).



# Teaching the Nature of Science Using the 2018 Science Standards of Learning

By: Anne Petersen and Tyler Waybright

“Nature of science (NOS) refers to the “values and assumptions inherent to the development of scientific knowledge” (Lederman and Zeidler, 1989), the epistemic and ontological stance with which scientists approach investigations of the natural world (Matthews, 1994), and how society impacts and is impacted by science (Clough, 2006).” (Kruse & Wilcox, 2011)

Developing an understanding of the NOS is a complex process that goes beyond the memorization of historical contributions of specific scientists and their contributions. Scientific understanding of a concept is a collaborative process that builds on the creativity and contributions, including failures, of many scientists. The development and acceptance of these concepts are impacted by both society and politics as both influence the focus and practice of science. These understandings may change as more information becomes available and our abilities to study concepts change due to the development of new technology or the societal climate at the time. In other words, the development of scientific understanding is a process as scientists strive to come to an understanding of the natural world.

The 2018 Science Standards of Learning were revised to promote a more conceptual approach to the teaching and learning of science. The intent of this revision is for teachers to support students as they construct meaning of scientific concepts, including the nature of science, through the use of science and engineering practices. The nature of science is not rote memorization of terms or specific facts; instead, students should use classroom experiences, scaffolded activities, investigation, prior learning, and terminology to develop a more robust understanding of the natural world and the concepts in the science standards. The roles of scientists and historical events continue to be key in the development of scientific understanding; however, solely memorizing the roles does not allow students the opportunity to build a true understanding of the NOS.

Students can also develop an understanding of the NOS as they DO inquiry based experimentation; experimentation, coupled with “stories” focused on the history of science, allow students opportunities needed to understand the tenets of the NOS. As students “discover” the tenets of

science, teachers can explicitly identify these tenets and use these to develop a more accurate representation of how the development of scientific understanding occurs.

## Recommendations for teaching NOS using the 2018 Science Standards of Learning

The use of historical examples in this pedagogical approach can drastically enrich students understanding as they walk in the footsteps of scientist past and present. These rich contextual experiences promote deeper understanding of NOS. In order to build a more accurate understanding of the NOS, teachers should allow the students the following opportunities in the classroom:

- Laboratory experiences that allow for increased student ownership in the development and implementation of experiments.
- Incorporation of historical materials (stories) that reflect the pathway that the occurred in the development of a theory or law. These stories should include not only the failures and successes that led to the development of the theory or law, they should also include the climate (social and political) that impacted the development of these laws or theories.
- Class discussions on commonalities between their laboratory experiences and historical development of theories and laws and align these to the tenets of the NOS.

An understanding of how science is conducted in the real world can be built throughout world the academic year. Opportunities to allow students to develop this understanding should be emphasized as students DO science!

## References:

- Kruse, J. and Wilcox, J. (2011). Using historical science stories to illuminate Nature of Science ideas and reduce stereotypical views in a sixth grade classroom. Paper presented at the 2011 Association for Science Teachers International Meeting, Minneapolis, MN, January 19-22.





## Donta the Dragonfly Explores the Dominion

Fall 2019



Like most classroom teachers, Donta spent the summer exploring the beautiful Dominion. She traveled far and wide and has many new places to share with you over the next few months. One of her favorite stopping points was when she was flying toward the Blue Ridge Mountains and found the Claytor Nature Center in Bedford, VA. There she discovered a nature preserve which had unique features and education programs that made nature both exciting and less threatening.

Donta shares an excerpt from this adventure.

During a summer excursion towards the Blue Ridge, Donta was enjoying the views of the fields and trees, while avoiding the hawks and crows that would love to make a meal of her. As she flew, she noticed a very large tree in the distance that looked like an ash tree. With the incursion of the emerald ash borer, many ash trees had succumbed to the pest's appetite and forests were changing. A large ash tree was worth investigating!



A sign told Donta that she was entering the Claytor Nature Center, and she passed along an ash-lined driveway towards her objective. As she approached the tree, she identified it as a large white ash tree! It stood in the lawn of a restored colonial farmhouse, looking out towards the Peaks of Otter and providing shade for a group of adventuring students taking a snack break. Trying not to distract the students too much, she flew around the tree to estimate its girth. More than five feet in diameter! That made this the fifth largest white ash in the state! And for it to be accessible for people to enjoy - how magnificent! The center's staff must be working hard to do preventative treatment for this tree and those along the drive, for the larvae of the emerald ash borer were ravenous and relentless!

Wings buzzing happily, Donta flew to a rock-lined pool in front of the house to take her own snack break on the insects hanging around there. The pool reflected an open view of the Peaks of Otter to the farmhouse visitors. She enjoyed the view as she snacked and watched the clouds float lazily over the not-so-distant peaks. Finishing her snack, Donta continued in the direction of the mountains, flying over fields, through the woods, and over the Big Otter River.



She heard a scream of "SNAAAAAAAAAAAAAKE!!!!!!!" and quickly changed her course to investigate. She came upon a curious scene. A woman was standing in the middle of a ring of wide-eyed children and laughing adults. She was asking the children, "Now...when I screamed, did that scare you?" The children nodded and looked around sheepishly at each other. Donta perched upon a pawpaw branch to watch. "Well," the woman said, "it turns out that screaming scares all the animals around you too! They think you're screaming ATTAATAAAAAAAAAACK!!!" The woman went on to draw connections between the children and some of the animals that many people find threatening - including snakes and bees - to help the kids understand the behaviors and motivations of the animals they might encounter while on their outdoor adventure. She demonstrated how to be respectful of wildlife even when startled or scared, and how being observant is the first step in avoiding scary encounters. After a few more minutes, the children lined up to head down a narrow dirt path into the woods. Donta was curious, so she followed.

The children entered a mature upland forest and strung themselves out in an almost single-file line. They walked slowly down the path, looking at the different types of trees, stepping over rocks, pointing out the millipedes, and making enough happy squeals of discovery to keep away any of the bears, coyotes, foxes, or bobcats that might have ventured into the area during the night and not yet left it.

The trail ran down a hill and rounded a bend as it exited the upland forest into a riparian zone. As the woman in front rounded the bend, she pointed off the trail and whispered to the children in front. She stayed at the bend and sent the children a little further down the trail to wait for the rest of the group. Soon, the excited whispers of "snake!" reached the back of the line. About five feet from the trail,

the remnant of a large tree lay in the sun, a large black rat snake curled on top of it. The children inched quietly along, fascinated and pointing excitedly, but staying on the trail and continuing to move. Towards the back of the line, one child stopped before turning the bend, tears streaming silently down his face.

The woman came to his side. "What's

bothering you?” she asked.

“I’m afraid of snakes,” he whispered.

“Well how about this,” she said, “See where the other kids are walking on the trail? And they’re being quiet, and the snake is not moving at all? We’re going to walk calmly and quietly, and we’ll stay on the far side of the trail as we go by – even farther away from the snake than the other kids are. You’re being really brave already, and I’m proud of you for not screaming. I bet you can make it!” The boy nodded in a hesitant way but still looked unsure.



As she finished talking, another boy came back from the front of the line and took the first boy’s hand. “Here, I’ll lead you by it,” said the second boy. The first boy nodded, closed his eyes, and let the second boy lead him past the log with the snake on it.

Quietly, the remainder of the group walked past the snake, which watched them but did not move.

When they were far enough from the log that it couldn’t be seen, the woman stopped the two boys. “Hey,” she said, “You made it!” The first boy opened his eyes, and his tears stopped. “Were you scared?” she asked, and he nodded. “But your friend came to help you and we were respectful of the snake and it respected us, and nothing happened, right?” The boy nodded again. “Do you feel pretty good about that?” The boy nodded and hesitantly smiled. “I’m so proud of you right now! High five for bravery in the face of fear!” she said. The boy slapped her outstretched hand, face now beaming with relief and accomplishment.

The woman moved back to the front of the line, and the group continued its journey.

Donta, satisfied with how the group was progressing, flew on. - Danielle Racke

In an increasingly technological age, the human psyche calls out for a natural connection. Even as skyscrapers and shopping centers overrun fields, forests, and wetlands, children and adults are reaching for technology that creates the illusion of being outdoors.

Spread over 491 acres in Bedford, VA, Claytor Nature Center exists to facilitate connections between people and a natural world that can be experienced beyond the fabricated screens of 3D goggles.

More than eight miles of minimal-impact trails allow public visitors and students to explore a variety of habitats and



natural features. Those features include different types of woodlands, wetlands, fields, ponds, and a one-mile stretch of the Big Otter River. A few facilities, including a large education building with seminar room, lab, and wrap-around deck; a picnic pavilion; a nature-play space called Otter Space; and a 16-bed lodge all facilitate nature and environmental education programs for schools, scouts, families, and organizations. Claytor Nature Center also oversees astronomy education and outreach programs for Belk Astronomical Observatory, which sits on the highest point of its property on the southside of the grounds.

Claytor Nature Center is owned and operated by the University of Lynchburg and observes holidays according to the University schedule. Otherwise, it seeks to be freely accessible to the public seven days a week from 8:30a – 5:00p. More information about some of its features and facilities, including the opportunity to rent Cloverlea Farmhouse and Gardens as a special event venue, can be found on the webpage or by contacting <[cncsc@lynchburg.edu](mailto:cncsc@lynchburg.edu)>.

#### Information on the web

- Main webpage: [www.lynchburg.edu/claytor](http://www.lynchburg.edu/claytor)
- Environmental and nature programs: [bit.ly/cnc-education](http://bit.ly/cnc-education)
- Astronomy programs: [www.lynchburg.edu/observatory](http://www.lynchburg.edu/observatory)

#### Contact us

- Education programs (any): Danielle Racke, <[racke\\_d@lynchburg.edu](mailto:racke_d@lynchburg.edu)>, (540) 587-4061
- Astronomy programs: Trish Cerulli, <[cerulli\\_tl@lynchburg.edu](mailto:cerulli_tl@lynchburg.edu)>
- Facilities and special events: <[cncsc@lynchburg.edu](mailto:cncsc@lynchburg.edu)>
- Facebook: Claytor Nature Center and Belk Observatory

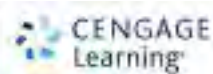
Written for Donta By Danielle Racke, Education Coordinator of the Claytor Nature Center.

If you know of a great resource for improving environmental education in the Dominion and would like Donta to visit and highlight, contact Cindy Duncan at [cduncan@cbf.org](mailto:cduncan@cbf.org)

Cindy Duncan is the VAST Director of Environmental Literacy and the Virginia Teacher Professional Learning Coordinator for the Chesapeake Bay Foundation.



**THURSDAY EVENING GENERAL SESSION I SPEAKER, 5:30 pm**  
**Sponsored by National Geographic Learning/Cengage Learning**  
**Dr. Mike Gil**



**Dr. Mike Gil**

**“If you’ve ever wondered what it would be like to be a marine biologist, working in harsh, unforgiving conditions, to reveal insights that help us understand (and, thus, better protect) valuable marine ecosystems, then this is the (YouTube) channel for you. I will show you this secret world, behind the scenes, and, in doing so, I’ll showcase the power of science to change a life and improve the world.” Mike Gil**

Check out Mike’s site to get an idea of what his videos offer you and your students. “Tips for Young Scientists”, “What is it Actually Like to be a Marine Biologist”, “What Scientific Consensus Really Means” are a few of Mike’s videos online. Go to the YouTube channel: <https://www.youtube.com/sciallorg> for a sample video and more.

To support SciAll.org, subscribe here:

[https://www.youtube.com/channel/UC9aecO5LSI-9\\_9b6-WqD7kw?sub\\_confirmation=1](https://www.youtube.com/channel/UC9aecO5LSI-9_9b6-WqD7kw?sub_confirmation=1)

## **SciAll Is a Science Educational and Research Organization**

### **Founded and Run By Dr. Gil**

SciAll.org (incorporated in the United States as the 501(c)3 nonprofit 'SCIALL ORG INC', EIN: 82-0683398), is a science education and research organization.

Our mission is to expand and diversify public interest in science. Under this umbrella, we follow two core aims. **Aim 1:** Provide inspiration and guidance to students, particularly those from groups underrepresented in STEM, to help them understand the process of science and what it takes to succeed in STEM careers. **Aim 2:** Make the scientific process accessible to a broad public audience, particularly among groups traditionally underrepresented in STEM fields and groups that are traditionally skeptical of environmental science. To fulfill these aims, we connect the public directly to professional scientists, who volunteer as vloggers for our campaign. Our team of scientists, from various backgrounds, create and freely disseminate online videos that showcase personal reflections and stories that convey the relatable, intuitive, and, often exhilarating, human side of scientific research. We quantify the impact of our content through voluntary viewer surveys. For example, according to surveys from 530 voluntary respondents (60% female, 19% minorities): 94% (95% of females, 96% of minorities) became interested to learn more about scientific research because of our videos, which “made science more appealing” to 51% (54% of females, 56% of minorities) (full results published open access\*). Though unconventional, our efforts to make science more accessible to the public are working. To date, our videos have been watched for >20,000 hours (on YouTube alone), and we’re just getting started.

#### **More on Aim 1:**

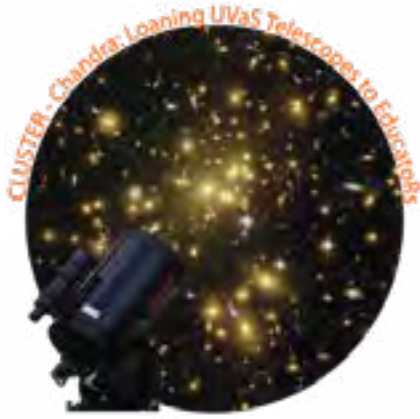
Many students, particularly those from underserved communities and from households that lack a tradition of higher education, are denied the opportunity to understand the process of science and what STEM careers offer, both in terms of benefits to society and fulfillment to individuals. Thus, SciAll.org seeks to openly share the otherwise esoteric processes of both conducting science and becoming a professional scientist. We complement traditional teaching approaches: our content first rouses interest in STEM, inspiring students to seek knowledge, and once sufficient knowledge is acquired (e.g., through traditional, classroom-based learning), our content then offers students mentoring and advice on how to effectively advance their careers in STEM.

#### **More on Aim 2:**

Environmental science answers the question: how do we reduce our impacts on the environment to grant our species a sustainable existence? However, the public is deeply divided about whether environmental science should guide human behavior. The fate of our species rests upon our ability to address these divisions. Thus, SciAll.org seeks to make the scientific process and the personal motivations of scientists accessible across political, economic, and cultural divisions. We do this by striving to make our content nonpartisan in political tone, while often discussing topics that have become unjustly politicized. It is only when science is inclusive and, consequently, embraced by people of all backgrounds, that it can guide our species to a sustainable and prosperous existence.

\*Gil, M.A. [YouTube videos of 'research in action' foster diverse public interest in science](#). *Ideas in Ecology and Evolution* 10 (2017).





## **CLUSTER**

### **Chandra: Loaning UvaS Telescopes to EducatoRs**

### **A Telescope Loaner Program for Teachers**

#### **What is CLUSTER?**

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

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

**CLUSTER** is managed by Steve Layman, a long-time member of the Charlottesville astronomical Society. From 2010-2013, support for this education and outreach program was provided by the National Aeronautics and Space Administration through Chandra award GO0-11097X to Dr. Craig Sarazin of the University of Virginia, issued by the Chandra X-Ray Observatory, which is operated by the Smithsonian Astrophysical Observatory for and on behalf of NASA under contract NAS8-03060.

Current funding is provided by the Friends of the McCormick Observatory. For information on supporting their education and outreach programs, please visit their webpage.

#### **How To Get Involved**

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

Oct. 5, 2019	4:00 – 10:00 p.m.
Jan. 18, 2020	3:00 – 9:00 p.m.

The telescope kits can be transported in the trunk and/or back seat of a passenger car. Telescope kits will need to be returned no later than 2 weeks prior to the date of the next session.

Schools participating in the program in 2019 and 2020 will receive, at no cost, Celestron 70 – 90 mm refractor telescope kit which they may keep after the UVA telescope has been returned. Participating schools will also be issued an account to access the Rapid Response Robotic Telescope at Fan Mountain, Virginia.

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

For teachers already involved with CLUSTER, there is an internal collaboration site (Collab).



**Are you a VISTA Alum? The Sterling Grant is pleased to offer you a free registration to attend the VAST 2019 at the Hotel Roanoke, Nov. 14-16. Please contact Robin Curtis at [secretary@vast.org](mailto:secretary@vast.org) for a code.**





## NASA Contest: Name the 2020 Mars Rover

Your students are invited to enter a contest to name the 2020 Mars Rover. The NASA site has information about the student contest. Check out the website: [futureengineers.org/nametherover](https://futureengineers.org/nametherover) and it has the eligibility rules.

All K-12 students in US public, private, & homeschools are eligible to enter (also US students in schools outside the continental US). The Grand Prize winner of this contest will win a Family Trip to the Mars 2020 Rover Launch. Wow!

The site for students to get started is: [futureengineers.org/nametherover](https://futureengineers.org/nametherover). Students write an essay and submit their

chosen name for the 2020 Mars Rover.

Also great support information can be found at the [futu-reengineers.org/GetInvolved/Educators](https://futureengineers.org/GetInvolved/Educators) site.

This national student science contest actually started on August 28, 2019 and closes for submissions on November 1, 2019 by 11:59 PM PST.

Key dates info, about this student contest, can be found at: [Mars.nasa.gov/Mars2020/participate/name-the-rover/#key-Dates](https://Mars.nasa.gov/Mars2020/participate/name-the-rover/#key-Dates).

## Engaging Students Through Trees

**Arbor Day Foundation: at [TreeCampusK12.org](https://TreeCampusK12.org)**

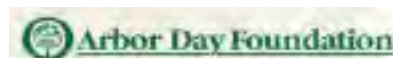
Are you a tree hugger at heart? Do you search for opportunities to connect your students to nature? Does your school celebrate Arbor Day and deserve recognition for its love of trees?

The Arbor Day Foundation's new Tree Campus K-12 program provides a free library of curriculum and a simple framework for using campus and community trees as a learning tool.

<https://www.arborday.org/programs/tree-campus-k-12/learning-hub.cfm>

### Access Free Resources Now

If your school already has a "green team," celebrates Arbor Day, or covers tree-centric curriculum at any level, you're already on the path to earning recognition as a Tree Campus K-12 school. If not, Tree Campus K-12 might be the perfect first step to inspiring the next generation of tree stewards.



Beginning with the 2019/2020 school year, your school can earn recognition by meeting four goals throughout the school year.

Explore our free library of curriculum and start your Tree Campus K-12 journey today at [TreeCampusK12.org](https://TreeCampusK12.org).

<https://www.arborday.org/programs/tree-campus-k-12/learning-hub.cfm>

<https://www.arborday.org/programs/tree-campus-k-12/program-goals.cfm>

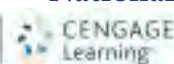
## WE INSPIRE PEOPLE TO PLANT, NURTURE AND CELEBRATE TREES.

Arbor Day Foundation 211 N 12th Street  
Lincoln, NE 68508 1-888-448-7337

## Please Come to the PDI on THURSDAY or You Will Miss:

### Thursday Evening Events in Roanoke AB

National Geographic sponsored speaker, Regional Science Challenge,  
WorldStrides sponsored, Night with the Exhibitors



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 (after General Session I i**

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

# Environmental Science: Sustaining Your World

G. Tyler Miller, Scott Spoolman



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| 2. Science, Matter, Energy, and Systems                     | 9. Food, Soil, and Pest Management                  | 15. Human Health                                       |
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| 4. Biodiversity and Evolution                               | 11. Geology and Nonrenewable Mineral Resources      | 17. Solid and Hazardous Waste                          |
| 5. Species Interactions, Succession, and Population Control | 12. Nonrenewable Energy Resources                   | 18. Environmental Economics, Politics, and Worldviews  |
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| 7. Saving Species and Ecosystem Services                    |   |  |

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A watershed is the area of land that drains water to a common outlet, such as a river or the ocean. Watersheds are important for understanding how human activities affect the environment. This focus explores the role of watersheds in the water cycle and how human actions can impact them.

**Water Resources and Pollution**  
Water is a vital resource for all life. However, human activities can pollute water sources, affecting ecosystems and human health. This focus discusses the challenges of water pollution and the importance of protecting our water resources.

**Water Quality and Quantity**  
Water quality and quantity are closely linked. Human activities can reduce the amount of water available and degrade its quality. This focus examines the factors that affect water quality and quantity and the steps we can take to improve them.

**Water and the Future**  
As the world's population grows, the demand for water will increase. This focus explores the challenges of meeting future water needs and the role of technology and policy in ensuring a sustainable water future.

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Learn more at:  
**NGL.Cengage.com/SustainingYourWorld**



# Friday Night PDI - Auction and DJ

November 15, 8:30 pm - 10:00 pm

Roanoke AB right after the awards presentations



**Plan to enjoy the Auction and DJ on Friday night.** You will want to have as many VAST bucks you can collect to bid on auction items. The best way to get **VAST Bucks** is to visit the **Exhibitors Thursday** night and during the day **Friday, DJ, Ron Shaneyfelt** will entertain and challenge your POP Culture knowledge. He may provide winners with more **VAST Bucks** as he plays popular tunes.



Science Auction Winners



Dancing at the PDI



DJ Ron Shaneyfelt

**SCIENCE AUCTION** - There is seldom a better floor show for a group of science teachers than to see them bidding against each other for that one thing they could really use. The best part is that to participate, it will cost you exactly nothing. That's right – NOTHING! Besides, real money isn't good at the auction! New this year, If you bring items for the auction you will receive **VAST Bucks** for each bag of items.

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

**VAST BUCKS \$\$\$\$** Do you have VAST Bucks for the Auction?

Everybody can visit the exhibitors to receive VAST Bucks! Now mind you, it is not real money! They are VAST Bucks, good only at the auction to be held Friday night, November 18th. When else have you had the chance to burn through hundreds and thousands of other people's money?

## **HOW TO EARN MORE VAST BUCKS \$\$\$\$**

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

Visit the exhibitors during the open hours of the Exhibit Hall Thursday night and all day Friday until Friday evening. You may need to remind Exhibitors to give you some VAST Bucks!! Don't be afraid to ask an exhibitor for VAST Bucks.

## **A FEW RULES TO FOLLOW FOR THE AUCTION**

- First, and foremost is safety – if the item is not safe to use, 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! Do not leave it behind. If you do not want it, give it to someone else.



# SCIENCE

## Come Join Us!

**November 14-16, 2019**

Hotel Roanoke & Conference Center, Roanoke, VA.

### **From 23 & 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**  
Professor of Biology at Brown University

Kenneth R. Miller 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.



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[www.smv.org](http://www.smv.org)



### **Delta Education**

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Nashua, NH 03063

[www.delta-education.com](http://www.delta-education.com)

### **Science Matters**

### **Community Idea Stations**

23 Sesame Street  
Richmond, Virginia 23235

[www.ideastations.org/sciencematters](http://www.ideastations.org/sciencematters)

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## Step Out of Your Classroom!

Get the most from your membership by taking advantage of all VAST has to offer.



### Website

The VAST website ([vast.org](http://vast.org)) contains the most recent news and updates. Journal and Newsletter archives are available. On the site renew your membership; check your membership status; and update your membership information. Read about awards and mini-grants.

### Social Media and E-notes



**Twitter:** <https://twitter.com/VaSciTeachers>

**Facebook:** <https://www.facebook.com/virginiascienceteachers/>

**LinkedIn:** <https://www.linkedin.com/VAST Group on LinkedIn> - <https://www.linkedin.com/groups/1836848>

You need social media accounts to log on to these these social media sites.

**E-Notes** - Delivered to your email mailbox with timely information for VAST members.

### Newsletter

Published five times a year, The Science Educator includes science education news, resources, and current news.



### Journal of Virginia Science Education

Published twice a year, the JVSE includes peer reviewed articles, science education news, and resources for all levels and both formal and informal educators.





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Virginia Science Education Leadership Association	Libbey Kitten
Virginia STEM	Chuck English

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	Dr. Jennifer Maeng
Math/Science Coalition	Dr. Jackie McDonnough
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PDI Chair	Dr. John Kowalski
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Web Administrator	Dr. Denny Casey

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Tom Fitzpatrick	Michael Pratte
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9/10/2019



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



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

**Please send articles, letters to the [editor](#), or labs by the submission deadline, January 1, 2020, for inclusion in the next digital PDI VAST Newsletter.**

### **Candid Photos Needed**

**If you have photos of students, colleagues, activities or events at the PDI, please consider donating them to VAST. You must have parental permission to publish student photos and you give VAST permission to publish all photos you submit.**

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