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

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VAST PDI 2018
Diversify and Strengthen Science for All

November 15-17, Williamsburg, VA

VAST PDI Calendar

- **Early Bird** discounted registration closes on **Oct. 15**
- **Online registration** closes on **Oct. 31.** Please register on site at the PDI after **Oct. 31**
- **Dead line** to sign up for the **Donna Sterling pre-conference short course** and the **afternoon pre-conference workshops** is **Oct. 31.**
  Sign up is NOT available on-site at the PDI.
- **Deadline to sign up for Friday and Saturday meals is Oct. 31. Meal tickets are NOT sold on site at the PDI.**

VAST PDI Links

- PDI Page
- Concurrent Presentations
- PDI Registration
- Hotel Information
- Donna Sterling Pre-Con
- Thursday afternoon Workshops
- **General Session Speakers**
  -Thurs. pm Speaker, Astronaut " Scooter" Altman and Dr. Jeff Jordan, **NASA.**
  - Fri.am **Speaker,** Munazza Alam, **Nat.Geo.Young Explorer**
  - Sat. pm Speaker, Dr. Okhee Lee, **New York University**

From the Executive Director

What's New!

Lots of things!!!

Do it Now! **Start collecting your scratch and dent for the AUCTION. For every bag of science collectibles you will receive $100 VAST bucks. Please drop off your items at registration. (See page 15 for more information)**

Register and Attend the VAST PDI 2018!

SPEAKERS!!!! Cutting edge Science!!!!

Thursday night with the Exhibitors will be sponsored by WorldStrides where we will see animals, take neat photos, eat and drink, and network!!!
Yes, There Will Be LIVE Animals, A boa constrictor, maybe alligator and more life from Florida

VTCA*, the Rock Guys, are dropping ROCKS so get ready for sampling this year.
Friday night Awards Banquet followed by Legends of Learning Raffle, Door prizes, Auction and DJ. Everyone will be a winner at this event with fun food and drinks.

Saturday at the closing of the Exhibit Hall with give aways with the vendors. Stop in and see if you are the lucky one. Last Chance to Visit the Exhibit Hall 10:25-11:15 WHERE NO OTHER EVENTS ARE SCHEDULED....

BUT WAIT....wait until the end and attend the Last Concurrent Session 10 and be one of the lucky ones for a possible $100 gift card giveaway at each of the 10 last concurrent session presentations.

ACT NOW! Oct 15 early bird discounted registration.
Oct 31 last chance to purchase pre-con and meal tickets

*** The Virginia Transportation Construction Alliance**

Susan Booth, **EdS**
Executive Director

Menu

Click on the article name to go directly.
Click "Menu" to return to this page.

PDI Sponsors: Support Science Education

The 2018 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.

National Geographic Learning | Cengage Learning

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Delta Education ...because children learn by doing.

Dominion Energy

Science Matters

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FREY

eduware

ASRC Federal Space and Defense

Virginia Space Grant Consortium

Vernier

Science Museum of Virginia

we're game for education

WorldStrides

LEGENDS OF LEARNING

LONGWOOD UNIVERSITY

PASCO

Don Cottingham
Retired VAST President

Thank You !

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 Board of Directors. 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 - 2018

Wednesday, November 14, 2018

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

Thursday, November 15, 2018

Ticketed Donna Sterling Institute Preconference Short Course

7:30 a.m. Short Course Continental Breakfast and check in

8:00 a.m. - 3:00 p.m. Short Course Presentations and Lunch *Collaborative Teaching in Science Content Areas*

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

3:15 - 4:45 p.m. **Pre-Conference Ticketed Workshops**

Elementary: Take a Walk on the High Wire! Exploring Balanced and Unbalanced Forces through Inquiry and Practices of Science! (Sponsored by Delta Education)

Middle School: Integrating Science, Math, and Workplace Skills (Sponsored by Longwood University)

High School: Diversity in Science and Inclusive in the Classroom (Sponsored by National Geographic/ Cengage)

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

Speaker: **Astronaut Scott "Scooter" D. Altman and Dr. Jeff D. Jordan**

Title: ***Creating Scientific Leaders: Stories of Effective Approaches to Teaching Leadership Skills in K-12.***

(Door prize giveaway at the end of the session) (Sponsored by ASRC Federal)

6:45 p.m. - 7:30 p.m. **Regional Science Challenge** (general session room)

7:30 p.m. - 9:00 p.m. **Night with the Exhibitors** (*Sponsored by WorldStrides*)

Friday, November 16, 2018

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: **Munazza Alam, National Geographic Young Explorer**

Title: ***Building Stronger Classrooms: Diversity, Equity, and Inclusivity***

(Door prize giveaway at the end of the session) (Sponsored by National Geographic Learning/Cengage)

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. **Awards Ceremony**

8:30 pm - 9:15 p.m. **"Get Your Game On"** *(Sponsored by Legends of Learning)*

9:15 p.m. - 10:00 p.m. **Auction and DJ**

Saturday, November 17, 2018

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. **Okhee Lee, New York University**

Title: ***Science for All: Instructional Shifts to Promote Science and Language Learning With All Students Including English Learners*** *(door prize giveaway at the end of the session)*

(Sponsored by Virginia Space Grant Consortium)

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**

($100 gift card giveaway at the end of each presentation of concurrent session 10- sponsored by School Specialty & VAST.)

2018 ANNUAL PROFESSIONAL DEVELOPMENT INSTITUTE
"Diversify and Strengthen Science for All"

VAST is pleased to announce the 2018 Donna Sterling Pre-conference: Powerful Collaborations of Science and SPED Instructors Working Together for Students' Success

Wondering how to be more successful with ALL your students?

QUESTION: How can teachers transform collaborative and inclusion science classes so they meet the vision of Dr. Donna Sterling – the vision of student-centered, authentic, inquiry-based classes where students learn to think and act like scientists?

ANSWER: Come to the VAST Sterling Pre-Conference on November 15 and learn strategies from experts from across the USA and in Virginia!

WHO IS LEADING?

Dr. Sami Kahn, nationally recognized expert on inquiry-based science instruction in collaborative and inclusion settings.

Dr. Sami Kahn
Assistant Professor, Teacher Education

WHO ELSE?

Dr. Kahn from Ohio University is bringing a team of friends who will be collaborating with her, to help you gain skills in many aspects of the inquiry-based collaborative and inclusion science classroom including team-teaching, assessment, literacy.

Her team: Dr. Teresa Shume, North Dakota State University
Dr. Keri DeSutter, Minnesota State University
Dr. Jonte' Taylor, Pennsylvania State University
Dr. Michelle Koomen, Gustavus Adolphus College

VAST is providing teams of master teachers to help you address issues in elementary, middle, or secondary classrooms, incorporating the best approaches to science instruction while recognizing the practical needs to Virginia's science classrooms such as Virginia's SOL assessments.

Our team: Elementary: Sarah Donnelly and Angela Ryan
Middle: Dr. Jennifer Maeng and Dr. Amanda Gonczi
Earth science: TBA
Biology: Camilla Walck and Gina Faison

WHEN? 8:30-3:00 Thursday, November 15
WHERE? Williamsburg, VA at the Kingsmill Doubletree Marriott
WHAT IS INCLUDED? Breakfast, lunch, Dr. Kahn's book Towards Inclusion of All Learners through Science Teacher Education.

HOW TO REGISTER? www.VAST.org. Click on Annual PDI. Click on Donna Sterling Institute Pre-Conference Short Course, go from there!
COST? Only $100!!

Note: Does not include registration to the VAST PDI Nov. 15-17. The VAST PDI begins at 5 pm on Nov. 15, AFTER the Pre-conference.

Dr. Donna Sterling was a dynamic, innovative educator based at George Mason University who most recently was the lead co-principal investigator on the Virginia Initiative for Science Teaching and Achievement (VISTA) project. Her family supports the Sterling pre-conference through a generous yearly donation, in memory of Dr. Sterling.

2018 VAST PROFESSIONAL DEVELOPMENT INSTITUTE

THURSDAY PRE-CONFERENCE HANDS-ON WORKSHOPS

November 15: 3:15 PM – 4:45PM

Afternoon Ticketed Workshops

November 15, 2018. **Pre-Conference Ticketed Workshops:**

3:15 - 4:45 p.m. *Elementary:* ***Take a Walk on the High Wire! Exploring Balanced and Unbalanced Forces through Inquiry and Practices of Science!*** ***(Sponsored by Delta Education)***

3:15 - 4:45 p.m. *Middle School:* ***Integrating Science, Math, and Workplace Skills*** ***(Sponsored by Longwood University***

3:15 - 4:45 p.m. *High School:* ***Diversity in Science and Inclusive in the Classroom*** ***(Sponsored by National Geographic/Cengage)***

Preregistration is required. Cost is $5.00/workshop. Each workshop is limited to 25 participants.

ELEMENTARY WORKSHOP – (sponsored by Delta Education)
Take a Walk on the High Wire!
Exploring Balanced and Unbalanced Forces through Inquiry and Practices of Science!
Presenter: Roxane Dupuis, Science Education Consultant

MIDDLE SCHOOL WORKSHOP
Data Science: Integrating Science, Math, and Workplace Skills – (sponsored by Longwood University)
Presenters: Dr. Ginger Lewis, Longwood University, Dr. Julia H. Cothron, STEM Author & Consultant, Dr. Paula Leach, ITTIP at Longwood University

HIGH SCHOOL WORKSHOP – (sponsored by National Geographic Learning-Cengage)
Diversity in Science and Inclusive in the Classroom
Presenter: Munazza Alam, National Geographic Young Explorer

Exhibit Doorprize Event
Saturday Morning 10:25 a.m.
11:15 a.m

Last Chance to Visit the Exhibit Hall

No other events are scheduled.
Visit exhibits and fill out a raffle for a chance to win.
You must be present to win.

School Specialty

Stay Until the End and WIN!

Support your science colleagues and attend one of twenty presentations during Concurrent Session 10. In each session, one attendee winner will walk away with a **$50 School Specialty Science Gift Coupon and VAST will add a $50 gift card.** Select from innovative classroom resources, lab supplies, and 1000 other learning products. **Stay to learn, stay to win!**

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Department of Education

ATTEND THE 2018 VAST PROFESSIONAL DEVELOPMENT INSTITUTE AND GET THE LATEST UPDATES FROM THE VIRGINIA DEPARTMENT OF EDUCATION

VDOE Staff members will give the following concurrent session presentations.

2018 Science Standards of Learning: Elementary

This session is designed to provide elementary teachers and leaders with information concerning the 2018 Science Standards of Learning. Although science content has not changed significantly, the wording of the standards has been changed to focus on science concepts. This change was made with the intent of allowing teachers to focus on concept development in science. The skills and processes have been reorganized to support Profile of a Graduate and to aid teachers as they embed these skills into content instruction. (presentation repeats on Friday and Saturday)

2018 Science Standards of Learning: Secondary

This session is designed to provide secondary teachers and leaders with information concerning the 2018 Science Standards of Learning. Although science content has not changed significantly, the wording of the standards has been changed to focus on science concepts. This change was made with the intent of allowing teachers to focus on concept development in science. The skills and processes have been reorganized to support Profile of a Graduate and to aid teachers as they embed these skills into content instruction. (presentation repeats on Friday and Saturday)

You can be a Winner: PAEMST Information Session

The Presidential Award for Excellence in Mathematics and Science Teaching is a prestigious national award that recognizes exemplary teaching in the science and mathematics fields. This year, the grant focuses on 6-12 grade teachers. This session will focus on the application process for PAEMST.

VDOE Science Outcomes Update

Science outcomes have been prepared for Environmental Science, Anatomy and Physiology, Astronomy, and Ecology with the intention that these outcomes become the Standards of Learning for these courses at the next Standards of Learning Revision. Learn more about the outcomes as well as strategies/activities for teaching the Environmental Science Course.

VDOE Update

This session is designed to provide teachers and teacher leaders information as to legislation and initiatives, both state and federal, that may impact science instruction.

Please RSVP for refreshments

Thursday Night - 2017 PDI

See you There

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

Enjoy complimentary snacks sponsored by WorldStrides and a cash bar

Night with the Exhibitors
and
Meet Your Regional Director

Region I: Carolyn Elliott

Region II: Dr. Anne Mannarino

Region III: Mike Pratte & Craig Vann

Region IV: Susan Bardenhagen

Region V: John Almarode & Tammy Stone

Region VI: Tom Fitzpatrick

Region VII: Diane Tomlinson

Region VIII: Kathrine Bowen & 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 building event competition. **Help us plan for enough refreshments, RSVP - See the top of page 10!**

Contact Regional Directors:
https://vast.wildapricot.org/Board-Information

Registrants for PDI
RSVP ALERT!

Please be aware that you will be asked to fill in a short survey that requires a quick turn around time to tell us, if you will be attending the Thursday and Friday receptions at the PDI. We are asked to provide a count to insure the amount of food, drinks and drink tickets.

Please be looking for an e-note after the close of on line registration on October 31st; fill it out and send it back.

Thank you !
Susan Booth EdS

Will You be a First Timer?

We will be so happy you are coming to the PDI and hope you will come again and again.
We have a session just for you!
Session 1, 8:30 a.m. – 9:20 a.m., Auditorium, Thomas Fitzpatrick

Navigating the PDI can be a daunting task for first time attendees at VAST. This session will give first time attendees tips for untangling the many offerings and focusing in sessions that fit their specific needs. The session presenters will help first timers set their professional development goals for the PDI, assess offerings and plan what sessions they will attend. Attendees will leave the session ready to get the most of their PDI attendance.

Students and Pre-service Teachers
This session is for YOU!

Exclusively for Pre-service Teachers What YOU Need to Know

Friday, Room 18, Lunch time • Noon – 1:00 p.m.

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!

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

VAST 2019 Ballot

2019 Slate of Board of Directors Officers

(all of the following candidates are current VAST members, in good standing)

President-elect:

Michael Pratte, K-12 Facilitator of Science, with Stafford County Public Schools

Michael is beginning his 23rd year as a Virginia science educator. As a classroom teacher, Michael presented a wide variety of topics at both VAST PDI and regional conferences. Michael credits his local and collegial connection of elementary, middle, and high school VAST members as being an integral part towards his earning National Board Certification. His journey to provide better inquiry, equity, and investigation of science content opened the opportunity for him to serve as a preK-12 facilitator of science supporting both content and professional learning. Michael is a member of NSTA and he has collaborated with VDOE to support science standards and curriculum development. He embraces the appropriate use of technology and STEM based learning where science content, phenomenon, and career path scenarios lead the learning experience. Michael participated in the VISTA new coordinators program and continues to maintain great professional relationships and collaboration with county leaders through the VSELA organization. His colleagues and students acknowledge that he has a tremendous passion for taking student learning outside the traditional classroom for field experiences and stewardship opportunities. Michael accredits these teaching experiences to his receiving the VAST Earth Science Award for outstanding science teacher in 2013. Michael currently serves as a VAST Co-director for Region III.

Vice-President:

Nicholaus Swan, Instructional Technology Coach, with Newport News Public Schools

Nicholaus has a M.S.ED in curriculum & instruction and his initial licensure was in middle school social studies and English. After taking the Praxis II in biology, he landed a job teaching 6th grade science at Hunter B. Andrews (PK-8) in Hampton. After hearing about the VISTA program at William and Mary from Richard Macdonald (science lead, Hampton City Schools), Nicholaus chose to extend his science education by participating in a VISTA program at the College of William & Mary. Soon after that, Nicholaus found himself at the first, of many, VAST professional development institutes (PDI), at the Williamsburg Convention Center. Nicholaus states that he was blown away by this PDI experience and that the experience rejuvenated him. The very next year Nicholaus found himself presenting a session, with his best friend Kyle, at the VAST PDI at the Crown Plaza in Norfolk. In 2014, Nicholaus was invited to attend a VAST Board of Directors, where he quickly became chair of the Middle School Committee. In this role, he assisted with the creation of policy guidelines for this committee; he also wrote VAST Journal articles about instructional technology. After completing his ED.S, in supervision and leadership, Nicholaus was promoted and changed divisions, to Newport News. Nicholaus currently serves as the Chairman of Technology, facilitating VAST meeting productivity and contributing to technology policy guidelines.

Region 2 Co-Directors: Rebecca Schnekser and Camilla Walck

Rebecca Schnekser, Lower School Science Specialist, Cape Henry Collegiate

Rebecca Schnekser is a Lower School Science Specialist and Teacher (pre-K-5) at Cape Henry Collegiate. As a VAST member, Rebecca has shared her science experiences with colleagues at the PDI, regional trainings, and within her school system. She has experience as a science leader in the classroom, school division, and science department. Rebecca has served on the curriculum committee, textbook evaluation committee, and she has held science workshops for other educators. Rebecca has presented six sessions at VAST PDI's since 2013. Because of her science achievements she won a VAST RISE Award for Elementary Science Teaching, and the Donna Sterling Exemplary Teaching Award. Rebecca is a National Geographic Certified Teacher and Trainer & was recently named as a Grosvenor Teacher Fellow by National Geographic for 2018-2010. Rebecca has been published through VAST and the Science Educator. She states: "I'm passionate about authentic, field-based science education for students; especially at an early age."

and

Camilla Walck, Teacher and Instructional Lead at Princess Anne High School

Camilla Walck is a high school teacher in Virginia Beach. She is graduate of Old Dominion University, where she received her BS and MS in Science Education and a PhD in Curriculum and Instruction, with an emphasis in Biology. This past year, Camilla was listed on the VAST Board as the PAEMST (Presidential Award for Excellence in Mathematics and Science Teaching) representative for VAST. She is also a member of NEA, VASCD, TASE, VAST and PAEMST. Camilla is National Board Certified, and NBCT recertified. Camilla was recently selected as one of 5 national science teachers to serve as a STEM Ambassador. As a STEM Ambassador, Camilla will attend a week-long conference in Washington, DC to learn more about her role in promoting STEM education. Camilla was the sole author of a review book for IB Biology, which was published by Barron's. She has also been published in the Journal of Educational Psychology. Camilla was the featured speaker for the Hampton Roads Business Women, speaking about "STEM Women in Technology".

Region 4 Director: Susan Bardenhagen

Susan Bardenhagen is a retired educator with 43 years as a science educator, and a long-term substitute for Fauquier County Public Schools. She has been the Regional Director for VAST Region 4 since 2010 and she would like to continue in this position. During her years on the VAST Board of Directors, Susan supported the Membership and Advocacy Committees and for the past few years she has helped with the VAST student art contest. Susan has also presented at many of the annual VAST PDI's. She is a member of NSTA and she presented at the regional conference and helped coordinate NSTA's involvement with the 2014 USA Science & Engineering Festival.

she presented at the regional conference and helped coordinate NSTA's involvement with the 2014 USA Science & Engineering Festival. She is active as a regional science fair judging coordinator; a volunteer with the society of Women Engineers; an eCybermission virtual judge. As a founding member of the regional affiliate BNVCTM, she helps organize their PD's each year, while also presenting Math/Science integration in both state and regional PD's. Previously, for Region 4, she has coordinated six summer PD's; one on environmental science and five on STEAM. This past summer, she was awarded the STEAM Educator Award by the international "STEAM+" organization. Susan enjoys playing the violin in the Manassas Symphony.

Region 6 Co-Directors: Jill Collins and Patty Gaudreau

Jill Collins, STEM Academy teacher & STEM Instructor

Jill Collins is a teacher/ STEM Instructor at the STEM Academy in Chatham, Virginia. She has been a science educator for 22 years. As a STEM Academy Instructor in Pittsylvania County School Division, she has led professional development courses for teachers and managed the cyber security summer program. Throughout her 22 years of teaching, she has been a presenter for: VAST conferences, VMI STEM conferences VA Children's Engineering Conference, and for STEM-H. Jill was a Virginia Initiative for Science Teaching and Achievement Coach for five years. She is a former recipient of the Air Force Association STEM Educator of the Year, was nominated for the 2015 STEM-H Educator of the Year, and was nominated for two consecutive years for the STEM-H Innovative STEM Program. Jill has written PCS Grade 3 Alternative Assessments, STEM lessons for PCS teachers, and provided STEM Nights for PCS elementary schools. She is a member of the Danville Science Center and collaborated with the center through a grant for all the PCS 5th & 7th graders to attend a Meaningful Watershed Educational Experience (MWEE). Jill is looking forward to being a co-director for VAST Region VI.

and

Patty Gaudreau, Administrator for Montgomery County Public Schools

Patty Gaudreau is currently the Administrator of Science Curriculum for Montgomery County Public Schools. She has been a science educator for 26 years. Patty's career as a science educator began in Maine, a state with a strong focus on environmental protection. While teaching 6th graders in Maine, she helped develop an in-district school for environmental science, the Auburn Land Lab. Following 12 years of classroom instruction, Patty was positioned as the Director for the Auburn Land Lab, which was a repurposed school building that sat next to Lake Auburn. In addition to the lake, this school had hiking trails, a ropes course, and a small dam. During her time as director for this environmental school she helped build a professional development center for use by teachers, local college students, Americorps, and the community. In 2004, Patty came to Virginia as a graduate assistant in the Virginia Tech doctoral program for Educational Leadership and Policy Studies. This prepared her for her next position as the Science Supervisor for Montgomery County Public Schools. Patty became a member of VAST in 2010 and received the Science Educator Award in recognition of leadership in developing the outdoor classroom for Montgomery County Public School students.

Region 8 Co-Directors: Katherine Bowen and Benjamin Campbell

Katherine Bowen, Nottoway Public Schools

Katherine Bowen has served in the capacity of Region 8 co-director since September 2017, when she agreed to help fill this open position with Ben Campbell. Katherine is currently a member of the VAST Board of Directors and learned about our organization by attending our summer retreat last summer. Katherine has attended VAST PDI conferences for the last six years and has presented at two of them. She was involved with the VISTA program through Virginia Commonwealth University in 2012-2014. Katherine is also currently serving on the Board of Directors for the Virginia Association of Environmental Educators. As a Biology and Environmental Science teacher, Katherine has attended numerous professional development programs including the Ecology Institute. As a result of being involved with organizations like VAST, VISTA, and the Ecology Institute, Katherine has helped plan and implement several programs at her own school (Nottoway High School). These programs include a blue bird preservation project in which students built blue bird nesting boxes, hung the boxes and now are involved in ongoing monitoring of blue birds and a second program in which her Environmental Science and Agricultural students participate in the landscaping and cleanup of areas around their school complex.

and

Benjamin Campbell, Assistant Professor of Science Ed., Longwood University

Benjamin Campbell has served in the capacity of Region 8 co-director since September 2017, when he agreed to help fill this open position with Katherine Bowen. Benjamin is currently a member of the VAST Board of Directors and he learned about our organization by attending our summer retreat, last summer. Benjamin has been a member of VAST since joining the faculty of Longwood University and moving to Virginia in the fall of 2016. Benjamin previously served as the Treasurer of the Central Arizona Chapter of the Society for Conservation Biology (2005-2007). In addition to VAST, Benjamin is a member of the National Association for Research in Science Teaching, the Association for Science Teacher Education, the National Science Teachers Association (NSTA), the National Association of Biology Teachers, and the Textbook and Academic Authors Association. Before Benjamin completed his education and joined Longwood, he was a high school science teacher for five years in San Antonio, Texas. Benjamin's research in science education focuses on teacher knowledge and instructional practices of early career science teachers. Benjamin has been published in several publications, including: The William & Mary Educational Review, PDS Partners, International Journal of Science Education, Studies in Science Education, and The Science Teacher.

BALLOT

_____Membership number (see e-note)

Ballot for VAST 2019 Elected Board Positions

Vote for one:

- ❑ **President-Elect; Michael Pratte**
- ❑ **Vice-President; Nicholaus Swan**
- ❑ **Region 2; Becky Schnekser and Camilla Walck**
- ❑ **Region 4; Susan Bardenhagen**
- ❑ **Region 6; Jill Collins and Patricia Gadreau**
- ❑ **Region 8; Katherine Bowen and Ben Campbell**

- ❑ **Approve changes**
- ❑ **Do not approve changes**

The VAST membership will be voting on the Bylaws changes at the Annual Meeting at the VAST PDI November 15-17 held at Williamsburg this year. The full documents may be reviewed at www.VAST.org. The Bylaws changes are listed here and highlighted in the Bylaws. Bylaws were separated from Operating Procedures.

1. Article IV Section 4. Delete old conference terminology
1a. Article IV Section 8. Deleting old conference terminology
2. Article IV Section 12. Remove "with cause", redundant. Section 12 was moved from Article XI, Section 6.
3. Article VI Section 2. Meeting times do not need to be stated in Bylaws.
4. Article VII Section 2. Move to operation procedures.
5. Article IX Section 1. Reworded for clarity.
6, 7, 8. Article X Section 1, Section 2, Section 3. Removal of Operating Procedures from Bylaws
9. Article X Section 4. Rewritten for clarity. Operating Procedures removed from text.
10. Article X Section 5. Removal of the words operating procedures.
11. Article XI Section 1. Move to operating procedures. "The nominating …"
12. Article XI Section 3 Moved to operating procedures. New Section 3.
13. Article XI Section 5 Moved to Article IV Section 9. Section 10.
14. Article XI Section 6 Moved to Article IV #2.

Members will vote at the PDI annual meeting in November.
To cast an absentee vote, please send this ballot to VAST Secretary: Robin Curtis, 4127 Wiffet Way, Williamsburg, VA 23188

K-8 Teachers Share Fair Extravaganza

K-8 science teachers, you have great ideas!

Don't keep them to yourself! Help other teachers and share an awesome classroom strategy at the VAST PDI. This will be a one-hour session to be held on Saturday, November 17, from 8:30 to 9:30. Attendees will visit your table as they "cruise" the room to gather a wealth of ideas shared by you and the other presenters.

To be a presenter and to reserve a table please fill in the Google doc at:
https://goo.gl/forms/JT38TFTW52dzZWzF2

Janet Lundin, Middle School Chairman: Virginia Association of Science Teachers (VAST)
8th grade science teacher, Mary Ellen Henderson Middle School, Falls Church, Virginia
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VAST BUCKS

Get Your Game On with Legends of Learning!
Friday Night PDI - Auction and DJ
November 16, 8:30 pm - 10:00 pm
VAST and Legends of Learning will host the Get Your Game On!
Earn a drink ticket from Legends of Learning!

Legends of Learning (legendsoflearning.com) is a game based learning platform with over 1,200 games and simulations for 3-8th grade science. Legends focuses on ongoing research to create standard-aligned (including SOLs) games that deliver a wide range of lessons and assess content proficiency for stronger mastery and classroom engagement.

Since Launching in April 2017, we are already in 6 of the 8 regions in Virginia and partnering with over 20 districts including Prince William, Virginia Beach, Chesterfield, Henrico, Petersburg, Louisa, Rockbridge, and Halifax to name a few.
Come to the Friday night Auction at VAST to learn about how you can transform your classroom using science games. As we get our game on, we will have the following Legendary game stations with some of the original classics: Legends of Learning games,the original Nintendo, Twister and giant Jenga! Play a game and earn a drink ticket. We look forward to a night of fun and games!

Auction and DJ on Friday night at the PDI, and the main way to get the **VAST Bucks** that you need for the auction is by visiting the **Exhibitors Thursday** night and all day Friday.

Get Your Game on with

Legends of Learning

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!!

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!

2018 VAST Art Poster Contest Winners

Susan Bardenhagen, Art Contest Judging Coordinator

Virginia science student artists created exciting interpretations of the PDI theme: Diversify and Strengthen Science for All. This annual contest is open to K-12 students. This year we did not have any winners in the grades 9-12, but the winners did and exceptional job. Thank you to the students, teachers, and judges. Congratulations to all the winners.

Primary Grades K-2

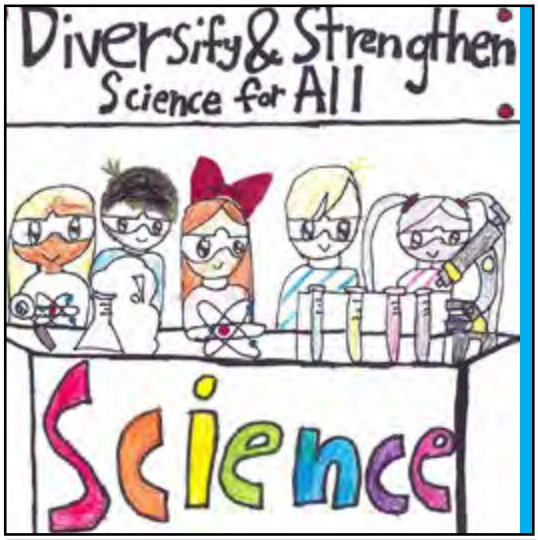
GRAND PRIZE WINNER & First Place:
Natsuno Momotani
1st Grade:
Hollymead Elementary School
Whitney Hinnant
Science Teacher
Albemarle County

Second Place:
Carina Hoffeditz
2nd Grade:
Plains Elementary School
Cameran Kite
Science Teacher
Rockingham County

Third Place:
Nila Shankar
1st Grade:
Creighton's Corner Elementary School
Mary Cloutier
Science Teacher
Loudoun County

Intermediate Grades 3-5

First Place:
Mihir Nimkar
3rd Grade:
Rosa Lee Carter Elementary School;
Mrs. Cristina Unger
Science Teacher
Loudoun County



Second Place:
Conoha Momotani
4th Grade:
Hollymead Elementary School
Terry Gallagher
Science Teacher
Albemarle County

Third Place:
Daniela D. Vitello
5th Grade
Mountain View Elementary School
Terri Teeter,
Science Teacher
Loudoun County

Middle School Grades 6-8

First Place: Caroline Morgan, 7th Grade: Nansemond Suffolk Academy Dr. Clint Calzini Science Teacher

Second Place: Cyann Davis-Lawrence, 7th Grade: Nansemond Suffolk Academy Dr. Clint Calzini Science Teacher

Third Place: Violet Johnston 7th Grade: Nansemond Suffolk Academy Dr. Clint Calzini Science Teacher

Honorable Mention: Shannon Connor, 7th Grade: Nansemond Suffolk Academy Dr. Clint Calzini Science Teacher

Honorable Mention: Elizabeth Shiembob, 7th Grade: Nansemond Suffolk Academy Dr. Clint Calzini Science Teacher

Exhibit Hall

Are you looking fir new classroom ideas and resources?
The VAST PDI Exhibit Hall is Where the Best Resources Come to You.

Amplify Education
AstroCamp and Camp Motorsport
Astronomy to Go
Catalyst Learning Curricula
Cengage Learning / National Geographic Learning
Central Virginia Waste Management Authority
Chesapeake Bay National Estuarine Research Reserve
Children's Museum of Virginia
Chincoteague Bay Field Station
CodeVA
Delta Education FOSS
Delta Education
Department of Environmental Quality/ Virginia Resource-Use Education Council
Dominion Energy
ETA Hand2Mind
ExploreLearning
Fisher Science Education
Five Ponds Press
Flinn Scientific, Inc.
Frey
George Mason University
Grocery Manufacturers Association (GMA) Science and Education Foundation
James Madison University
Jefferson Lab
Legends of Learning
McGraw Hill Education
NASA Langley Research Center
National Energy Education Development Project
National Institute of Aerospace, Center for Integrative STEM
Nauticus/Battleship Wisconsin
National Science Teachers Association
O'Brien Associates
Operation Wallacea
PASCO Scientific
Pearson
People for the Ethical Treatment of Animals
Roots for A-STEM, LLC
Science Matters, Community Idea Stations
Science Museum of Virginia
SmartSchool Systems
Texas Instruments
United Poultry Concerns, Inc.
Vernier Software & Technology
Virginia Association of Science Teachers
Virginia Aquarium
Virginia Coal & Energy Alliance
Virginia Department of Aviation
Virginia Department of Game and Inland Fisheries
Virginia Department of Forestry
Virginia Department of Tranportation
Virginia Institute of Marine Science
Virginia Junior Academy of Science
Virginia Living Museum
Virginia Lottery, Virginia529
Virginia Space Grant Consortium
Virginia State Parks
Virginia Tech - College of Natural Resources and Environment
Virginia Tech College of Science
Virginia Transportation Construction Alliance
Virginia529
Wake Forest School of Medicine
WHRO - eMediaVA
WorldStrides

SUMMARY OF POSITION:

The Outreach Manager's focus is to establish, develop and foster relationships with teachers and school administrators with the ultimate goal of signing up groups to attend the AstroCamp program at the Virginia campus. The ideal candidate will have strong skills and experience in building relationships, establishing a network, public speaking, knowledge of science and science education, ability to create and execute school and facility promotional presentations and assisting in occasional program tasks.

ESSENTIAL DUTIES AND RESPONSIBILITIES

- **Develop and implement a recruitment plan to achieve measurable goals**
- **Understand and execute complex instructions**
- **Serve as the liaison between schools and AstroCamp regarding program developments and events**
- **Attend conferences and local events to promote AstroCamp, VA**
- **Develop on-site materials and handouts for conference and school visits**
- **Process paperwork in a timely and effective manner**
- **Have complete knowledge of ALL program aspects and be able to communicate those effectively**
- **Work weekly with the Marketing Director**
- **Participate with the AstroCamp and Guided Discoveries management team using accepted management techniques and adheres to accepted business practices**
- **Demonstrate strong leadership to attending schools**
- **Prepare annual department budget in consult with the AstroCamp, VA Director and Marketing Director, CA**
- **Demonstrates organization and attention to detail in maintaining deadlines and schedules**
- **Ability to perform other duties as assigned by the AstroCamp Director or Marketing Director, CA**

EDUCATION AND/OR EXPERIENCE

Teaching credentials or College level school degree in science; two-year related experience and/or training; or equivalent combination of education and experience.

OTHER QUALIFICATIONS: Other qualifications do apply. See the link below for a full description.

APPLY HERE:

https://recruiting.paylocity.com/recruiting/jobs/Apply/61909/Guided-Discoveries-Inc/Virginia-School-Program-Outreach-Manager

On Expedition:

Teacher Joins Field Science Team in the Peruvian Amazon

This is Part 1 of a 4 Part Series on this Expedition

Donna Sterling Awardee 2017

Becky Schnekser, Cape Henry Collegiate, Virginia Beach, VA

Background

In July 2017, I decided to apply for the Donna Sterling Award for Exemplary Science Teaching at the Elementary Level with the big idea to join a field science expedition, gain on site knowledge of science skills and field protocols, and scale it to my classroom to enhance my teaching. I should really take a few steps back though, and explain to you how this big idea came about. In 2014, I met Andres Ruzo after his keynote at VAST PDI in Roanoke. I was captivated by his story, his passion, and his project; I had to meet him. After his keynote, I waited in line to meet him. I felt very connected to his story and inspired by his current project, studying Shanay-Timpishka, the Boiling River of the Amazon. From that moment of meeting Andres, I did everything I could to stay connected with his work. I often joke about Andres having two choices; become my friend or file a restraining order. Thankfully, he chose friendship, and what a friendship it has become! We have collaborated on projects with my students since 2015, and I was even able to get him to my school in 2016 to make an impression upon our middle and upper school students. To this day, students and teachers alike refer to his visit fondly and ask what he is currently studying. Through our frequent collaboration, I have often told Andres I would be with him in the Amazon one day, as a part of the field team. He would always respond with a chuckle and, "Right on, any time, I would love to have you there." It was always something on my bucket list, a dream. That is, until July 2017, when I pitched the idea to travel to the Amazon as a member of Andres' team to study Shanay-Timpishka, the Boiling River of the Amazon, for one of my essays for the Donna Sterling Award. To my great surprise, I honestly did not think I had a chance at winning the award, I did. I will not soon forget the phone call from Juanita Jo Matkins, letting me know that I had won the award. In true disbelief, I sent a text message to Andres and it was a done deal, so to speak. I would be joining The Boiling River Project's Field Season 10 team in the summer of 2018. I can honestly tell you the rest of 2017 and 2018 up until meeting the expedition team in Lima, Peru was a complete blur. Until the moment I met the team, I truly did not believe any of this was real. I might even venture to say that while in the field with the team, it was still mostly dreamlike.

I am just a teacher. That is literally how I introduced myself to the field team; Andres rescued me though and told them how and why I was there as a valued member of the team. The next week and a half in the field was filled with adventure to say the least. Shanay-Timpishka is thermal river found in the Peruvian Amazon, nearly 700 kilometers away from the nearest volcanic activity. You see, thermal river systems exist the world but are usually connected to large geothermal sources; volcanoes. This river is not, making it a special location in the world of geothermal studies. This alone breeds so many questions begging to be studied and answered which is the very core of science. During this field season, we would focus on water sampling to track water quality, collecting 360 and drone imagery of the area, and studying biodiversity of the river through aquatic survey.

The Boiling River Field Season

The trek to our base camp at Mayantayacu was bumpy, exciting, depressing, and every shade of green imaginable. I have to explain the depressing parts, because clearly that descriptor is the outlier here. Along the way, we saw evidence of deforestation and illegal mining. Two of the largest threats to the jungle, rainforest, and thermal river systems of the Amazon. These were the gaping holes in the thick vegetation I observed as we advanced closer and closer to our base camp. Even more devastating evidence of this destruction would come a few days later after a heavy rainfall.

Upon arriving to our base camp, I saw it. The most sure evidence that a thermal river system was present. Steam rose from the earth in unmistakable clouds billowing in convective currents. I observed it first from the backseat of a Toyota truck and was moved to grab the arm of a team member seated beside me. I audibly gasped in excitement and disbelief that four years after hearing of its existence, I was now at the edge of Shanay-Timpishka. A location a year earlier I had merely written on a bucket list as a place I wanted to visit. (It literally showed up in my Facebook memories.) I rushed to exit the truck, I needed to see the river in person, breathe its vapors, and take it all in. My heart raced in excitement, I was here, preparing to study this fabled river in person. The next few hours spent acquainting myself with the base camp are a complete blur, I just wanted to be by the river. The first moment I had to climb down to the rocks, I absolutely did. The rocks absorbed and radiated the heat from the river, the vapors engulfed me in a sauna like bubble, and spontaneous breezes cooled me off at the perfect moments when I felt as if the heat and humidity were too much. For the next two weeks, this river was my home, I could not be more excited at that thought. Over the next two weeks I was able to analyze water samples, use a thermal camera to collect and record the temperatures of different points of the river, complete an aquatic survey, collect 360 imagery, and assist the drone team as they completed a survey of the area. Our field team was more like family than a team, and it took less than a day for us to form this tight bond. Something about knowing that this is a group of people with who you must rely upon for survival has that effect, I think. Although each person brought a specific set of skills and expertise to the team, we all truly worked together helping each sub-group complete their tasks for the field season. As educators, we often impress upon our students, the importance of collaboration, cooperation, and effective communication. These skills were of the utmost importance in field while oftentimes you were collecting information or observations for someone else to use later. You were the main contact and needed to be able to express your work effectively and in a way that would make sense to someone who was not with you at the time. It was a large puzzle that required everyone's work in order to be successful. While in the field with a group, you also needed to communicate effectively as a matter of safety and in the name of data collection as well. We were trekking alongside a thermal river, that is, a river that would scald you within seconds of contact. If you saw or encountered danger you needed to be able to let the team know for your own safety and theirs as well. Most often this was in the form of warning those behind you that a particular section of the trek was difficult or how to navigate it in a safer way than you just encountered. As you can imagine, in a humid environment, the rocks and soil we traversed was often moist or covered in algae which made each step a fall risk. Certain sections quickly gained nicknames based on the way a team member gracefully or not so gracefully fell.

Working with fish, drones, 360 cameras, and water samples

Prosanta Chakrabarty, Inthyologist and Evolutionary Biologist from LSU, was the lead on completing the aquatic survey. We were interested in finding what lives in Shanay -Timpishka. Interestingly enough, there are parts of the river that maintain cooler temperatures. How might the biodiversity of those portions differ from the hotter portions? How are they similar? Does rainfall affect the biodiversity of the river? So many more questions are out there to be answered, and this was our first crack at it! This is a pretty lofty task, which is why it required many of us to complete over the course of the field season. To collect an aquatic survey, we used cast and dip nets initially. These were used to collect samples and record where we found fish and equally as important, where we did not. When a sample was collected, the GPS coordinates and anecdotal notes of the area were then recorded. Tagging and identification

would happen at the base camp which meant samples collected were then placed in plastic bags with water and into large buckets which were carried by team members. You can imagine that the weight increased with each sample and we would often rotate who was carrying the bucket throughout the day. When the active collection part of the day was finished, the aquatic survey was not. This was when the samples would then be tagged and identified to species level if possible. They would then be transferred to a formaldehyde bath for transport back to the states.

Roger Palmer, Science Department Chair and GIS teacher at Bishop Dunne in Dallas, Texas, and McClain Martensen, senior at Bishop Dunne in Dallas, Texas were the co-leads on drone survey collection of Shanay-Timpishka. McClain is a highly skilled drone operator, renowned for her pursuit of all things GIS; especially flying drones and creating 3D renderings using the aerial imagery. On our first day in the field, I had the pleasure of assisting them atop a waterfall as they prepared to complete their first survey. I stood in awe as they prepared and fixed minor pieces that popped out of place during our climb. Our climb to the top of the waterfall was difficult and steep. The thick detritus between trees did not support our weight well and often times the vegetation we wanted to use as handles were covered in unforgiving thorns. Pair this with the necessity of carrying two large pelican cases containing the drones and other equipment, and you can begin to imagine the difficulty of this particular climb. In the end, however, the success of McClain and Roger's efforts were worth the difficulty. The imagery was fantastic and flights, nearly flawless. I learned a lot about flight conditions, drone tracking apps, battery life tracking, and various other details that are important when working on a drone aerial imaging mission. I knew what McClain would be doing and her skill levels were impressive, after experiencing it in real time, what she and Roger were able to do under pressure was even more unbelievable.

Gathering 360 imagery along the Shanay-Timpishka was the task for which I was the Lead. For two days, my partner Wesley Della Volla and I learned a lot about this type of photography, although I have been using a 360 camera for about 2 years now. This task was a little more serious than how I was using the technology to document students in action; I was now collecting imagery for science field work which would require a more critical attention to detail. Wesley was the perfect teammate for this task while he has extensive experience with National Geographic Storytelling training as a mentor, tv field production and animation, as well as Virtual Reality Experience production. Collecting our imagery was an intense game of hide and seek. We had to scout the location of the shot we wanted then hide from a camera with 360 view. To make matters a little more complicated, I had to be within a few feet of the camera

itself in order to trigger the shot with my cell phone. Some of my best stories come from these two days in particular while I oftentimes was half submerged in water, balancing in a plank within crevices of rocks filled with tarantula nests, and one of my favorites, getting stuck by my shirt, pants, and hair in thick and thorned vegetation. Wesley jokes that he only had to walk around corners to hide, making his role in this endeavor of little importance but his contributions to capturing the perfect shots was incredibly valuable. Taking 360 images is almost the polar opposite of traditional photography in every way. One major difference is in the optimal lighting. For these images, afternoon, flat, very muted light was best. We took images in the morning and afternoon for comparison and the detail and sharpness of the afternoon images was incredible.

Andres was our water sampling lead and overall field season Principal Investigator. While working with him, I was able to use a thermal camera to capture images and temperature data along the site along with 360 imagery of all of us in action together. The thermal camera made me feel like a legitimate scientist; something about the camera itself and image coloration. This was helpful in recording data on site in addition to field notebook record keeping. It is also fascinating to see the image coloration, easily comparing temperatures of large spaces and all components within the image. For example: a picture might have water, rocks, people, and vegetation within the shot. Each of these components has a different temperature reading and therefore a different color associated. The picture then has a collage of colors showing you quickly the comparison in different components' temperature. Water is an integral part of all of the studies we conducted, so everything completed by and with Andres specifically, was important to each of

the other pieces of the data puzzle. All samples collected in the aquatic survey call the river 'home', the imagery collected via drone and 360 camera were focused upon this river itself, and of course Andres' data was all focused on the water itself. We needed to use one another's completed tasks to come together as a field season team and to piece together complete analysis of the site. Oftentimes, as humans, we attempt to compartmentalize data and observations but the truth is more often than not the interconnectedness of data and observation depends greatly on other data sets. In my opinion, trying to keep them separate is least helpful in gaining full understanding of a concept. I would be remiss if I did not mention Kyle Smith, a senior at St Mark's in Dallas Texas. He designed, fabricated, programmed, and tested water chemistry data collection probes that were semi-submersible. His dedication to the design, creation, and testing of these probes was incredible. I sat with him the day before we entered the field as he worked out small bugs in his code before testing on site. I also had the privilege of accompanying him one of the times that he tested his probes on site. He wanted everything to be perfect, and they nearly were. As with anything, there are improvements to be made, but their effectiveness was spot on.

Why does this matter as an educator?

As an educator, seeing and more importantly experiencing the real world applications of my classroom is paramount. How often do we tell students "you will need this when _____"? Or "When you have a job, you will need to work in a team, solve problems, communicate, etc."? We strive to impress the importance and application of our classrooms to the real-world, but when is the last time you experienced that application first hand? Who cares about clouds, states of matter, recording and analyzing data, effective communication…? The list goes on. We have plenty of daily practice in the need to communicate effectively with colleagues, administrators, and families, but what about collecting data in the field with a team of scientists? For me, this expedition was my first time working in the field with scientists but I teach and revolve most of my classroom content around field science. I take my students in the field every chance I get to feel connected to content and see a legitimate connection, but I never experienced this outside of my classroom before. What about the logistics behind jobs in engineering or robotics? We know they exist, we know programming is an important skill, but have you ever worked with these in an arena other than your classroom? I want that model, apprenticeship style experiences, to become a legitimate part of professional development. How much would that strengthen your ability to connect your students to the real world application of your classroom content?

I encourage you to seek out opportunities to do just that; rethink your professional development. What would help you be a better teacher and ultimately have the biggest positive effect on your students?

The Donna Sterling Award is one avenue. This coming year, it will be open to elementary level teachers and in 2020, it will be for secondary teachers. The application/nomination window will begin over the summer with a July deadline.

What about a VAST mini grant to enhance or introduce a new project idea to immerse your students in authentic learning opportunities? This will open over the summer for project submissions with a deadline in August.

National Geographic Teacher Certification is another opportunity which then opens you up for eligibility to be a Grosvenor Teacher Fellow. Enrollment this semester ends October 21 and the application for the Grosvenor Teacher Fellowship is due January 3, 2019.

For more information on the field team and professional development opportunities mentioned in this article:

Prosanta Chakrabarty@PREAUX_FISH www.prosanta.org
Becky Schnekser@schnekser www.expeditionschnekser.com
Andres Ruzo@georuzo www.boilingriver.org
Donna Sterling Award https://vast.wildapricot.org/Awards
VAST mini-grant https://vast.wildapricot.org/Grants
National Geographic Certification https://www.nationalgeographic.org/education/programs/educator-certification/
Grosvenor Teacher Fellow https://www.nationalgeographic.org/education/programs/grosvenor-teacher-fellows

What Happens to Deer Antlers
A schoolyard field investigation
for grades 2-5

Suzie Gilley
Wildlife Education Coordinator/Project WILD State Coordinator
VA Dept. of Game and Inland Fisheries

Activity Summary:

Each year male white – tailed deer, elk and other members of the deer family shed their antlers after rut or breeding season. Each spring as days lengthen male deer, bucks, begin to grow a new set of antlers. With millions of deer in the United States, we should be able to find antlers when we hike in the woods or even in our own neighborhoods. What happens to all these antlers? Students conduct an investigation to discover what happens to antlers placed in various locations around the school.

Materials needed:

Antlers of white-tailed deer *(Talk to friends who hunt deer for donations of antlers. Check the VDGIF booth at the PDI. They may have some available. You may also use use "soup" bones obtained from the meat department at your local grocery store.)*
Pictures of deer with and without antlers *(For pictures of White-tailed deer check your school library for Virginia Wildife magazine.)*
Measuring tapes
Graph paper
Camera

Background:

Antlers begin growing as days lengthen in the spring. Antler buds form on the pedicels at the top of the skull. Growth is rapid all spring and into early fall. To supply nutrients to the growing bone, antlers are covered with a thin velvet or skin that contains hundreds of tiny blood vessels. In the fall at the start of the breeding season the skin dies and the antlers harden off. Bucks will rub the loose velvet off on small saplings as they prepare for the rut or breeding season, which peaks during November. Male deer or bucks use their antlers to establish dominance and compete for mates during the breeding season.

Once the breeding season is over and hormone levels decrease the bone where the antler was attached to the pedicel begins to erode away. Eventually the antler falls off, generally during January to March. Sometimes both antlers will fall the same day, other times the buck may walk around several days with just one antler.

The Virginia white-tailed deer have small sets of antlers compared to other species in the deer family. Moose antlers may be seven feet from the tip of one to the tip of the other and are grown during the same period each year. Moose antlers can weigh over 40 pounds. Caribou, reindeer and elk antlers may each be over three feet long with multiple points. Deer will usually grow larger antlers as they age. However antler size also depends genetics, the availability of food, and other environmental factors. Additional information can be found in the links at the end of this investigation.

Procedure:

Pass an antler around the classroom. After everyone has had the chance to touch and examine the antler, encourage the students to make statements and ask questions about the antler.
Below are some questions that will help guide the students.

What animal is the antler from?
Have they ever found one just laying on the ground?
What is it made of?
Why do deer lose their antlers?
Are they eaten by dogs, foxes, or coyotes?
Do they decompose?
What about other bones, why don't we see more bones or skeletons?

Antlers are made of bone or calcium which doesn't decompose as flesh does. Some do get carried off and chewed on by members of the canine family. If they are buried by leaves and soil they will eventually breakdown but not quickly.

The main method that antlers and bone get recycled is from rodents that gnaw on bones and antlers to keep their teeth

from growing too long and for calcium and other minerals. This process recycles the calcium quickly back into the ecosystem where it is taken up in plants and again made available to deer and other animals. Teachers may want to discuss human sources of calcium and which plants contain this essential mineral. Why is important that children also have calcium in their diet?

Field Investigation

- Measure each antler from the base to the end of each point or branch. Draw or take a picture of the antler and save it for comparison later. Use a permanent marker to identify each antler at multiple spots on the antler (e.g.base side) in case one area gets chewed off. They can each simply be assigned a number or letter. If a scale is available, weigh the antler. Create a data sheet for each antler similar to the one included in this activity.
- Place each antler in a location on the school grounds where you think there will be rodents. The base of a tree, near the compost pile, or under a bush are all possible locations. To prevent the antler from being carried off use wire to tie it to a stake. You can drill a hole in the antler to attach the wire or just the wrap wire several times around its base. Now it is a waiting game.
- After 2 weeks check on the antler. Is there evidence that it has been gnawed on by mice, squirrels or other small rodents? If so measure the section gnawed. If at the end of one of the points, measure the length. Take a picture for comparison.
- Repeat every 2 weeks until you begin to notice lots of activity around the antler then visit the spot once a week.
- If you can rake the area around the antler smooth, try capturing the footprints of the animal(s) visiting the antler. You can use playground sand that has been moisten or sprinkle a very thin layer of lime or chalk dust on the ground around the antler to capture the steps of small mammals. Large tracks made in sand can be captured in plaster, smaller tracks can be captured in a photo.
- If a trail camera is available, set it up to take a picture of the visitor.

Look for Suzie Gilley at the VDGIF booth in the Exhibit Hall at the PDI.

Additional resource connections:

https://www.dgif.virginia.gov/wp-content/uploads/What-Happens-to-Deer-Antlers.pdf
https://www.dgif.virginia.gov/education/resources-for-teachers/white-tailed-deer-in-the-classroom/
https://www.dgif.virginia.gov/education/resources-for-teachers/
https://tpwd.texas.gov/publications/nonpwdpubs/introducing_mammals/white_tailed_deer/

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 for second semester 2019 orientation is Saturday, January 19. To help offset the costs of maintaining the telescopes, there is a $50 fee to borrow the telescope for the three months. For more information and to register, please contact Steve Layman, CLUSTER Project Manager at slayman2528@comcast.net

Steve Layman, Project Manager
UVA CLUSTER Telescope Loaner Program, 434 960-9404

Getting Started: General Timeline for Student Projects

Dr. Julia H. Cothron, VJAS Representative to VAST Board

Last spring, I had the opportunity to interact with a group of teachers, primarily from southwestern and southside Virginia, who participated in a two-day program at the Virginia Junior Academy of Science (VJAS) and Virginia Academy of Science (VAS) meetings, held at Longwood University (LU). These educators observed presentations made by VJAS students – over 600 presented – as well as VAS concurrent sessions and poster sessions. They attended special lectures, tours of the science center, a college and career fair, and the LU University President-Provost Reception. As I read their evaluations, there were questions about "getting started" such as project timelines and helping students with project topics. So, I looked for resources.

First, I searched my files to see if I had kept any timelines. I found a general timeline – which I used frequently and published several times. I like this timeline because it is a good communication tool for parents and educational leaders, as well as students – you can add the details and deadlines after they understand the "big picture." I hope you find it useful.

- **September: What is a research project?** Basic concepts of experimental design are introduced, motivational project ideas presented, and expectations clarified for students and families.

- **September to October: What is my project?** Through brainstorming activities and library research, project topics are refined, materials and equipment identified, and procedures developed for conducting research. Proposed experiments are summarized through reviewing the literature and finalizing experimental designs.

- **November to January. How do I collect and analyze data?** Students refine techniques; collect and analyze data through tables, graphs, and statistical tests; and summarize results.

- **January to February: How do I write about scientific research?** Components are edited, revised, and integrated into scientific research reports. Reports are modified to the specifications of the competitive events the students enter.

- **March to May: How do I present research?** Students learn how to make visual or oral presentations. Presentations are modified to the specifications of the competitive events the students enter.

- **May to June: I did it!** Student achievements are showcased; family, school, and community support is acknowledged and publicized.

Second, I contacted my long-term professional colleague and friend, Mary Frances Hobbs. Mary was a teacher-leader at the May VJAS-VAS program. At a luncheon, Mary spoke on helping students choose a science project question. She also prepared a handout, which is the basis of her article. I'm sure you will find it useful – Mary is a master at tapping students' interests and making research rewarding.

How to Help Students Choose a Science Project Question: The Toughest Part of the Process

Mary Frances Hobbs, VJAS Sponsor & Committee Member
E.C.L. Miller (VAS) Science Teacher of the Year

Upon reflecting on over twenty years of working directly with high school students and their individual and group research projects, I realized that the key to success is often guiding them to find a topic that they are passionate about. Once this difficult step is completed, then their own passion drives them to work past their own conceived limits of energy and time to find the answers to their questions. Yet, the enigma continues, how is this done? One always starts with classroom activities that teach students the format for research by identifying variables and using the "Four Question Strategy." These good practices will work for many students, but what about the others?

My suggestion is that it is best done in one-on-one short conversations with students. I did this for many years with my students who were struggling with the process. Others in the class had found a research article that triggered their interest or had a hobby that allowed them to ask a question that would match their pre-existing passion. However, a remnant of students was left bewildered.
What to say to these poor floundering young people who want to be successful but need direction? Well somewhere in their lives is an idea or perhaps just a notion of something that they are really curious about. Here are some examples of conversations and resulting projects that captured students' attention. A portion of these stories came from my students and the others were in classrooms where I was mentoring a new science teacher and helping out with science projects. Notice the similarity of the questions that were asked and the diverse answers that resulted. Also pay attention to the fact that I do not remember, years later their answers to the questions that did not unlock the topic for them, but did clearly remember the question that did and it was often a different question for a different student.

Student 1: A Middle School Science Student

1. **Teacher:** What are your interests, what do you like to do in your spare time?
   Answer: I like to play video games—oh well try again.
2. **Teacher:** If you could start a job tomorrow - that would be your favorite career of all and that you would continue with for the next ten to twenty years - what would it be? **Answer:** I want to be a dentist

For this student that was the defining moment—my mind started clicking. If he were a high school student with more background I would have sent him to his family dentist that week to request teeth. This is a little known fact, but dentist pull teeth often and sometimes keep some of them. One of my students followed this idea and tested human teeth with different drinks like sodas and fruit juice and recorded their mass and appearance over time to determine what had the most detrimental effect on the enamel. Yet, this is a middle school student who wants to be a dentist. So I remembered a lesson that had been developed at the MathScience Innovation Center on growing calcium carbonate crystals on wire mesh to provide a substrate for coral beds to form in areas where they had been damaged. What does this have to do with dentists? It is important for a dentist to understand all about how the calcium in the teeth is formed and damaged and this will give this young man a background. He loved the idea and worked hard on it and got a second place at his school science fair.

Student 2: A High School Student with Very Little Interest in Science Whose Father Was a Researcher

1. **Teacher:** What are your interests, what do you like to do in your spare time? Answer: I like dirt bikes and hunting in the woods on the weekends
2. **Teacher:** if you could start a job tomorrow - that would be your favorite career of all and that you would continue with for the next ten to twenty years - what would it be? Answer: I want to be a carpenter

Now I know that this sounds like another dead end, but it was a beginning. We began to talk about how wooden structures are protected once they are built. He had access to plenty of scrap boards so I suggested that he get ten of them of the same wooden material and size and paint sections of each one with different paints or varnishes and then leave them out in the weather for several months (Yes, this project had to be started early in the year, but all projects should be started early in the year). He went back and took observations of the boards and measured the size of the flakes of paint or varnish that had worn off. He ended up presenting this project at VJAS. He did not win an award, but he could answer every question that came to him because he loved working with wood and knew it well

Student 3: A High School Student Who Loved Animals

1. **Teacher:** What are your interests, what do you like to do in your spare time? Answer: I raise rabbits and show them in the state fair. This was all it took.

Now, that may not sound like a science research project in the making but it was a doozy. He had one group of large white rabbits and one group of dwarf white rabbits. He decided to investigate the old nurture over nature question. He planned to breed both rabbits at the same time and when the offspring were born he switched two of the rabbits in each group to the other mother. Having worked with these animals for many years, he knew how to do this successfully. Then he would keep careful records of their size and weight and see if the small ones raised with the larger mother grew larger than their brothers and sisters and if the large ones ended up smaller than their siblings. It was a powerful project and again, he was a resident expert on his topic and the preparation for his oral presentation was so easy because he could answer questions about rabbits all day long.

Students 4 and 5: Really Unsure

1. **Teacher:** What are your interests, what do you like to do in your spare time? **Answer:** ___
2. **Teacher:** if you could start a job tomorrow - that would be your favorite career of all and that you would continue with for the next ten to twenty years - what would it be? **Answer:** We are not sure.
3. **Teacher:** Have you two read something in a science article that you found interesting and would like to know more about? Answer: _____
4. **Teacher:** Have you done an experiment in class that you could expand into a project?
   Answer: Yes, we liked the liquid chromatography lab where we separated the colors of inks.

Thus, a research project was born! We had done the chromatography experiment in conjunction with a forensic lab and they wanted to see if they could identify the colors of ink in several commonly used pens that a criminal might have used in a ransom note. Yes, there is a lot of fiction in this premise, but they got excited about the investigation and did a great job of following procedures and ended up presenting their project at VJAS.

Phenix Green Team Schoolyard Habitat

Alexis S. Tharpe
6th Grade Science, Phenix PreK-8 School

The Phenix Green Team has installed our new garden! The garden is located on the left side of the building outside between the kindergarten pod and the elementary cafeteria. The garden has been designed to be a peaceful place for students to learn about their environment and their role in protecting it. The area contains regional plants that will attract birds and butterflies during the school year and require minimal upkeep over the summers. It has also been designed to store and recycle rainwater for the plants using student-built rain barrels. This reduces erosion by decreasing and slowing runoff and helps control flooding by directing naturally filtered rainwater into the storm drain.

The Green Team has installed four raised beds in the garden. The students have built the beds to grow vegetables, fruits, and flowers. The beds prevent soil compaction and erosion and provide good drainage and a barrier to pests while still attracting other wildlife. The placement of the beds allow students to gather around to work, investigate, and discuss. The beds may also allow for planting earlier in the season because the soil is warmer and better drained when it is above ground level.

The Phenix students and staff are excited about the changes taking place in the garden. The Green Team continues to plan for summer maintenance and fall planting. Next steps included the installation of a koi pod; however; the students discovered a rabbit burrow so that pond has has to be put on hold.

The Green Team has also worked with the Phenix Art Club to redesign the interior courtyards. After the school system, cut down the tree in the cement planters, both clubs were concerned about the ascetics of the area. Student built benches were placed around the courtyard and wildflower seeds were planted in the empty planters. Portable planters have also been added and include herbs and annuals.

Mrs. Tharpe's Science Central - email
https://sites.google.com/a/hampton.k12.va.us/mrstharpe/home

Bilingual STEM Resources

Published by Sandy Kauten

Learning a new language is hard. Trying to learn complicated math and science concepts in a new language is even harder.

With almost five million English Language Learners (ELLs) in U.S. public schools facing this near-impossible challenge, it is difficult to believe that bilingual STEM resources are still not readily available. The rate of high school graduation for ELLs is only 63 percent, almost 20 percent lower than the national average. These students often fall behind in basic subjects due to insufficient language accommodations.

Wendi Pillars, an experienced ESL teacher from Chatham County Schools in North Carolina, says, "Teachers continue to report that they feel unprepared to work with students who are language learners… even though ELL enrollment continues to increase annually in most states." This issue also causes educators to overlook ELLs who may be candidates for advancement, evidenced by the paltry two percent enrolled in gifted programs.

Even as ESL, bilingual, and dual-language immersion schools become more popular, these programs almost universally face a lack of resources.

This is particularly frustrating for Spanish-speaking ELLs, who make up a significant portion of this population. Spanish speakers comprise over half of all ELLs in the U.S., with more than 3.8 million students. In the U.S. today, one of every four public school students is Hispanic—and this number increases daily. In fact, the U.S. is now home to more Spanish speakers than Spain.

STEM subjects (Science, Technology, Engineering, and Math) are vital to helping students succeed in school and in daily tasks like understanding mortgages and using electronics. The National Science Foundation stresses that "to succeed in this new information-based and highly technological society, students need to develop their capabilities in STEM to levels much beyond what was considered acceptable in the past." Careers in STEM are growing quickly, and typically provide high salaries. It is more important than ever to ensure that all students are receiving quality STEM education, yet English Language Learners have notably few resources that deal with these subjects.

Fortunately, educators and educational publishers are beginning to address this problem.

There is now a resource designed specifically to help Spanish-speaking ELLs learn STEM subjects. A set of middle-grade books offers literature-based science and math brainteasers in both English and Spanish, with easy side-by-side comparison that allows students to develop their language and STEM skills at the same time. Having a resource like this, which clearly explains science and math concepts in a fun, accessible way, can be game-changing for ELLs.

These books are part of the 5-book One Minute Mysteries series, written by father/daughter team Eric and Natalie Yoder. They challenge kids to solve real-life brainteasers using their knowledge of STEM subjects. Previously only available in English, the bilingual edition of the science mysteries book was released last year, titled More Short Mysteries You Solve With Science! • *¡Más Misterios Cortos que Resuelves con Ciencias!* The second bilingual book was just released in August, this time offering math mysteries, Short Mysteries You Solve With Math! • *¡Misterios Cortos que Resuelves con Matemáticas!* Carmen M. Martinez-Roldan, Ph.D, from the Bilingual Education Program at Columbia University, writes of the book set, "Bilingual materials addressing STEM topics are long overdue. These books give kids the vocabulary and confidence they need to succeed in the classroom."

For more, great bilingual resources, take a look at the websites listed in the sidebar.

It's important for these books and other bilingual resources to be easy enough to use at home as well as in the classroom. Bilingual resources are especially helpful for kids who speak English at school, but use only Spanish

SIDEBAR:

The Need for Bilingual Education

- Nearly 1 in 10 students in U.S. public schools are ELLs.
- The U.S. is home to 52.6 million native or bilingual Spanish-speakers.
- 70% of Hispanic students speak a language other than English at home.
- Students in two-way dual language programs show higher reading and math scores.
- Bilingual adults experience less cognitive decline as they age

Hannah Thelen graduated from Bowling Green State University with a BFA in Creative Writing. She lives in Washington, D.C., where she generally enjoys reading, writing articles or short stories, and drinking too much bubble tea. Contact her at Hannah@PlatypusMedia.com

at home with their parents. The development of language skills should be encouraged beyond the school day, for both Spanish speakers learning English, and English speakers hoping to become bilingual.

Bilingual education is not just for ELLs. Many English speakers are discovering the powerful positive impact that knowledge of a second language can have on academic and personal success. Reading and math scores of students in two-way dual language education are higher than those of monolingual students, regardless of ethnicity, socioeconomic status, proficiency in English, or special education skills. Bilingual children also demonstrate an increased sense of self-worth and identity, and tend to relate to others better than monolingual students.

The handful of websites and books mentioned here fill only a small portion of the bilingual STEM resources that this country needs. That being said, it's an important start. As educators and educational publishers become aware of the shortage, more bilingual STEM resources will become available and, more importantly, make their way into the hands of students who needs them.

Other Resources for Bilingual Education:

https://degree.utpb.edu/articles/education/esl-and-bilingual-education.aspx

https://www.kars4kids.org/blog/benefits-of-a-bilingual-education/

https://bilingualkidspot.com/2016/07/21/bilingual-education-benefits/

https://www.nytimes.com/2012/03/18/opinion/sunday/the-benefits-of-bilingualism.html

https://www.cultofpedagogy.com/supporting-esl-students-mainstream-classroom/

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Hannah Thelen
Platypus Media: Resources for Families, Teachers, and Parenting Professionals
725 8th Street, SE, Washington, DC 20003

Earth Science Week Resources • Celebrated October 14 - 20

The theme of this year's event is "Earth as Inspiration," an exciting theme that bridges science and art, and supports the development of creative activities to generate excitement for the geosciences. The Virginia Department of Mines, Minerals, and Energy (DMME) has been an active supporter of earth science week for several years (https://www.dmme.virginia.gov/dgmr/EarthScienceWeek.shtml). This year we are reaching out to Earth Science teachers and other interested teachers in Virginia to further promote this important event.

- Free Earth Science Week AGI kit visit: http://www.earthsciweek.org/materials
- Complete one or more activities with your class that are aligned with this year's theme.
- Sponsor a community event to support earth science week. It could be aligned with one of the special days designated during earth science week that focus on.
- Submit student entries to the AGI Video (all ages), Photography (all ages), Visual Arts (Grade K-5), or Essay (Grade 6-9) contests. All entries are due by 5 PM on Friday, October 19.
- Learn more about these focus days by visiting: http://www.earthsciweek.org/focus-days.

NASA Opportunities for Students from The Virginia Space Grant Consortium (VSGC)

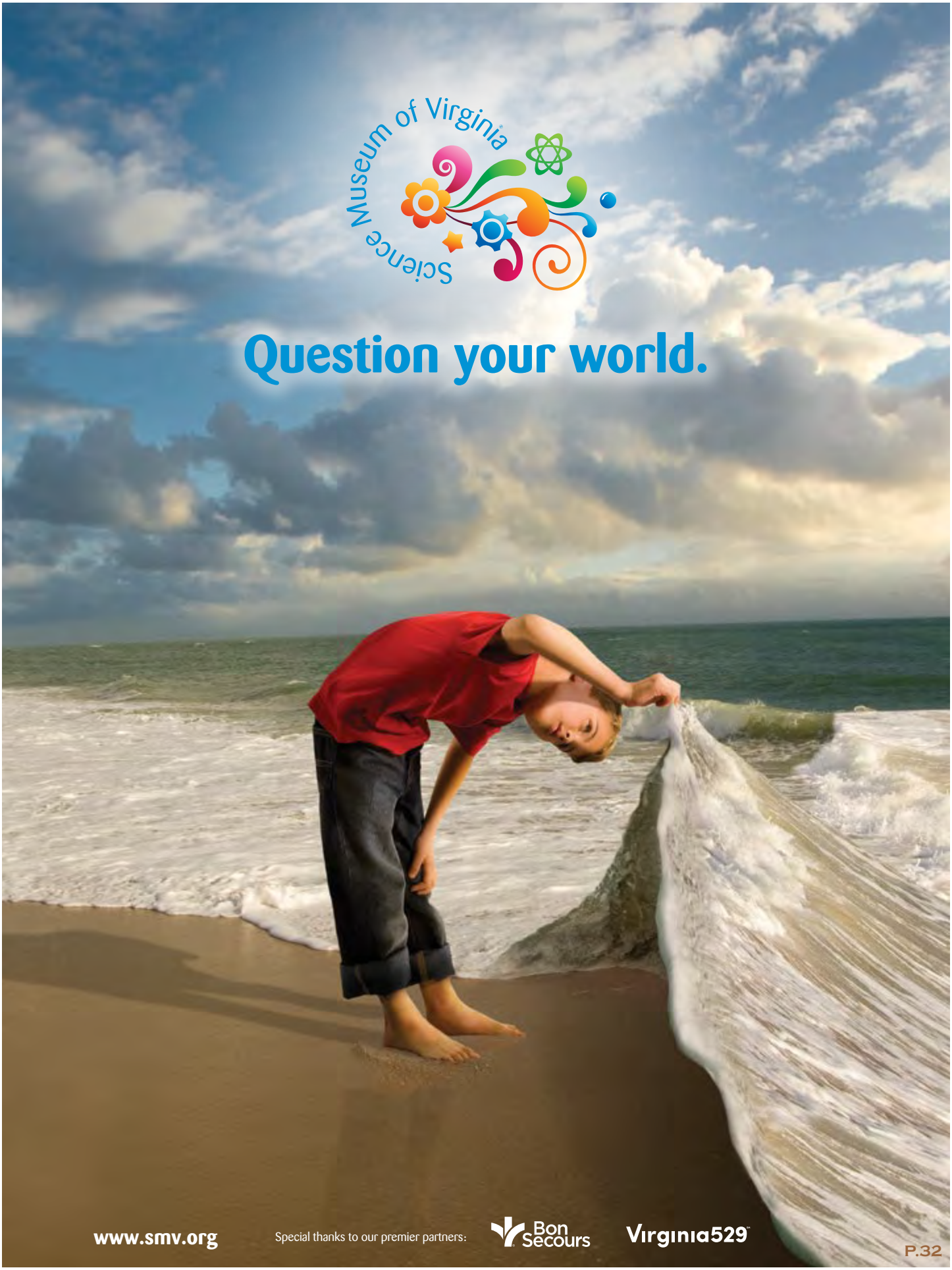
Our Program **Online Course applications** are OPEN for 10th, 11th, and 12th grade students to apply. The Virginia Space Grant Consortium (VSGC) provides the following STEM opportunities. All of our programs are FREE to all Virginia students.

Virginia Space Coast Scholars (VSCS) – Program for 10th grade students focusing on the missions flown or managed by NASA Wallops Flight Facility on Virginia's Eastern Shore, with a Summer Academy program at NASA Wallops Flight Facility. http://vscs.spacegrant.org/

Virginia Aerospace Science and Technology Scholars (VASTS) – Program for 11th or 12th grade students focusing on NASA's human spaceflight missions and the Journey to Mars with an online course with a Summer Academy program at NASA Langley Research Center. Students can earn up to 4 free dual enrollment credits. http://vsgc.odu.edu/VASTS/

Virginia Earth System Science Scholars (VESSS) – Program for 11th or 12th grade students, VESSS is an interactive, on-line Earth System Science Course featuring NASA scientific research and data. The students can earn up to 5 transferable, free dual enrollment college credits and can also compete to attend a Summer Academy program at NASA Langley Research Center. http://www.vsgc.odu.edu/VESSS

Rudo Kashiri, Education Programs Manager, Virginia Space Grant Consortium
600 Butler Farm Road, Suite 2200, Hampton VA 23666
rkashiri@odu.edu


Science Museum of Virginia
Question your world.
www.smv.org
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P.O. Box 1076
Elon, NC 27244
www.associatedmicroscope.com

Regent University School of Education
1000 Regent University Drive
Virginia Beach, VA 23464
www.regent.edu

Frey Sciencetific/ CPO Science
P.O. Box 3000
Nashua, NH 03061
www.cposcience.com
www.freyscientific.com

Science Museum of Virginia
2500 West Broad Street
Richmond, VA 23220
www.smv.org

Delta Education
80 Northwest Boulevard
Nashua, NH 03063
www.delta-education.com

Science Matters Community Idea Stations
23 Sesame Street
Richmond, Virginia 23235
www.ideastations.org/sciencematters
www.facebook.com/sciencemattersva

National Geographic
20 Channel Center Street
Boston, MA 02210

Cengage Learning
10650 Toebben Drive
Independence, KY 41051
ngl.cengage.com

Vernier Software & Technology
13979 SW Millikan Way
Beaverton, OR 97005
www.vernier.com

VAST Corporate Members

Astrocamp
8144 Mt. Laurel Rd.,
Clover, VA 24534
astrocampsummerva.org

Flinn Scientific Inc.
P.O. Box 219
Batavia, IL 60510
www.flinnsci.com

Fisher Science Education
Part of Thermo Fisher Scientific
1523 W Philadelphia St. Fl 2
York, PA 17404
www.fisheredu.com

Five Ponds Press
477 South Rosemary Ave,
Suite 202
West Palm Beach, FL 33401
www.fivepondpress.com

Jefferson Lab
628 Hofstadter Road, Suite 6
Newport News, VA 23606
www.jlab.org

Lab-Aids, Inc.
17 Colt Court
Ronkonkoma, NY 11779
lab-aids.com

PASCO Scientific
10101 Foothills Blvd.
Roseville, CA 95747
www.pasco.com

Virginia Space Grant Consortium
600 Butler Farm Rd. S-200
Hampton,VA, 23666
www.vsgc.odu.edu

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Board Information

Is Your Address Changing?

Be sure to let VAST know your new contact information. Neither the post office or the Internet will forward our newsletters. Please e-mail **Barbara Adcock, Membership chair: membership@vast.org**

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Network with VAST members, colleagues and friends through LinkedIn

Please consult the website for up to date information, VAST forms for awards and mini-grants, advertising and current PDI information: vast.org or https://vast.wildapricot.org

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, 2019, for inclusion in the next digital PDI VAST Newsletter.

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