



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

ISSN 1945-7405

VAST.Org or <https://vast.wildapricot.org>

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

The Science Educator

Fall 2017

A Publication of VAST, The Virginia Association of Science Teachers

Vol. 66, No. 2

Spacey Casey will be there, how about you?

The speakers, presenters, and exhibitors are coming. The bags and name tags are ordered; and the program is published and printed. Officers are writing their scripts and plaques and certificates are engraved and printed. Name tags and tickets are ready and the VAST bucks are printed and bundled. The DJ and auctioneer are ready to go. Meals are planned and hotel staff are making your beds and fluffing your pillows. Dinah Zike's staff has been folding and cutting and are ready to present, and the NASA's Centennial Experience Exhibit is traveling to Roanoke. The Science Museum of Western Virginia Staff is preparing for a crowd of science teachers to visit during the three days of the VAST PDI. What about you? Have you registered? The VAST PDI committee and the VAST Board have been working to make this the best Professional Development Institute for Virginia's Science Teachers ever. We hope you will be there.



Look for Spacey Casey at the PDI in November and take a photo with him.

One more reason to attend:

When teachers attend professional developments, they receive one point per hour they attend. They will need to take proof of their attendance to their supervisor to support the points they indicate on their licensure renewal form to be submitted to the state.

You will need a Certificate of Attendance. When you attend the PDI you will be given a link to log on to a survey. After completing the survey, you will be able to print your Certificate of Attendance.

Registration Deadlines

VAST 2017 Professional Development Institute November 16 - 18, 2017

September 6 - Presenter Registration
October 15 - Early Bird Registration
October 31 - Donna Sterling PreCon
October 31 - PreCon Workshops
October 31 - Regular Registration
October 31 - Meals Registration
After October 31 - Register Onsite

VAST was founded in 1952 to promote excellence in science education. In 2002 we celebrated our fiftieth anniversary. This year we celebrate our 65th anniversary and look to the future with great anticipation.

**Celebrating 65 years
of fostering excellence
in science education in
Virginia.
1952-2017**

Come celebrate with us, and let's work together to build a brighter future one student at a time.

From the Executive Director



Breaking News!!!!

I have heard that some teachers are not being allowed to attend the VAST PDI because their schools are not warned in Science.

Did anyone stop to say....**"WE ARE ACCREDITED BECAUSE OF VAST"**?

You **did** get all the training!

You **did** bring it back and shared it with your teachers!

You **did** do new lessons with your students!

You earned the A+ so why not continue the benefits of VAST!

Awsome
Credible
Connections
Relating
Engineering
Design
Inquiry
Technology
Educating
Dozens

Susan Booth, EdS
Executive Director

Contents:

1. [Front Page](#)
2. [Executive Director's Message, Menu](#)
3. [President Shirley Sypolt Message](#)
4. [President-elect Page - Plans for 2018](#)
5. [PreCon - Workshops](#)
6. [General Session Speakers](#)
7. [PDI First Timers](#)
8. [Schedule-At-A-Glance](#)
- 9-10. [VAST Art Contest Winners 2017](#)
- 11-13. [VAST 2018 VAST Slate of Board of Directors](#)
13. [Science Museum of Va, Pastport to Celebrate Science](#)

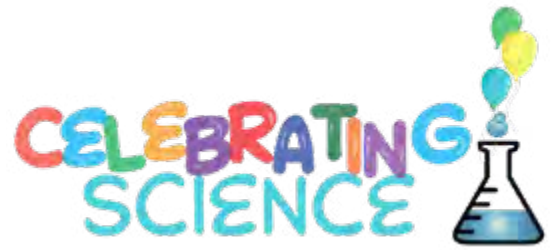
Menu

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

15. [NASA Stem Program](#)
16. [Science Museum of Western Virginia](#)
17. [VSGC Opportunities, ASM Materials Teacher Camps](#)
18. [VSGC - The FRTS National Rocket Competition](#)
19. [Friday Night Science Auction](#)
20. [NASA eClips](#)
22. [VaTech Natural Resource Program](#)
- 23-25. [Science for All, George Dewey](#)
26. [Partners in Science](#)
28. [Corporate Members and Benefactors](#)
29. [VAST Leadership and VAST Mission](#)



Shirley Sypolt
VAST President 2017



Celebrating Science 2017!

Approximately 30 of your VAST Board & PDI committee members “**celebrated science**” this past summer by participating in a weekend retreat at Camp Piankatank in Middlesex County. At this retreat, break-out groups focused on the following topics: Membership, Regional Directors, Partnerships, and Communication. At this organizational retreat, we were able to devote lots of time to discussing these critical focus topics and we were also able to create action steps to present at our upcoming September Board meeting.

Hopefully on August 21, you had the opportunity to use safety glasses and observe the solar eclipse. What an awesome celebration of science!

As summer has come to an end, I hope you have settled into an exciting new school year. Take the time to remember why you love teaching science and plan for awesome science experiences for your students this year.

Don't forget to plan awesome science experiences for yourself- you've earned it! A great way to do this is to plan now to attend the upcoming fall VAST PDI (Professional Development Institute) at the Hotel Roanoke and Conference Center, November 16-18. Plan to pre-register and attend a Pre-Conference session (**Success for All with Dinah Zike Strategies**) on Thursday and one of that same afternoon's Pre-Conference sessions. Register and also join us on Friday and Saturday for awesome speakers (Andres Ruzo, Kaleela Thompson, & Callan Bentley), exciting concurrent sessions, exhibits, and an entertaining Auction with DJ.

Another reason to come join us in Roanoke this fall is to help us celebrate the 100th anniversary

of the NASA Langley Research Center, by exploring their traveling exhibit. This traveling centennial exhibit features an interactive journey through a century of NASA Langley's aeronautics, science and space achievements. The exhibit, housed inside a specially equipped 18-wheeler trailer, will be located just outside the Hotel Roanoke. You will be able to walk through interactive displays and see videos about Langley's past, present and future.

Also plan to take a short walk, just a few minutes, to the Science Museum of Western Virginia. Admission to this museum will be free, when you show your VAST PDI Badge.

By attending the 2017 VAST PDI, educators at every level of science will find many topics of interest with which to build expertise. VAST, a professional association, advocates for high-quality science instruction for all students at all levels. The PDI provides an avenue for communication among all members of the science teaching community. I encourage all science educators to take this opportunity to use the VAST PDI as a part of your professional development plan in order to expand and promote excellence in science education, as well as science literacy in Virginia. The VAST PDI provides educators an engaging and fun opportunity to earn recertification points.

As the president of VAST this past year, I have thoroughly enjoyed hearing from and working with our exceptional board and association's members. I am looking forward to meeting all of you at our upcoming fall Professional Development Institute in Roanoke, Virginia this November.

Meet me at the VAST PDI & share how you've been celebrating science in 2017!

Shirley Sypolt, Vast President 2017



Redefining “Science for All” in 2018

Plans for the 2018 VAST PDI are under way! As we ready ourselves for the 2017 VAST PDI in Roanoke keep in mind that planning for our next PDI is gearing up. As the organization's President-Elect,

I have selected the theme “***Diversify and Strengthen Science for All***” to guide my strategic planning for our next PDI. Why the theme you might ask? In the past 10 years the population of school age English Language Learners and other special populations have skyrocketed in our classrooms. Yet the change in demographics has not been matched by a marked increase in professional development for teachers, particularly in the area of science education in those same classrooms. In an effort to better serve teachers of science who work with these students we are amassing general session speakers, concurrent session presenters and vendors with the stated goal of sharing strategies, research and resources. VAST will make every effort to serve emerging professional development needs of our members who serve an increasing number of diverse students in

our Commonwealth. If you have successfully developed strategies for working with ELL, students in poverty and or challenged learners consider submitting a proposal to present. We would especially like to hear from teachers who have experiences working with resource personnel in TESOL and Special Education. During the fall and winter semesters collect data on what is working in your classrooms so you can submit your proposals in the spring. Don't forget to check out our website at www.vast.org for resources and other timely information.

Next year's speaker line-up will include: Dr. Jeff Jordan, Senior Director of ASRC Federal and “Scooter” Scott D. Altman, Astronaut, as well as Munazza Alam, National Geographic/Cengage Astronomer, Explorer.

VAST is your professional organization.

All the best,
Jackie McDonnough, President-Elect

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VAST PreCon Workshops

Success for All with Dinah Zike Strategies!!

November 16th, 8:00 am – 3:00 pm

Pre-registration is required. Register online at www.VAST.org Time is running out!

October 15 is the last day to register as an Early Bird.

October 31 is the last day to register for the Donna Sterling Precon and the PreCon Workshops

No onsite registration is available for the PreCon.

Dinah will be at the PDI PreCon in person, Thursday afternoon and will be at the Dinah Zike Booth in the exhibit hall on Friday.

The Sterling Committee sponsors the Dinah Zike strategies for successful science teaching. Join us at the Hotel Roanoke from 8:30am-3:00pm. Register at VAST.org to reserve your place. The cost is \$125 and includes the professional development workshop, book, breakfast and lunch plus a materials packet. Participants will make three-dimensional interactive graphic organizers. Attention will be paid to vocabulary development, as that is a major hurdle for understanding science concepts for struggling learners, including ELL. The activities presented are appropriate for use before, during, and after science instruction, and are appropriate for recording basic concepts, observations, investigations, experiments, and assessment. Both independent graphic organizers (manipulatives) and dependent graphic organizers (note-taking strategies) will be featured. Teachers will leave the session with inexpensive activities that can be used immediately with their students.

Celebrate Science: Strengthening the 4Cs Using 3-D Interactive Graphic Organizers for: Elementary Grades (K-5)

Join a Dinah Zike Certified Trainer in this fast-paced, hands-on presentation as s/he shares methods for strengthening Critical Thinking, Communication, and Collaboration Skills, while encouraging Creativity. This session will focus on 3-D graphic organizers, Visual Kinesthetic Vocabulary (VKVs) and interactive notebooking that can be used for daily grades, group work, projects, and/or study guides. Participants will leave the session with inexpensive, easy to develop strategies that can be incorporated into any science curriculum. Materials packets provided, *Dinah Zike's Big Book of Science*.

Celebrate Science: Strengthening the 4 Cs Using 3-D Interactive Graphic Organizers for Middle/High School (6-12)

Join a Dinah Zike Certified Trainer in this fast-paced, hands-on presentation as s/he shares methods for strengthening Critical Thinking, Communication, and Collaboration Skills, while encouraging Creativity. This session will focus on 3-D graphic organizers and interactive notebooking that can be used for daily grades, academic vocabulary, group work, projects, and/or study guides. Participants will leave the session with inexpensive, easy-to-develop strategies that can be incorporated into any science curriculum. Materials packets provided include the book *Notebook Foldables for Spirals, Binders, and Composition Books*.

THURSDAY PRE-CONFERENCE HANDS-ON WORKSHOPS

November 16th, 3:15 pm – 4:45 pm

Deadline to register was October 31. Cost is only \$5.00 per workshop. No onsite registration is available for the precon. Each workshop is limited to 25 participants.

ELEMENTARY WORKSHOP

GLOBE Elementary – Making the Science and Literacy Connection with Elementary GLOBE

Presenters: Tina Harte, Jessica Taylor, NASA Elementary GLOBE develops literacy through Earth science-based storybooks that engage the natural curiosity of students through a variety of learning activities and science journaling experiences. In the hands-on learning session “Making the Science and Literacy Connection with Elementary GLOBE,” participants will discover how the Elementary GLOBE storybooks can improve student literacy skills while engaging them in science-based learning. The characters within the Elementary GLOBE storybooks actively apply the following science process skills: asking questions, carrying out investigations, etc.

MIDDLE SCHOOL WORKSHOP

The Role of Reading and Writing in Inquiry-based Middle School Science Instruction

Presenters: Kip Bisignano, Delta Education, Sarah McGlothlin, Narrows Middle School and Roxane Dupuis, Science Education Consultant Enhance inquiry in the science classroom through reading and writing activities that complement hands-on science investigations. Scientists use reading and writing to confirm studies, explore applications, and communicate new evidence-based claims. In this session, participants explore energy transfer in a variety of activities and learn a process to embed reading and writing strategies within the context of inquiry-based investigations. Participants will receive resources and Materials.

HIGH SCHOOL WORKSHOP

Environmental Science with Vernier

Presenter: Jackie Bonneau, Vernier Learn how to use Vernier technology to study environmental science in the field or in your classroom. Water quality, renewable energy, and other topics from our Investigating Environmental Science through Inquiry and Renewable Energy with Vernier lab books will be performed using LabQuest 2 in this hands-on workshop. Data Sharing with mobile devices and mapping on Logger Pro will be demonstrated. Explore our wide range of tools that promote understanding of environmental science concepts. Vernier will raffle (2) \$50 gift certificates at the end of the workshop. Copies of labs used during the workshop and Vernier catalogs will also be available for attendees to take home.

VAST 2017 Professional Development Institute

“Celebrating Science”

General Session Speakers

Thursday, November 17, 5:30-6:45 p.m., General Session 1

Andrés Ruzo, National Geographic Young Explorer

STEAMY Lessons from the Boiling River of the Amazon

Sponsored by
Cengage
Learning



In 2014, National Geographic Explorer Andrés Ruzo gave VAST a sneak-peak into his work at the Boiling River of the Amazon prior to its world-wide release. This year Andrés is back and eager to share exclusive behind-the-scenes updates-- highlighting new experiences and advancements in the scientific work and conservation efforts at this sacred geothermal site. Join us for a journey

into the Amazon, that started with a childhood legend, and a spark of curiosity! Investigating a childhood legend led him to the Shanay-timpishka, the “Boiling River” of the Amazon, and a sacred site to the indigenous tribes, where the water can reach over 95 °C (203 °F). The greatest mystery of this place: How can a “boiling river” exist 700 km (435 miles) from the nearest volcanic center?

Friday, November 17, 10:40-noon, General Session 2

Andrés Ruzo, National Geographic Young Explorer &

Kaleela Thompson, University of Florida

The Scientific Journey:

How Bugs, Volcanoes & Curiosity Can Change the World

Sponsored by
Cengage
Learning



Truly “Celebrating Science” means acknowledging that there is a personal journey behind every new discovery and research paper. With the goal of exploring how to better connect students and adults to science, this session will explore the “scientific journey” from childhood curiosity to impactful initiatives. This session will open with an interview-style format moderated by National Geographic Explorer, Andrés Ruzo, and featuring budding butterfly expert, Kaleela Thompson. The latter part of the session will be a town hall style discussion where we will learn from

each other as VAST educators, identifying tips and tricks that have worked in the classroom to keep students engaged on their scientific journeys.

Kaleela Thompson is currently an 18-year-old freshman at the University of Florida, studying entomology; she is a 2017 graduate of Kecoughtan High School in Hampton, Virginia. She was the 2013 recipient of the National Science Teachers Association’s Angela Award, which is given annually to honor one female student in grades 5-8, who has a strong connection to science.

Saturday, November 18, 12:50-2:20 p.m., General Session 3

**Callan Bentley, Chancellor’s Commonwealth, Professor of Geology,
Northern Virginia Community College**

*“Astonishing Insights: How Science Helps Us Get Out of
and See the Real World”*

Sponsored by
Virginia Space Grant Consortium



Callan Bentley currently is an assistant professor of geology and Chancellor’s Commonwealth Professor of Geology at Northern Virginia Community College’s Annandale campus. He received a BS in geology at the College of William & Mary (1996), an MS in geology from the University of Maryland, College Park (2004), and an MS in Science Education from Montana State University (2009). Currently he is an assistant professor of geology and Chancellor’s Commonwealth Professor of Geology at Northern Virginia Community College, Annandale.

He is a frequent contributor to **EARTH** magazine and is the author of the geology blog **Mountain Beltway**. Callan was a contributor to five geology and Earth science textbooks published by Pearson and is under contract to write another as lead author. He has become known as an innovator in digital geology, in particular for the use of GigaPan images of outcrops and samples, a technique that allows “virtual field experiences” for distance learners and students with disabilities.

A VAST Beginning: Navigating the PDI for the First Time

By Dr. Jackie McDonnough

“Celebrating Science”, the theme for VAST 2017 Professional Development Institute perfectly underscores what my attendance will be this year. I will be celebrating my 22nd year as a lifetime member. I will also celebrate the end of my year as VAST’s president-elect and the beginning of my term as the president.

These celebrations have caused me to deeply reflect on my many rewarding experiences with the Virginia Association of Science Teachers. I was a wide-eyed Preservice teacher when I attended my first VAST PDI at Virginia Beach in 1988. My fellow classmates and I presented hands-on science activities as part of an assignment for Dr. Richard Rezba’s science methods course. Though many memories of that weekend have faded, I still remember the kindness and encouragement from those teachers who attend our session. I also vividly remembered the exhibit hall and all the freebies I collected. After that I vowed to attend all VAST PDIs.

Those experiences exemplify how important VAST is and can be to teachers of science. The PDI serves as a venue for all teachers of science, vendors and other service providers to come together for learning, information sharing and comradery. Through the years I’ve used information I got in sessions or from vendors to apply for grants, enhance my instruction and improve myself as an education professional.

Attendance at VAST can be an overwhelming experience for first-timers. I remember how big it all seemed my first time. Because of that and value I

knew VAST to be, I continued Dr. Rezeb’s assignment of having my preservice teachers present at VAST. Their experiences have always been positive because I had them review the program and devise a plan for sessions they would attend. I would like to share some strategies for getting the most out of your VAST PDI experience and to make attending more manageable.

First Time Attendee Strategies:

1. Review the PDI program before coming to select sessions that align with your professional development goals for the academic year.
2. Add all of the general sessions to your schedule. The speakers always have useful information to share.
3. Add in a couple of visits to the exhibit area because you will need time to visit all the vendors. Collect as many VAST bucks as possible.
4. If at all possible plan to attend the awards dinner and auction/dance that follows.
5. Register before the end of September and purchase lunch and field trip tickets. If you have a pre-purchased boxed lunch you can have a stress-free lunch break to network.
6. Plan to attend the session I will be conducting for first-time attendees “Getting the Best Out of VAST”.
7. Enjoy!

Will You Be a First Timer?

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

We have a session just for you!

Session 1, 8:30 a.m. – 9:20 a.m., Roanoke, Ballroom AB, Jackie McDonnough

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.

Schedule-at-a-Glance



Wednesday, November 15, 2017

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

Thursday, November 16, 2017

Ticketed Dinah Zike Short Courses

7:30 a.m. – 8:00 a.m.	Check-in Desk Open
7:30 a.m.	Continental Breakfast
8:00 a.m.– 3:00 p.m.	Strengthening the 4 Cs Using 3-D Interactive Graphic Organizers for Elementary Grades (K–5)
8:00 a.m.– 3:00 p.m.	Strengthening the 4 Cs Using 3-D Interactive Graphic Organizers for Middle/ High School (6–12)
12:00 p.m. – 1:00 p.m.	Lunch
2:30 p.m. – 5:15 p.m.	PDI Registration Desk Open

Ticketed Pre-Conference Workshops

3:15 – 4:45 p.m.	Making the Science and Literacy Connection with Elementary GLOBE <u>NASA</u>
3:15 – 4:45 p.m.	The Role of Reading and Writing in Inquiry-based Middle School Science <u>Delta</u>
3:15 – 4:45 p.m.	High School Environmental Science with Vernier

PDI Opens

5:30 p.m. – 6:45 p.m.

Special Sponsors: Vernier: badges, Delta: conference bags

General Session I – Welcome to the PDI

Keynote Speaker: Andrés Ruzo, National Geographic Young Explorer

“STEAMY lessons from the Boiling River of the Amazon”

(Door prize giveaway at the end of the session)

7:00 p.m. – 9:00 p.m.

Night with the Exhibitors and Meet Your Regional Director

(Complimentary Snacks)- **PASCO** (Cash Bar) (Winners of Exhibitor drawings posted at 8:30 pm)

Friday, November 17, 2017

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 (Winners of Exhibitor drawings posted at 5:00 pm)
8:30 a.m. – 9:20 a.m.	Concurrent Session 1
9:35 a.m. – 10:25 a.m.	Concurrent Session 2
10:40 a.m. – noon	General Session II- Business Meeting
	Speakers: Andrés Ruzo, National Geographic Young Explorer and Kaleela Thompson, college student
	“The Scientific Journey: How Bugs, Volcanoes and Curiosity Can Change the World”
	(Door prize giveaway at the end of the session)
11:45 a.m. – 1:00 p.m.	Ticketed Lunch
12:30 p.m. – 5:30 p.m.	Exhibit Hall Open (Winners of Exhibitor drawings posted at 5:00 pm)
1:10 p.m. – 2:00 p.m.	Concurrent Session 3
2:15 p.m. – 3:05 p.m.	Concurrent Session 4
3:20 p.m. – 4:10 p.m.	Concurrent Session 5
4:25 p.m. – 5:15 p.m.	Concurrent Session 6
6:15 p.m. – 8:15 p.m.	Ticketed Dinner/Awards Ceremony (Cash Bar, Awards Ceremony open to all to attend.)
8:30 p.m. – 10:00 p.m.	Auction and DJ (Cash Bar)

Saturday, November 18, 2017

7:30 a.m. – 10:00 a.m.	Registration Desk Open
7:30 a.m.	Continental Breakfast in the Exhibit Hall
7:30 a.m. – 11:30 a.m.	Exhibit Hall open (Exhibitor raffle results posted at 8:15 am)
8:30 a.m. – 9:30 a.m.	Concurrent Session 7
9:35 a.m. – 10:25 a.m.	Concurrent Session 8
10:40 a.m. – 11:30 a.m.	Concurrent Session 9
11:45 a.m. – 12:35 p.m.	Concurrent Session 10
12:20 – 12:50 p.m.	Pickup ticketed box lunch on your way into General Session III
12:50 p.m. – 2:20 p.m.	General Session III – Meet Your New VAST Officers
	Speaker: Callan Bentley, Northern VA Community College
	“Astonishing Insights: How Science Helps Us Get Out of Our Heads and See the Real World”
	(Door prize giveaway at the end of the session)



Congratulations to the 2017 Student Art Poster Contest

First Place WINNERS!

With the PDI title of “Celebrating Science” for their theme, students across the Commonwealth created artwork. This year’s four categories were Kindergarten through 2nd Grade, 3rd through 5th Grades, 6th through 8th Grades, and 9th through 12th Grades. First, Second, and Third places were awarded in each category. For a complete list of all winners and all the winning entries in color, see the VAST website and the VAST October digital newsletter.



Primary Grades, K-2
First Place: Seamus Pfeiffer,
 Gravelly Elementary School,
 Prince William County
 Dina Baird, Teacher Sponsor

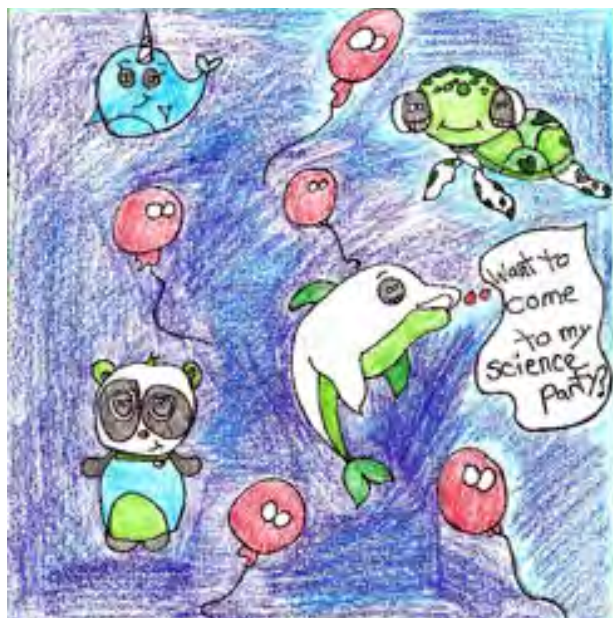


Primary Grades, K-2
Third Place: Sarah Gamer
 Gravelly Elementary School,
 Prince William County
 Dina Baird, Teacher Sponsor

Primary Grades, K-2
Second Place:
 Jeromie Shoulders
 Gravelly Elementary School,
 Prince William County
 Dina Baird, Teacher Sponsor



Intermediate Grades 3-5
Second Place: Raquellle Tua
 Norge Elementary School,
 Williamsburg/James City
 Jamie Collins, Teacher Sponsor



Intermediate Grades 3-5
First Place: Adaline Violet Scott
 Norfolk Academy,
 Norfolk City Schools
 Patti Klewans, Teacher Sponsor



Intermediate Grades 3-5
Third Place: Gabriella Adkins
 New Kent Elementary School,
 New Kent County
 Cathy Bruner, Teacher Sponsor



Grand Prize Winner graced our program's front cover. Congratulations to all the winners. Many thanks to the sponsoring teachers. You can see the original entries displayed at the PDI.



**Middle School Grades 6-8
First Place and GRAND PRIZE WINNER:**
Alice Ji,

Rachel Carson Middle School,
Fairfax County
Moosa Shah, Sponsor Teacher

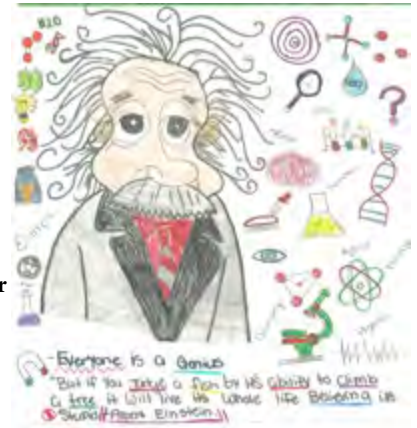


**Middle School Grades 6-8
Second Place**

Ethan Martin,
Halifax County Middle
School, Halifax County
Natasha Devenuti, Teacher
Sponsor

**Middle School Grades 6-8
Third Place**

Alexis Edwards,
Rustburg Middle School,
Campbell County
Andrea Rice, Teacher Sponsor



**High School Grades 9-12
First Place:** Rachel Manley

Jefferson Forest High School,
Bedford County
William Burnette, Teacher Sponsor



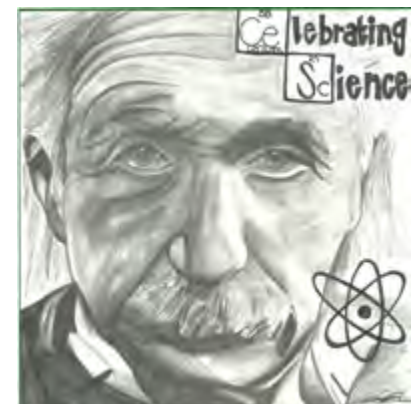
**High School Grades 9-12
Second Place:**

Patty Mathis

Gate City High School,
Scott County
Donna Rowlett, Teacher
Sponsor

**High School Grades 9-12
Third Place:** James Boule

Randolph-Henry High
School, Charlotte County
Patricia Dunnivant, Teacher
Sponsor



2018 VAST Slate of Board of Director Officers

2018 VAST Board of Elections Ballot Voting Process



The ballot this year contains an amendment to the VAST Bylaws and Standard Operating Procedures approved by the Board that will allow VAST to conduct electronic elections in the future. To go into effect, the VAST membership must vote to accept it.

VAST will be conducting a pilot electronic election in conjunction with the paper ballot. Paper ballots will be provided at the 2017 PDI this year. For both the paper ballot and electronic ballot this year, you **MUST** use your VAST Membership ID#. Votes without Membership ID#s will not be accepted. All votes via the electronic ballot will be accepted. If a member mistakenly votes by paper and electronically, only one of those votes will be valid.

Electronic elections will not only facilitate the process for the membership to vote, but will also allow reminders to be sent automatically. Votes will be tallied automatically permitting the Nomination Committee to report the results in a timelier fashion. The online company that VAST is using is Election Buddy. If the pilot is successful and the amendment to the Bylaws and Standard Operating Procedures is accepted by the VAST membership, the voting process will go paperless in 2018.

Watch for your invitation to vote via email later this month.

President-elect: Vote for one: Tom Fitzpatrick or LoriAnn Pawlik
Tom Fitzpatrick, K-12 Science Supervisor with Roanoke City Schools

- Tom Fitzpatrick is completing his 30th year in public education in Virginia, with 21 years as a middle school science teacher teaching life, physical, and earth sciences, and 9 years at the K-12 Science Supervisor with Roanoke City Schools. His responsibilities include writing curriculum and providing professional development for teachers of grades pre-K through chemistry, creating Local Alternative Assessments, teacher support, new teacher recruitment and training, and classroom teaching as needed. Tom has served as the Region 6 Director for VAST for three years, and is a member of NSTA. Tom has presented at the VAST PDI, NSTA regional and national conferences, Texas Instruments T3 conference, and at the JASON National Educators Conference. He is a trainer for Project Learning Tree, Project WET, Project WILD, Growing-up WILD, and in the past was a Certified JASON trainer for the JASON Project. He was honored as his District's Teacher of the Year and as a Virginia Regional Teacher of the Year and was a finalist for the McGlothlin Award. Tom wishes to be considered for the position of President-Elect. He is interested in seeing "that VAST not only continues to play a key role in Science Education in Virginia, but that the association expands its support for individual science teachers across the commonwealth, providing access to resources, training, and trends in science for teachers who cannot always attend the PDI".

President-elect:
LoriAnn Pawlik, K-5 STEAM Teacher, 4th Grade, Penn Elementary School

- LoriAnn Pawlik is a STEAM Teacher in Prince William County working toward an Educational Leadership certificate through JMU. Lori has been a VAST member for three years after earning her MS Education with Teacher Certification from ODU in 2012. She began her school's robotics program in 2012. LoriAnn was named Science Lead in 2013. She instigated Family STEAM Night, Science Fair, STEM Club, and coding. Lori involves her students and families in citizen science projects and is a Virginia-certified stream monitor. Lori is a Project Lead the Way Launch Teacher, and 2017-18 will be the second year of a generous Leidos grant to help bring science and engineering to the elementary level. She was honored during 2016 by the Prince William County Schools' Spark Foundation's Saluting Our Stars event and by Volunteer Prince William for her work with PWSWCD (Stream Monitor). In 2015, she was named the Air Force Association's Northern Virginia Teacher of the Year and the American Chemical Society's, Virginia Section, Distinguished Elementary Educator of the Year. In August, Lori will be presenting for the third time at Elementary PD Day for the Prince William County Schools science department, and in November at the VAST Conference. Prior to public school teaching, she earned a BS Physics from the University of Washington. Lori is a member of NSTA, ITEEA, VTEEA, VCEC, FLL, ASCD, and TSSUS.

Secretary
Robin W. Curtis, Adjunct Faculty, College of William and Mary School of Education

- Robin has served in many VAST leadership roles including as VAST Secretary (96-98), Vice President (99-00) and President (2002). She served as the NSTA District VIII Director 2006-2009 and served on NSTA Standing Committees and Advisory Boards (2005-Current). Robin is a Lifetime member of VAST and is a member of NSTA. Her honors include King & Queen Teacher of the Year, Shell Science Finalist, PAEMST Honorary Recognition as well as Cambridge Who's Who. Currently Robin is teaching Elementary Science Curriculum and Instruction at The College of William & Mary. Robin authored several articles for The Inquirer, and VAST Journal. Currently, Robin serves as the VAST Secretary and would like consideration for re-election to this position.

Continued next page.

Region 1 Director

Carolyn Elliott, Physical Science Lead Teacher, Goochland Middle School

• Carolyn Elliott says it “has been a pleasure to serve as VAST co-director for Region One for the past two years”. If re-elected, she will focus on continuing to develop a communications network with the Region One membership to provide a forum for sharing teaching strategies and ideas for K-12 science. Region I also has plans to offer professional development field trips for teachers and to continue pursuing partnerships with local science venues. She has worked in the field of public education for 19 years. Her experience includes teaching science at both the high school and middle school levels in three Virginia school systems. Carolyn has served on the Item and Test Review Committee for the 8th grade SOL; developed school curricula for middle school science; and presented at the VAST PDI. Her other experience includes working at the State Council of Higher Education, where she helped develop the public radio program, *With Good Reason*, which features the work of professors from Virginia’s state-supported colleges and universities. She served as host and producer of the program for five years. Carolyn has also taught high school journalism and worked as a freelance health writer. Carolyn’s undergraduate degree is from Miami University in biology education and she earned an MEd in Exceptional Education from James Madison University.

Region 3 Director Co-chairs, Michael Pratt and Diane Clowes

Michael Pratt, K-12 Science Coordinator, Stafford County Public Schools

• Michael Pratte has served as co-director of Region III from 2015-2017. He has taught in Stafford County Public Schools since 1995 and is entering his 5th year as a Learning and Development K-12 Facilitator of Science. His coordinator and facilitator responsibilities have included: planning and implementing multi-day and session math and science PD, hosting county symposiums, offering targeted PD for science teams and colleagues, and the facilitation of field experiences for K-12 learners.

Diane Clowes, Liaison for Secondary Science, Instructional Resource Teacher, Spotsylvania Coounty Public Schools

• Diane Clowes has also served as co-director of Region II from 2015-2017. She is currently the Secondary Science Liaison for Spotsylvania County Public Schools. She is member of the Virginia Science Education Leadership Association (VSELA). An educator for 27 years, Diane has worked at the elementary, middle, and high school levels. In 2011, I was a Virginia state finalist for the Presidential Award for Excellence in Mathematics and Science Teaching and her work creating sustainable and easily replicated Science programs at Ni River Middle school helped the school to become a 2012 Intel School of Distinction. A professional development program Diane created won the Virginia Mathematics and Science Coalition’s “Programs that Work” Award. I have presented science and STEM topics at VETC and NSTA conferences. To promote STEM education in Spotsylvania County and the surrounding region, I am a board member on the Chamber of Commerce’s STEM16 committee. The committee is committed to bringing schools and businesses together to promote STEM teaching and learning in Region 16. Through all her work she strives to improve teaching and learning.

Region 5 Director

Tammy Stone, Science Coordinator, Rockingham County Public Schools

• Tammy Stone is the science coordinator for Rockingham County Public Schools. She is adjunct instructor in Chemistry for James Madison University. Tammy has eighteen years’ experience in science education. Tammy is passionate about environmental education. She serves as a mentor teacher for the Chesapeake Bay Foundation, and is on the board for the Pure Water Forum. Tammy is a member of VSELA (Virginia Science Education Leadership Association) and NSTA (National Science Teacher Association). In 2005, Tammy was honored by VAST for teacher achievement in Chemistry. In 2013, she was honored by the Virginia Chapter of the American Chemical Society with the Franklin D. Kizer Distinguished Chemistry Teacher Award. Tammy has enjoyed being the region 5 Co-director for VAST and hopes to continue her work with region 5 over the next several years. She is running for reelection to be the Region 5 Director for VAST.

Region 7 Director

Donna Rowlett, Biology Instructor, Gate City High School, Scott County Public Schools

• Donna Rowlett has been active in VAST for eight years. Most recently, she co-presented a wetlands session at the last annual PDI and delivered the VAST position statement regarding “Profile of a Graduate” to the August 24, 2016, VDOE Public Meeting held in Abingdon, Virginia. Donna is active in VSELA (Virginia Science Education Leadership Association) where she serves on the Program Committee, having previously served on the Leadership Committee. Donna serves on the board of C.R.E.A.T.E. (Cove Ridge Educational Alliance for Teaching Experientially) at Natural Tunnel State Park, and is a member of Virginia Association for Environmental Education. She has previously served as science department chair of Gate City Middle and High Schools, as well as chair for Scott County Public Schools district science department. Presently, Donna serves as a mentor for new teachers as well as those teachers new to the science classroom. During the 2012-13 school year, Donna participated in the Virginia Initiative for Science Teaching and Achievement (VISTA) Science Coordinator Academy conducted at George Mason University. She is a Project WILD facilitator, and is willing to lead WILD professional development activities in Region VII.

Continued next page.

Ballot Continued

Standard Operating Procedures Change:

ARTICLE XI: Elections

Original

Section 2. Ballots and lists of candidates, including credentials, shall be published in the newsletter at least thirty days prior to the annual meeting. Absentee Ballots must be returned at least one (1) week prior to the annual meeting. Ballots for officer positions will be provided at the annual meeting.

Edited

03. 28.17 Section 2. Ballots and lists of candidates, including credentials, shall be made available in all forms of communication to the membership at least thirty days prior to the annual meeting.

Watch for your invitation to vote via email later this month.

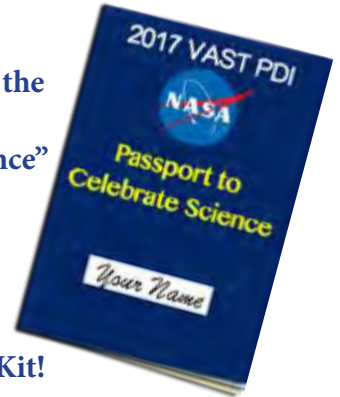


Science Museum of Virginia

Welcome back, teachers! As the new school year gets into full swing, the Science Museum of Virginia has asked that I help highlight a few opportunities that may be of interest to you and your students.

- The Museum's Fall Field Trip Guide has been mailed to schools, but you can access a digital copy on their website. It highlights activities by grade level including a featured adventure, optional add-ons and SOLs covered.
- The Museum is hosting a teacher open house on September 16 from 9:30 a.m. – noon, to give you an opportunity to learn more about field trips and get your questions answered by a member of their education team. To sweeten the deal, you can bring your family with you to enjoy a light breakfast and receive FREE Museum admission.
- Finally, once of the Museum's biggest days is almost here. Every year, thousands of guests enjoy RVA Makerfest, which is hosted at the Museum. On October 7, from 10 a.m. – 5 p.m., guests will enjoy FREE Museum admission and can see over 100 local makers discuss their craft and demonstrate their skills. The event encourages guests to embrace their inner DIY drive and is a great chance for children to see STEAM disciplines at work.

Stop by the NASA Booth at the
VAST PDI to get your
"Passport to Celebrate Science"
and enter to win...



**A FREE NASA
GLOBE Aerosols Teaching Kit!**

Here's how to become eligible:

1. Participate in each of the different types of NASA activities as described in the Passport.
2. Download the GLOBE Observer App in advance & make a cloud observation while in Roanoke.
3. Return to the NASA Booth before departing to drop off your passport to enter the raffle.

Questions: Contact Marilé Colón Robles, Marile.Colon-Robles@nasa.gov

VAST Members!

We need your Active Input!!!!

Get involved:

- *Add to the website
- *Add to the Facebook
- *Do you Twitter?
- *Can you LinkIn?
- *Submit to the Newsletter
- *Write a Journal article
- *Serve on a committee or the Board.

Susan Booth, EdS

As an organization, VAST is always stronger and better with your support!

WE'RE EXCITED TO JOIN YOU AT VAST!



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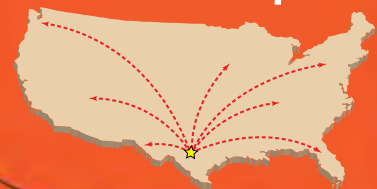


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NASA-related STEM Programs for Virginia Students



The **Virginia Space Grant Consortium** would like to share the following information about the following **FREE** NASA-related programs for Virginia's high school students interested in STEM.

Virginia Aerospace Science and Technology Scholars (VASTS)

is a NASA-based program for 11th /12th grade students and STEM teachers who are interested in aerospace-related science, technology, engineering and/or math (STEM). This course focuses on space mission design and human space flight. Master Teacher positions are also available. VASTS is an interactive online learning course with a space mission design and human space flight theme, culminating in a one-week residential Summer Academy at NASA Langley Research Center in Hampton for those students who qualify. Offered at no cost to the student, VASTS consists of seven modules and a final project to be completed from November 2017 through May 2018 under the guidance of licensed master educators. Based on success in the online coursework, students may be selected to attend a Summer Academy where they interact with NASA scientists, engineers and technologists to design a human mission to Mars. Students who successfully participate in VASTS can apply to earn 2 college credits for the online course and 2 additional credits for the Summer Academy.

Please direct students or other faculty to the website for program information and application, <http://vsgc.odu.edu/VASTS/>. The deadline for student applications is November 12th, 2017.

For more information on this program, please contact:

Ian Cawthray

VASTS Education Program Coordinator

ian.m.cawthray@nasa.gov

Or visit: <http://vsgc.odu.edu/VASTS>

Virginia Earth Systems Science Scholars (VESSS)

is a NASA-based program for 11th/12th grade students and STEM teachers who are interested in Earth Systems Science-related science, technology, engineering and/or math (STEM). This course focuses on Earth Systems Science and the NASA mission that help study these topics. Master Teacher positions are available. VESSS is an interactive, on-line Earth System Science Course featuring NASA scientific research and data. The course is offered for dual enrollment college credit (statewide through TNCC) for high school juniors and seniors in the Spring semester 2018.

By combining detailed Earth System Science content with real world data analysis, students will be exposed to a rigorous course that will work across science disciplines to cultivate 21st Century Learning Skills. The program will focus on preparing students for the rigors of college and careers while allowing them to develop strong science-based skills such as critical thinking and inquiry-based problem solving. VESSS will have two components. The first component is an online sixteen-week

course running from December through April. The second component is a residential NASA Summer Academy at NASA Langley Research Center for students who perform well in the course. Students who successfully participate in VESSS can apply to earn 3 college credits for the online course and 1 additional credit for the Summer Academy.

Please direct students or other faculty to the website for program information and application, <http://vsgc.odu.edu/VESSS/>. The deadline for student applications is November 12th, 2017.

For more information on this program, please contact:

Joyce Corriere

VESSS Education Program Coordinator

Joyce.H.Corriere@nasa.gov

Or visit: <http://vsgc.odu.edu/VESSS/>

Virginia Space Coast Scholars (VSCS) is a NASA-based STEM program for 10th grade students who are interested in NASA's space, Earth, and airborne science-related missions managed by NASA Wallops Flight Facility. Master Teacher positions are available. VSCS is a program focusing on the earth and airborne science, engineering, and technology integral to current missions at NASA Wallops Flight Facility and the Mid-Atlantic Regional Spaceport. This dynamic (and FREE) program, designed by the Virginia Space Grant Consortium (VSGC), inspires students who possess technical and/or scientific interests and are motivated to learn about the many different opportunities that NASA offers. The VSCS program features two key elements: 1.) an on-line science, technology, engineering, and mathematics (STEM) learning experience featuring five modules; and 2.) a seven-day residential Summer Academy at NASA Wallops Flight Facility on Wallops Island, VA where selected scholars will learn first-hand from NASA professionals about cutting edge technologies and missions.

Program Information:

- FREE Program for 10th Grade Students
- Online modules covering NASA aircraft, balloon, and sounding rocket missions launched or managed at Wallops Flight Facility
- Online course runs from December 2017 through April 2018
- Highly successful students will be selected for a week long Summer Academy at NASA Wallops Flight Facility (Chincoteague, VA)
- The deadline for student applications is November 12th, 2017
- <http://vscs.spacegrant.org/> for application and more information

For more information, please contact:

Kirsten Manning, Education Program Coordinator

kmanning@odu.edu



SCIENCE MUSEUM of WESTERN VIRGINIA



The Science Museum of Western Virginia welcomes VAST participants.
Bring your VAST badge on November 16, 17, or 18 to enjoy
FREE admission to the museum!



One Market Square SE, Suite 4 | Roanoke, VA 24011 | 540.342.5710 | www.smwv.org



More Opportunities from The Virginia Space Grant Consortium (VSGC)

The Virginia Space Grant Consortium (VSGC), through the GeoTED-UAS project, **will sponsor three educators to attend the national M-STEM conference hosted by Thomas Nelson Community College** and coordinated by the National Resource Center for Materials Technology Education (MatEdU) which is headquartered at Edmonds Community College. See below for more information about M-STEM.

This is a competitive sponsorship that requires that selected educators attend the Unmanned Aircraft Systems (UAS) track on Tuesday during the Conference. Applicants will be selected based on their submission of a letter of interest that indicates how they plan to integrate what they learned into their teaching. Integration of UAS will be especially considered when selecting applicants. Applicants should have a full one-year timeline of integration of content and resources gained from the M-STEM Conference.

Only educators from Virginia high schools and community colleges are eligible to apply.

VSGC will sponsor the full registration cost of \$129 and will pre-register teachers following selection. One requirement of our sponsorship is that you attend the full-day UAS track on Tuesday.

Interested educators should send Chris Carter (cxcarte@odu.edu) your name and full contact info and include a description of what and how you hope to integrate the content of the Conference including integration of UAS into your courses. The more detail and the more you can describe the potential impact at your

institution, the better your application can be reviewed.

Application material must be received by Sept 28. A small report will be required following the conference. It is a competitive sponsorship and we will confirm selections asap.

Virginia Space Grant Consortium (VSGC) and the partners for the VSGC-led GeoTED-UAS project would like to invite you to the Materials in STEM Education (M-STEM) Conference being hosted by Thomas Nelson Community College on Nov 5-7, 2017.

M-STEM brings together students, faculty and business to strengthen understanding of Science, Technology, Engineering and Math (STEM) principles, especially relating to materials science, and to enhance K-20 technology education integration. A unique feature of MSTEM is hands-on, interactive learning which presents information in a way that engages students and teachers.

This is a national materials education conference led and coordinated by the NSF-funded National Center for Materials Education. Members of the GeoTED-UAS project will be leading a full day education track on unmanned aircraft systems (UAS). We encourage you to register to attend. Please see link below for more information and to register.

<http://www.materialsinstem.org/>
Chris Carter, Deputy Director
Virginia Space Grant Consortium (VSGC)

ASM Materials Science Teacher Camps

These happy campers enjoyed a week-long, hands-on, event filled week last August at Highland Springs HS near the Richmond Airport. Many learned about this opportunity at the 2016 VAST in Williamsburg by attending a presentation from Roger Crider, ASM Master Teacher (front row, left).

The ASM Materials Education Foundation supports educators involved in materials, science, and engineering through a free 40-hour materials science workshop called the ASM Materials Camp Teachers

- Are you a high school science, technology, or math teacher?
- Are you looking for new, free, or low-cost lab ideas and experiments?
- Would you like to earn four CEU credits for FREE?
- Most importantly, do you want to engage your students by linking their everyday lives to the larger principles of science and math?



If the answer is yes, then ASM Teachers Camp is for you.

Roger Crider will present a short preview of the camp activities and host an exhibitors booth at the 2017 VAST. See you there!



Celebrate NASA Langley Research Center's (LaRC) Centennial at the 2017 VAST PDI! This once-in-a-life-time exhibit experience lets visitors ride along to discover NASA LaRC's past 100 years of historic accomplishments related to aeronautics, science and space research and exploration. Showcasing a variety of NASA artifacts, audiovisual technology and unique 3D imagery, visitors are immersed in Langley's early beginnings as the first civilian aeronautics lab to becoming the birthplace of the National Aeronautics and Space Administration. Visitors also have an opportunity to go with NASA as we take the next giant leaps - to make airplanes fly faster, cleaner and quieter, to improve our understanding of our home planet, Earth, and to have humans journey to Mars. From their experience, visitors will come away excited about Langley's storied legacy and ready to be a part of its soaring future.

The new GLOBE Observer app will accompany the Centennial Exhibit. Explore and join the GLOBE community by contributing important scientific data to NASA and GLOBE, your local community, and students and scientists worldwide.

In addition, NASA Langley's Office of Education and Science Directorate will team up with fellow educators to demonstrate new activity kits.

- Earth Right Now. Your Planet is Changing.
We're on it.
- Technology. Technology drives exploration.
- ISS, Off the Earth, for the Earth.
- Aeronautics. NASA is with you when you fly.
- Mars. Join us on the journey.
- Solar System and Beyond. NASA:
We're Out There.

**NASA's Centennial Experience Exhibit (including the above features) will be open during VAST PDI exhibit hall hours at the Hotel Roanoke.*

Visit NASA's Centennial Experience Exhibit at VAST:

Thursday, November 16th, 2017

Friday, November 17th, 2017

Saturday, November 18th, 2017

7:00 p.m. - 9:00 p.m.

7:30 a.m. - 10:30 a.m.

12:30 p.m. - 5:30 p.m.

7:30 a.m. - 11:30 a.m.

Future PDIs

2018 DoubleTree by Hilton Hotel, Williamsburg, Nov. 15 - 17

2019 Hotel Roanoke, Roanoke, Nov. 14 - 16

2020 DoubleTree by Hilton Hotel, Williamsburg, Nov. 12 - 14

Friday Night PDI - Auction and DJ

Friday Night - 2017 PDI

November 17, 8:30 pm - 10:00 pm

As in the past, VAST will host the **Auction and DJ on Friday night**, 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. This is also when you can meet your **Regional Director**, at the **Build Event** near the exhibit hall entrance. This event will start Thursday night, with instructions from your Regional Director. Members of each region will be able to contribute to the construction of a structure that will be later tested to failure.

Can your region do it? Can you help your region win “the people’s ovation and fame forever?” Remember, **Region 5** currently holds the title, so bring your best ideas for building a...what? A tower? A bridge? There will be plenty of room, and we’ll extend the time across the PDI for everyone to contribute for the honor of their region. More details will follow, but email your regional director as well to make sure you get the latest updates!



Science Auction Winners



Dancing at the PDI



DJ, Ron Shaneyfelt



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

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!



The Center for Integrative STEM Education: NASA eClips™



Our World **Grades K-5**

This program supplements existing elementary objectives not only in science, technology, engineering and mathematics, but also in reading, writing, and visual and performing arts.



Real World **Grades K-5**

These video segments connect classroom mathematics to 21 century careers and innovations and are designed for students to develop an appreciation for mathematics through real world problem solving.



Launchpad **Grades 9-12**

These video segments support project-based and problem-based learning experiences in science, mathematics, and career and technical education classrooms.

What is NASA eClips™?

NASA eClips™ is a proven and effective multi-media educational program. Since 2008, the National Institute of Aerospace (NIA) has worked with NASA to develop the NASA eClips suite of educational resources, including videos, educator guides, and numerous supporting classroom materials. NIA's Center for Integrative STEM Education continues to produce new resources based on current research and continued needs of the country's K-12 educators. NASA eClips™ is a web-based video and educator resource repository that focuses on grades K-5, 6-8, 9-12 and the general public. These resources are available on-demand to every school in the nation and address the demand for instant information that is engaging, interactive and easily integrated into daily lesson planning.

How can NASA eClips™ enhance my students' learning experience?

The video format arouses students' curiosity and encourages them to ask their own questions. NASA eClips™ help students explore new topics on their own. Video segments can be used to determine students' depth of understanding. Students can design their own video segments modeled after the NASA eClips™ to demonstrate their understanding of concepts taught in the classroom.

How do I get these programs?

Teachers and others can access all NASA eClips™ products on the Internet. Video segments are available at <http://www.youtube.com/NASAEClips>. Video segments with additional teacher materials and program information are available at <https://nasaclips.arc.nasa.gov/>.

Do I need to register to use these programs?

Registration is not needed to use NASA eClips™ materials. Materials are available on demand and free of charge to anyone with Internet access.

How do I use these resources with my students?

Educator guides utilizing NASA eClips™ related activities and educational best practices are available on the website under the "Teacher Toolbox" heading. NASA eClips™ Educator Guides provide examples of ways teachers may effectively use video segments as an instructional tool. Each guide includes instructional objectives, background information, links to video clips, instructions for implementing inquiry-based lessons, additional resources related to the topic and suggestions for extending or modifying lessons. All lessons are presented in the 5-E delivery model and are aligned to national standards for science, math, and technology. There are several engineering challenges to engage students and provide them with opportunities to apply content skills and knowledge in a real-world context.

The Engineering Design Packets are part of the Teacher Toolbox. The elementary and secondary design packets can be used to introduce students to a formal design process. Students answer questions about each step of their design process. A rubric is included to assist with evaluation. These open-ended packets can be applied to any design project and can be used to enhance existing curriculum.

Why does NASA support this program?

For the United States to remain technologically and economically competitive on a global scale, educators and parents must engage and prepare students for careers based on a solid foundation in the sciences, technology, engineering and mathematics, or STEM. This NASA project brings together exciting video segments with educational best practices to inspire and educate students to become 21st century explorers.

Our Lesson Plans Include You

As a first-grade teacher, Heather Waild needed a high-quality, affordable and flexible graduate school. She chose Regent University for its leading-edge, values-based teaching and top online program — as recognized by *U.S. News & World Report*, 2016. With convenient eight-week sessions, Regent helps you earn your degree at your own pace. Let our expert faculty prepare you for the next step in your teaching career.

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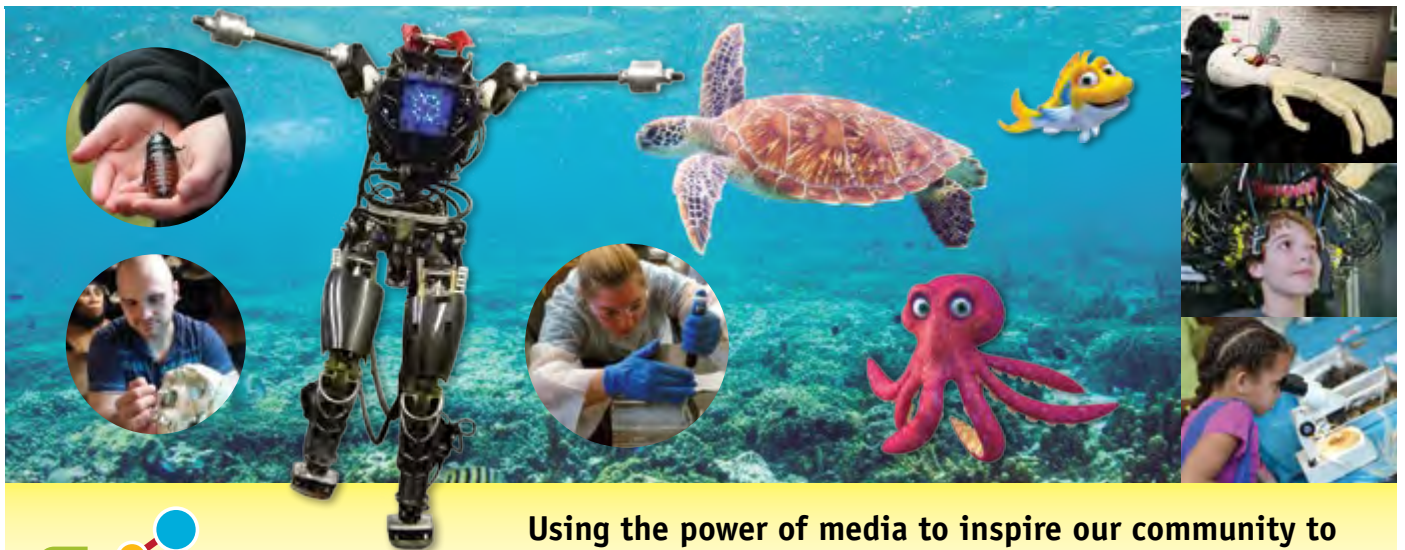
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Virginia Tech's College of Natural Resources and Environment has consistently been recognized as a leading program in North America.

Virginia Tech's Natural Resources Program Ranked No. 1 in Nation for Third Straight Year

For the third year in a row, USA Today College has ranked Virginia Tech as the nation's best for studying natural resources and conservation.

Paul Winistorfer, dean of Virginia Tech's College of Natural Resources and Environment, said, "We are pleased with this recognition of our programs, which reflects the high quality of our faculty, staff, and students, as well as the quality of Virginia Tech as an institution. We are committed to making a difference for our students and also in addressing the many global challenges we face in the management and use of our natural resources."

"Our college has pushed very hard to continually evolve and diversify so that our programs align with the needs and problems facing the natural world," he continued. "Our faculty and staff are the heart of this success, and I am so proud of all they do to make us relevant so we can bring good science to bear upon a sustainable Earth. Advancing the science of sustainability is what we are all about."

USA Today College started ranking natural resources and conservation programs in 2015. No ranking organizations had previously done so because they traditionally focused on study areas offered by 80 or more colleges. There are only about 50 colleges across the United States with comprehensive natural resources programs.

According to USA Today, natural resources and conservation programs have become critical to solving many of the world's pressing issues today, so the publication started evaluating the programs.

"The College of Natural Resources and Environment houses multiple departments that expose students to specializations in fish and wildlife conservation, forest resources and environmental conservation, sustainable biomaterials, and geography," the report stated. "Due to exceptional education, affordable price, and high earnings boost, a degree from Virginia Tech is great choice for any student interested in this field."

The Department of Geography's offerings include a wide academic spread, from remote sensing and cultural geography to meteorology, with top career placements for the college's graduates.

The rankings study also noted that the college "offers hands-on learning opportunities, which allow students to engage in the classroom, while developing analytical and innovative thinking."

"Our research program, one of the most productive and prolific at Virginia Tech, provides excellent opportunities for undergraduate and graduate students to be engaged in our discovery mission," Winistorfer said. "Two of Virginia Tech's top 10 academic departments for total research award dollars are in our college. The Department of Fish and Wildlife Conservation and the Department of Forest Resources and Environmental Conservation are recognized North American leaders in research, graduate education, and experiential research opportunities for undergraduate students."

Leading the way in developing an undergraduate degree in water, the college has seen good success for this first-of-its-kind program in North America. Water is one of the world's most challenging issues, and the new water curriculum cuts across four other Virginia Tech colleges and 13 departments to address the complex problems in an interdisciplinary way. Every angle is looked at, from water science to law, economics, management, and the social sciences.

The college's degree in packaging systems and design in the Department of Sustainable Biomaterials has been one of the fastest-growing new majors on campus and was recently ranked seventh out of the top 20 packaging programs in the United States by Value Colleges. Graduates find many good-paying opportunities in the global packaging sector, which by several measures is the third largest sector on the planet. The green building systems course is teaching students to solve real-world crises; their project this year was designing sustainable housing for refugees in the Middle East.

Recognized globally, the college has a robust international program with study courses, service learning, and undergraduate research on all continents. It has partnerships with institutions all around the world.

"We strive to develop students so that they have depth of knowledge in an area of study, complemented by a breadth in collaborating across disciplines to problem solve with a commitment to service," Winistorfer pointed out. "Our students come to us expecting excellence and a mentoring atmosphere so they can go out into careers making a difference."

Contact: Lynn Davis | davisl@vt.edu | 540-231-6157

Flight

The butterfly counts not months but moments,
and has time enough.
Time is a wealth of change,
but the clock in its parody makes it mere change and no wealth.
Let your life lightly dance on the edges of Time
like dew on the tip of a leaf.

— Rabindranath Tagore

My morning eye caught a pair of small white butterflies as they danced and tumbled, skipping lightly over the dew-drenched honeysuckle vines, rejoicing, I imagined, in the stormy showers which had ended a period of drought. How much we may miss of Tagore's wisdom in our furiously logical classroom pace, where weeks and months move past according to our lessons and plans – or not according to our lessons and plans – missing the poet's wisdom of the wealth of change time brings us and missing utterly the clock's parody as we eschew the wealth and merely dwell with the changes.

For some of us the past summer freedoms from imposed schedules provided us with the opportunity to fill the time with self-imposed schedules as a glass might constrain the water which flows into it. For others of us, the summer time provided wealth, not merely change, and freedom to allow the flowing water to seek its own channels to nourish life and provide the dew on the leaf's edges – a time for imagination to exercise its own wings in flight. Or, as the Gershwin *Summertime* lyrics have it: "One of these mornings you're gonna rise up singing, / And you'll spread your wings and you'll take to the sky."

I was both amused and disheartened to notice just inside the door of Barnes and Noble a few weeks ago a series of titles: "30-Second Religion," "30-Second Quantum Theory," and "30-Second Philosophies." I wondered what the creators of those ideas which have changed the lives of millions would think of this clock-driven parody by those who seem to have taken to heart school children's easy assumption that once facts have been memorized, they also have been understood in our overly-scheduled rush to nowhere. What is it like to dance on the edges of Time, as Tagore would have it?

Imagination is the creative or constructive power of the mind. To ponder over a thought is to imagine with high standards. To dream is to imagine with fantasy. Observation shows that imagining can either perfect a man or degrade him. A day-dreamer who produces little is criticized, but a man whose thoughts and dreams create, develop, and discover better means of living is appreciated. Science has advanced to its present status because man dared to put his imagination to work. He acquires standards of conduct not only from examples of good and bad around him, but by formulating his ideals through his imagination. Man's destiny will not be realized when he learns all the concepts of science and mechanism. He must also create the ideals by which he wishes to live in his hand-made society.¹



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This passage on imagination was written in 1958 by Nanette (Lass) Altheide when she was a high school senior in Lyons Township High School in LaGrange, Illinois for their student publication, *Pen and Inklings*. As Nan Lass formulated her own ideals through her imagination, her words speak to the heart of every teacher who takes as an article of faith our mission to guide and nurture the minds and imaginations of the children entrusted to us. It certainly flies in the face of those who think the limits of teenage wisdom concern only the next opportunistic moment or text message. Her final two lines speak to an earlier 20th Century event.

May 20-21, 2017 witnessed the 90th anniversary of the history-making trans-Atlantic flight by Charles A. Lindbergh in 1927. His forward-looking imagination took him in his custom-designed Ryan M-2 plane across 3610 miles of mostly ocean in 33.5 hours. After an early morning take-off carrying 450 gallons of fuel, the Spirit of St. Louis soared from a muddy Long Island Roosevelt Field and touched down after dark the next day on Le Bourget Field, Paris. Flying at altitudes from only a few feet above the surface to as high as 10,000 feet, and despite dozing off several times, Lindbergh managed to keep awake for 55 hours with no rest – that in itself would amaze us. In only a generation from Wilbur and Orville Wright's famous beginnings on that December morning in 1903, the 25-year-old Lindbergh extended the reach of the human imagination into uncharted territory. Both the Wrights and Lindbergh truly fulfilled Nan Lass's comment of "[imagination] with high standards".

How high? Ask the 18 MIT undergraduates, professors, and alumni who in the mid-1980's embarked on a project to build a human-powered aircraft. As a tribute to the ancient Greek myth of Daedalus' escape from Crete, "Daedalus 88" was built and flown. Weighing only 69 pounds, with a wingspan of 112 feet, the craft was as much glider as propeller-driven. [You can see it yourself at Dulles Airport's B Terminal outside Washington, DC.] A Greek Olympic cyclist powered the plane on its 72.4-mile flight only feet above the crystal Aegean, eastward from Crete to Santorini in just under four hours. Described as an endurance feat similar to two back-to-back marathons, the flight set a record by the World Air Sports Federation for duration and total distance traveled. The plasticity of the human intellect and imagination is

also shown in Lindbergh's life, not only in the spontaneous adjustments he made during his historic flight, but later on the threshold of the space age. A good friend of mine, James O. Taylor, who received his commission to (Air Force) Colonel the same year Lindbergh resigned from his, and who knew Charles Lindbergh personally, shared with me an 8-page handwritten introspective², intended for *Time* magazine, which Lindbergh wrote on 4 July 1969 at age 67, only days before Neil Armstrong and Buzz Aldrin were to place the first human footprint in the dust of our moon. The following passages are in Lindbergh's own words as he reflected back upon his own life and accomplishments, and forward in the Apollo years of our space adventures.

In the '30's I assisted Robert Goddard, the father of spatial conquests. Standing with him on New Mexico plains at the foot of his converted windmill launching tower, it seemed to me that the greatest adventure man could have would be to travel through space.

What motivates man to great adventures? I wonder how accurately these motives can be analyzed even by the participants themselves. When I think of my flights in the early years of aviation, I realize that my motives were as obvious, as subtle and intermixed, as the waves on the oceans I flew over. But I can say [quite] definitely that they sprang more from intuition than from rationality, and that the love of flying outweighed practical purposes – important as the latter often were.

...as the art of flying transposed to a science, I found my interest in airplanes decreasing. Rationally I welcomed the advances that came with self-starters, closed cockpits, radio and automatic pilots. Intuitively I felt revolted by them for they upset the balance between intellect and senses that had made my profession such a joy. And so, as intuition had led me into aviation in the first place, it led me back to an early boyhood interest, the contemplation of life...resulted in my working intermittently for several years in the Department of Experimental Surgery of the Rockefeller Institute for Medical Research...I [later] found the mechanics of life less interesting than the mystical qualities they manifest.

...I had become alarmed about the effect our civilization was having on continents and islands. My military missions took me over the slashed forests, the eroded mountains, the disappearing wilderness and wildlife. I believed some of the policies we were following to ensure our near future strength and survival were likely to lead to our distant-future weakness and destruction...I wanted to regain contact with the mystery and beauty of nature. Wilderness expeditions in Africa, Eurasia, and American Continents brought me to an appreciation of nature's wisdom...resulting [in] a perspective that drove into my bones, as well as into my mind, the fact that in instinct rather than in intellect is manifest the cosmic plan of life.

After a lunch with the Apollo 8 crew in December 1968, Lindbergh witnessed their launch from three miles away. [I recall similar feelings when, decades later, I was present for a space shuttle launch.]

When ignition came, clouds of smoke and flame churned like a storm's convulsions; and when the sound waves struck me, I shook with the earth itself...men actually launched on a voyage to the moon! For a moment, reality and memory contorted and Robert Goddard stood watching at my side. Was he now the dream; his dream, the reality? ...Here, after epoch-measured trials of evolution, earth's life was voyaging to another celestial body.

Decades spent in contact with science and its vehicles have directed my mind and senses to areas beyond their reach. I am now able to see scientific accomplishments as a path, not an end; a path leading to and disappearing in mystery. Science, in fact, forms many paths

branching from the trunk of human progress; and on every periphery they end in [the] miraculous.

Albert Einstein, too, had arrived at a similar conclusion in his famous remark: "The most beautiful thing we can experience is the mysterious. It is the source of all true art and science." Lindbergh continues:

Forty-two years ago, bucking a headwind on a flight in my monoplane between New York and St. Lewis, I tried to look into the future beyond man's conquest of the air. As the wheel had opened land to modern travel, and the hull the sea, wings had opened the relatively universal sky. Only space lay beyond. Could we ever extend our travels into space? ...Who then could foretell that, as soon as 1968, men would hurtle around the moon and back...Following the paths of science, we become constantly more aware of mysteries beyond scientific reach...I believe early entrance to this [space exploration] era can be attained by the application of our scientific knowledge not to life's mechanical vehicles but to the essence of life itself; to the infinite and infinitely evolving qualities that have resulted in the awareness, shape, and character of man. I believe this application is necessary to the very survival of mankind...

Basically, we seem to be retrograding rather than evolving. We have to look about us to verify this fact: to see megalopolizing cities, the breakdown of nature, the pollution of air, water, and earth; to see crime, vice and dissatisfaction webbing like cancer. ... [Whether this continues] depends on our perception and the action we take. Every era opens with its challenges, and they cannot be met successfully by elaborating methods of the past. Our technologies become inadequate; but among our sciences...are those that can point a way, shaping concepts of life, time and space.

That is why I have turned my attention from technological progress to life, from the civilized to the wild. In wilderness there is a lens to the past, to the present, and to the future, offered to us for the looking, a direction, a successful selection, an awareness of values that confronts us with the need for the means of our salvation. Let us never forget that wilderness has developed life, including the human species. By comparison, our own accomplishments are trivial.

One is reminded again of the thought and philosophy of other figures, in this case the 19th Century naturalist/philosopher, Henry David Thoreau and his observations that "in wildness is the preservation of the world," and that "none are so old as those who have outlived enthusiasm." Surely with Lindbergh his enthusiasm and his imagination for multi-dimensional contemplation and adventure continued through several different fields and experiences. What Nan Lass had called man's daring to put his imagination to work can be discovered in Lindbergh's references to the role of "intuition" and rationality in his own accomplishments and musings about the future from his perspective in the late 1960's, only 50 years ago.

Lindbergh's personal evolution through his lifetime seems to mirror Tagore's words on time's wealth of change as he danced lightly on the edge of time. What Lindbergh calls "intuition" and the mystical qualities manifested by the "mechanics of life" is manifest from the words of a high school senior when she wrote of man's "formulating his ideals through his imagination." Transferring these insights to education and schooling in the 21st Century will be the subject of a later column. Flight can be both literal and metaphorical, or, as Lindbergh would have it, both mechanical and mystical.

1. Lass (Altheide), Nanette. "On Imagination," *Pen and Inklings*. 1958. Grateful acknowledgment to Carl Altheide for permission to use her writing.
2. Lindbergh, Charles A. Letter 4 July 1969. Grateful acknowledgment to Col. James Oscar Taylor, Jr for sharing this personal reflection.
3. Photo by Ad Meskens, zie ook: vliegtuigen - Own work by uploader of object in National Air and Space Museum, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=5672293>

George

A VAST Life Member, George Dewey is a former VAST President and former NSTA District VIII Director. He teaches physics in Fairfax County, NBCT since 1999. He can be reached at george.dewey@fcps.edu.



Charles A. Lindbergh

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