



ISSN 1945-7405  
<http://www.VAST.org>  
Check the web for news, conference updates, registration, and forms.

# The Science Educator

Fall 2015 A Publication of VAST, The Virginia Association of Science Teachers Vol. 64, No.2

## Congratulations to the VAST Art Poster First Place WINNERS!



Grades Kindergarten  
through 3rd Grade

Cora Hammer,  
Broadas Wood  
Elementary

Grades 4th through  
6th Grade

Jessica Osuanah,  
Elmont Elementary

Enter your students in the  
2016 VAST Art Contest



Grades 10th through  
12th Grade

Carly Dilday,  
Salem High School



**VISIT EACH  
ORIGINAL  
ART CONTEST  
WINNER  
THROUGHOUT  
THE FLOORS OF  
THE VAST PDI!**

No Entries were submitted for  
Grades 7th - 9th this year.

From the Executive Director



# STOP, DROP AND GOOOOOOOOOOOOOOOOOO!!!!!!!

**This is your VAST Electronic Newsletter making sure you have registered to be part of the VAST experience. We are excited about our Precon, Keynote Speakers, Exhibitors and Hands-on Learning. I just cannot wait until we network during the exhibit hall hours, auction and refreshment times. What better way to make sure our students are learning all they can in the Commonwealth. See you soon!**

*Susan Booth, EdS*



**Next Year's PDI**  
**Doubletree by Hilton Hotel, Williamsburg,**  
**November 17 - 19, 2016**  
**Theme: Faces of Science in Virginia**

## Table of Contents

### Contents:

- |  |  |
|--|--|
| 1. <a href="#">VAST Art Contest Winners</a>                        | 11-14. <a href="#">Science For All, Dewey "Destinations"</a> |
| 2. <a href="#">Executive Director's Message, Table of Contents</a> | 14. <a href="#">USA BioOlympiad: Students in Spaceflight</a> |
| 3. <a href="#">Plan to Attend, Recertification</a>                 | 16. <a href="#">Edge of Yesterday Experiment</a>             |
| 4. <a href="#">DOE Welcomes you to the PDI</a>                     | 17. <a href="#">Virginia Naturally Schools 2015</a>          |
| 5. <a href="#">Friday Night - Auction Request</a>                  | 18. <a href="#">Online STEM Programs</a>                     |
| 6. <a href="#">PreCon</a>  | 20. <a href="#">Every Kid in a Park</a>                      |
| 7-8. <a href="#">VAST Ballots</a>                                  | 21. <a href="#">Corporate Benefactors and Members</a>        |
| 9. <a href="#">PDI Speakers</a>                                    | 22. <a href="#">VAST Leadership, Mission, About VAST</a>     |
| 10. <a href="#">NAE Engineer Girl Contest</a>                      |  |



Jenny Sue Flannagan,  
Ed.D.  
VAST President  
2015

## **VAST Members:**

### **Plan to attend the VAST Annual Meeting.**

Once a year at the PDI VAST holds a business meeting and asks VAST members to attend and participate. This year the meeting will be held at 8:00 am on Friday, November 20, (General Session II). Come to meet your officers and VOTE ! (Absentee ballots are on pages 7 and 8). VAST is your organization and your participation and input is valued.



Kathy Frame  
M.S.  
VAST President-elect  
2015

## ***VAST's Mission:***

# ***Excellence in Science Education through Innovation***

## **Where are You in the Recertification Process?**

### **Make Attendance at the VAST PDI**

### **Part of YOUR Professional Development Plan**

Are you aware of the new Professional Development requirements adopted by the Virginia Department of Education this July that designate the number of points a teacher may earn by attending a workshop, institute or seminar? The new manual defines the activities and the required time spent doing the activity.

Attending the VAST PDI is an effective way to build your professional portfolio and to increase your skills and experience as an educator. Being a presenter earns you even more points. Join your colleagues this fall at the VAST Professional Development Institute (PDI).

### **Virginia Licensure Renewal Manual July 1, 2015**

**Professional Conference** A professional conference is defined as any formal meeting, workshop, institute, or seminar of four or more hours which addresses educational concerns through objectives such as upgrading skills and knowledge, providing information, and/or providing motivating activities for educators or students.

A. Maximum number of points: 45

B. Point value assignment: 1) Participation - 5 points per day 2) Presentation - 15 points per topic presentation.

Points may be assigned for only one presentation on the same topic per validity period.

C. Criteria: 1) Must be four or more hours in length. 2)

Must include only time spent in those portions of the conference program that contribute to the participants' professional knowledge, competence, performance or effectiveness in education.



# COMMONWEALTH of VIRGINIA

## DEPARTMENT OF EDUCATION

P.O. BOX 2120

RICHMOND 23218-2120

**DATE** July 7, 2015

**TO:** Science Educators

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

Barbara Young, Science Specialist  
Office of Science and Health Education

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

**SUBJECT:** 2015 Virginia Association of Science Teachers Professional Development Institute

The Virginia Association of Science Teachers (VAST) has spent the past year planning for the 2015 Professional Development Institute (PDI) that will be held November 19-21, 2015 at the Westfield Marriott, Chantilly, Virginia. This year's VAST PDI supports the Science Standards of Learning (SOL) by offering over 200 concurrent sessions, several field trips, and nationally known keynote speakers. Science educators and administrators will be able to hear exciting speakers, network with fellow science teachers from all over the state, gain new ideas to enhance their content knowledge, and experience cutting-edge technology. The PDI preconference provides educators and administrators the opportunity to participate in a one-day pre-conference titled Uncovering Student Thinking in Science Through Formative Assessment to learn more about this topic as a team or individual.

Educators at every level of science will find many topics of interest with which to build their expertise. VAST, a professional association with over 2000 members, 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.

We encourage science educators to take the opportunity to use the VAST PDI as a part of their 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 opportunity to earn recertification points or college credit.

For more information regarding the Virginia Association of Science Teachers or the annual PDI, please visit [www.vast.org](http://www.vast.org) or contact Susan Booth, Executive Director at [susan.science@gmail.com](mailto:susan.science@gmail.com).



# Special Friday Night Event - 2015 PDI

November 20, 2015, 8:45 pm - 10:30 pm

*Bring items that are of no more use to you or your school to donate to the Friday Night's Auction.*

**Come for the fun, the DJ and the Science Auction!**

Look for items that are of no more use to you or your school to donate to the Friday Night's Auction. If you have a box of glassware and old microscope etc. sitting in the back of your stockroom that has only a future of collecting dust? Maybe you have 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?

**Use your VAST Bucks to bid at the Auction!**

**Get your VAST Bucks FREE at the Exhibit Hall and when you register at the PDI.**

**Bring your donations to the PDI!**

#### Guidelines:

- First, and foremost is safety – if the item is not safe to use, consider disposing of this item another way. Please do not donate such items. However 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 too many safety and storage issues.
- Third, if you bid on something, please plan to use it to teach science and not to sell it at your next yard sale.
- And Fourth, get 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 are taking it home that evening!

# Virginia Tech

## College of Natural Resources and Environment

### Preparing students through career-oriented programs

- |                             |                           |                               |
|-----------------------------|---------------------------|-------------------------------|
| • Meteorology               | • Fish and wildlife       | • International development   |
| • Packaging systems         | • Forestry                | • Conservation and recreation |
| • Sustainable biomaterials  | • Geospatial technologies | • Environmental management    |
| • Environmental informatics | • Environmental education |                               |
| • Water                     | • Geography               |                               |

Want to learn more? Visit us at

**cnre.vt.edu**

## Advancing the Science of Sustainability



**VirginiaTech®**

College of Natural Resources  
and Environment



Dr. Donna R. Sterling

## Uncovering Student Thinking in Science through Formative Assessment

**Location:** Lincoln Forum Auditorium, Westfields Marriott

**Time:** 8:30 a.m.-3:00 p.m.

**Cost:**

\$100 with registration to the VAST PDI

\$120 Preconference Only (Thursday)

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

### Description:

Students come to the classroom with preconceptions about how the world works. There is a growing body of research showing if we do not gather and interpret evidence of students' thinking, they will not build a bridge from their existing ideas to new concepts and information. So how do we uncover student ideas in science – and – what do we do once they're revealed?

Join us as we:

- **Learn** how to use formative assessment probes to uncover and analyze student thinking about key science concepts
- **Practice** formative assessment strategies that inform teaching and deepen students' understanding of science content
- **Apply** techniques that weave assessment into the process of instruction and learning

**Bio of Speaker:** Joyce Tugel provides professional development and consultation services to school districts and science organizations throughout the United States. Her work is primarily focused on the areas of formative assessment, standards and research on learning, and teacher leadership. Joyce is a co-author of two books in the NSTA Press **Uncovering Student Ideas in Science** series and editor of **Notes from the Field – Teaching for Conceptual Change: Uncovering Student Thinking in Science Through Action Research**. Joyce taught high school chemistry and physical science, and was formerly a researcher in environmental biogeochemistry. Joyce serves on the National Science Education Leadership Association's Board of Directors, and has served as the National Science Teachers Association's District II Director and Professional Development Division Director. She is a Fellow of the third cohort of the National Academy for Science and Mathematics Education Leadership. During her accomplished teaching career, Joyce received the Presidential Award for Excellence in Secondary Science Teaching and the Milken Foundation National Distinguished Educator Award.

### Session 2: Short Courses

3:30 p.m.-5:00 p.m.

**Short Course 1:** Engage your students with real world problems. Leaders: Elizabeth Kirk (VCU VISTA) plus an elementary teacher from the VCU VISTA program. Local problems can capture student interest and their desire to know more. Problem-based Learning can be the avenue to guide your design. Come with an idea, and leave with an outline for a unit to use this spring.

**Short Course 2:** Find your balance: Integrating science and math at the middle school level. Can you integrate science and math without losing your focus? In this session, leaders Laura Domalik (VCU) and a middle school teacher will lead you through activities that integrate mathematics and science and will assist you in developing research-based strategies for seamlessly integrating science and mathematics in your instruction.

**Short Course 3:** Authentic assessment in middle and high school: Developing and using rubrics. Session leaders Eric Pyle (JMU) and Anne Petersen (Gloucester County) will lead you through a workshop on developing and using authentic assessments in middle and high school science classrooms. Come with an idea for a rubric or two that you want to work on!

### Session 3: Keynote Session and Opening of the 2015 VAST Professional Development Institute 5:30 p.m.-6:45 p.m.

**Speaker:** Dr. Fredrick Bentley, The Franklin Institute

In this presentation, Dr. Bertley will discuss the progress of science, technology, engineering and mathematics (STEM) and the impact of this scientific and technological revolution on our society. Building off of Moore's Law, the presentation will showcase cutting edge innovations and discoveries from scientists and engineers around the world that can solve some of the world's greatest challenges and provide hope for future generations. From nanotechnology and computer science, to genomics and bioengineering, Bertley will take you through a tour-de-force of technological advances. Despite these incredible STEM resources, and the ever-growing dependency on science and technology, as well as, the increasing career diversity and employment opportunities, there simultaneously exists massive general illiteracy about STEM. Dr. Bertley discusses this duality and challenges us as educators, to think about how to positively impact the current and next generation of students around STEM. The role for teachers in developing basic science literacy skills in the k-16 space will be discussed.



# 2016 VAST Ballot

## President-Elect - Shirley Sybolt ..... Yes No

**Shirley Sybolt** is currently the Immediate Past-President of VAST and a 3rd grade teacher at Cooper Magnet Elementary School in Hampton. This past summer she was the STEM Teacher in Residence (TiR) at the Mariners' Museum in Newport News. Shirley is a National Board Certified Teacher (NBCT) and was the Langley Chapter AFA, Science Teacher of the Year in 2013, the NSTA Distinguished Elementary Science Teacher of the Year in 2003, and the Presidential Award of Excellence for Teaching Elementary Science in 2002. She has a master's degree in Environmental Education K-12 from Christopher Newport University, where she taught as an adjunct professor for 10 years.

## Vice-President - Celeste Paynter ..... Yes No

**Celeste Paynter** has served as a member of the VAST Board since 2006. She served previously on the VAST Board as the Region VIII Director from 2006 - 2012 and as Secretary from 2012 - 2014. She has been teaching various science subjects for the past twenty-five years both on the secondary level as well as in higher education. She is currently an adjunct professor at Southside Virginia Community College.

## Region 1 Director - Joel Fravel ..... Yes No

**Joel Fravel** went through the Virginia Initiative for Science Teaching and Achievement program and then spent the last two years as an Instructional Leader at George Mason University. Joel truly understands how to overcome the obstacles faced by teachers of science; he works with members in his building as well as other teachers in the region to design and implement highly engaging and meaningful lessons that integrate all areas of the curriculum.

## Region 3 Co-Directors - Michael Pratte and Craig Vann ..... Yes No

**Michael Pratte** has taught in Stafford County Public Schools since 1995 and is entering his 3rd year as K-12 Science Coordinator. He is National Board Certified; Vista-NCA trained, and was the recipient of the 2013 Earth Science Award for Outstanding Science Teaching. His coordinator responsibilities include: planning and implementing an annual multi-session 3 day Math & Science Institute, hosting county symposiums, consistent PD for teachers, facilitating field experiences for K-12 learners.

**Craig Vann** has worked at Rodney Thompson Middle School since 2001. He teaches 7th grade Life Science and is in his eleventh year as Department Chair; Craig is also the Lead Science Teacher at his middle school.

## Region 5 Co-Directors - John Almarode and Tammy Stone ..... Yes No

**John Almarode** is a former high school science teacher in Augusta County where he also worked with a STEM outreach program for students in grades PreK - 8. As a faculty member at JMU, he now teaches science methods courses in the inclusive early childhood and elementary education programs. His research focuses on interest and engagement in classrooms, which offers him the opportunity to work with many schools and school districts across Virginia. John holds a Ph.D. and has the distinction of being a Sarah Miller Luck Endowed Professor of Education.

**Tammy Stone** is the science coordinator for Rockingham County Public Schools and works as an adjunct instructor in the chemistry department at James Madison University. Tammy taught high school chemistry for sixteen years prior to becoming the science coordinator. Tammy is proud to work with amazing teachers in both her district and region. Her goal is to support the teachers in the region by striving to hold regional events in science professional development

## Region 7 Director - Diane Tomlinson ..... Yes No

**Diane Tomlinson** is an adjunct professor in the Education Department at Emory & Henry College where she teaches science and mathematics methods courses. She retired from Russell County Schools where she was the elementary/middle school science specialist, grant writer and program director for the school division. She continues to write grants and work as a program evaluator for state-funded grants awarded to universities, colleges and school divisions. She worked for the past three years as a VISTA instructional coach through the Virginia Tech cohort for middle school and secondary level science teachers. In addition, she is Corresponding Secretary for the Virginia Math Science Coalition. Diane is a Ph.D. candidate at Virginia Tech and plans to complete her doctoral program this school year.

*If you will not be present at the Annual Meeting held at the PDI, please cast an absentee ballot. Deadline for receipt of ballots is November 2, 2015. Return your completed ballot to: Julian Barnes, email: [vice.president@vast.org](mailto:vice.president@vast.org) or mail to: Julian Barnes, P.O. Box 823, Salem, VA 24153*



# 2016 VAST Ballot

## Proposed Additions to VAST's Operating Procedures:

At its March 28, 2015 meeting, the VAST Board approved the following:

Adding the following position on the Board:

Article VII, section 1

***The Regional Director Coordinator is appointed by the President and confirmed by the Board.  
The Regional Director Coordinator will be a non-voting member of the Executive Committee and the Board.***

\_\_\_\_\_Approve \_\_\_\_\_Do Not Approve

Article VII, sect 2.A.1.c.viii

***The Assistant Treasurer/PDI Treasurer is selected by the treasurer and approved by the Board.***

\_\_\_\_\_Approve \_\_\_\_\_Do Not Approve

Article VII, sect 2.A.1.c.ix

***The PDI Director is appointed by the President & approved by the Executive Committee; this position is a voting member of the board.***

\_\_\_\_\_Approve \_\_\_\_\_Do Not Approve

At the July 25, 2015 meeting, the VAST Board approved the following change to the mission statement:

### **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.***

\_\_\_\_\_Approve \_\_\_\_\_Do Not Approve

**Deadline for receipt of ballots is November 2, 2015.**

Return your completed ballot to: Julian Barnes, email: [vice.president@vast.org](mailto:vice.president@vast.org)

or mail to: Julian Barnes,  
P.O. Box 823, Salem, VA 24153

Dr. Jenny Sue Flannagan, VAST President



# General Session Speakers



Frederic Bertley



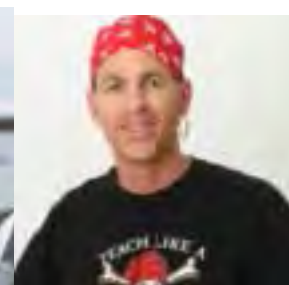
Baruti Kafele



Gwyneth Card



Shah Selbe



David Burgess



*Thursday, General Session I Keynote Speaker  
5:30 p.m. - 6:45 p.m.*

## **Dr. Frederic Bertley**

Senior Vice President of Science and Education, The Franklin Institute

**Education During the Scientific Revolution:  
Paying Attention to the Importance of STEM in  
a Technologically Driven Society**

*Sponsored by the Virginia Space Grant Consortium*

*Friday, General Session II. Keynote Speaker  
8:00 a.m. - 9:30 a.m.*

## **Baruti Kafele**

Principal

Recipient of the National Alliance of Black School Educators Hall of Fame Award, the New Jersey Education Association Award of Excellence and the prestigious Milken National Educator Award and best-selling author, Principal Baruti Kafele is ON FIRE!

**Closing the “Attitude” Gap: How to Fire Up Your  
Students to Strive for Success**

*Friday Night Awards Ceremony Speaker  
7:30 p.m. - 8:30 p.m.*

## **Gwyneth Card, PhD**

Neuroscientist, Group leader, Howard Hughes Medical Institute's Janelia Research Campus

What can you learn by studying fruit flies take flight? Gwyneth Card is trying to learn how the brain makes decisions and then translates those decisions into action.

**Great Expectations**

*Sponsored by the Janelia Research Campus of the Howard Hughes Medical Institute.*

*Saturday, General Session III Keynote Speaker  
8:00 a.m. - 10:00 a.m.*

## **Shah Selbe**, National Geographic Explorer.

Engineer and Conservation Technologist

“I bring an engineering perspective to groups, showing which technologies they could use and exactly how much it will cost.”

**Engineering for Good: Find Your Niche, Help  
the World**

*Sponsored by National Geographic/ CENGAGE, Learning*

*Saturday, General Session IV Keynote Speaker  
8:00 a.m. - 10:00 a.m.*

## **David Burgess**

Consultant and Motivational Speaker  
Burgess Consulting

**Teach Like a PIRATE ! Grrrrrrrrrr!**

A high-energy, interactive, and entertaining speaker who will send you back to class wit renewed energy and enthusiasm. Are you ready for “a unique blend of outrageously energetic performance art and magic, mixed with an inspirational message of how and why to become more passionate in the classroom”.

*Sponsored by the Vernier.*



VAST is proud to present these outstanding speakers. We urge you to attend the VAST PDI General Sessions. Speakers will model their “*Inquiring Minds*” and provide you with inspiration to “Design Inquiring Minds” in your classroom.



The NAE is pleased to announce the annual **EngineerGirl Essay Contest on the EngineerGirl website**. The National Academy of Engineering (NAE) invites students (both boys and girls) in **grades 3-12** to submit an essay about how they would protect the environment and the safety, health, and well-being of the public as a **responsible engineer**.

Cash prizes of **\$500, \$250, and \$100** are available for the best essays in each of 3 age categories. We want to hear from you! Submit your essay by **February 1, 2016** at 6:00 pm EST. (Note the deadline for 2016 has changed from previous years.) Find out more at [www.engineergirl.org/2016contest.aspx](http://www.engineergirl.org/2016contest.aspx)

## 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*, 2015. 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.

**M.Ed. Reading Specialist**  
**M.Ed. Special Education**  
**Ed.D./Ph.D. Special Education**  
**Autism Certificate**

**APPLY TODAY.**  
[success.regent.edu](http://success.regent.edu)  
**888.713.1595**



**REGENT  
UNIVERSITY**

School of Education

Christian Leadership to Change the World

EDU150630



## Destinations

### Working Together<sup>1</sup>

We shape our self  
to fit this world

and by the world  
are shaped again.

The visible  
and the invisible

working together  
in common cause,

to produce  
the miraculous.

I am thinking of the way  
the intangible air

traveled at speed  
round a shaped wing

easily  
holds our weight.

So may we, in this life  
trust

to those elements  
we have yet to see

or imagine,  
and look for the true

shape of our own self,  
by forming it well

to the great  
intangibles about us.

– David Whyte



Walking across the soft humus and leaf-strewn earth in the wood that day, listening to the nesting birds and soft sough of the wind through spring branches, it was easy to recall those famous lines from Longfellow's opening to *Evangeline*: "This is the forest primeval. The murmuring pines and the hemlocks..." There in a small clearing was a carpet of lycopodium and wintergreen running freely across the woodland floor. It was in woods like these that Leon first pointed out to me that American beech which,

when bulldozers had fractured the soil and the silence to cut a mountain road earlier in its life, had reshaped an exposed root into a substantial stem, today a secondary trunk. That old gnarled beech had a choice to make – allow the root thus exposed to perish, or "trust to those elements we have yet to see," using both visible and invisible "working together in common cause to produce the miraculous."



The poet says it best, with rhythm and harmony to remind the scientist in us that invisible water, mineral, and gas have been transformed by the miracle which is life in a tree to shape its own self into new forms. As the great roots have spread out to support the tree, they have extended deeper and deeper to draw up the invisible water table, transpiring the life-giving fluid from its uppermost leaves – all, that is, except for one, one trusting in those elements to form branch instead of root, shaping self to fit its changing world. Thus does the old beech allow the elements in the air, the same molecules which pass over the curved wing of plane or bird, to pass instead through branches and stomata to produce its own miracle of flight, upward this time instead of downward.

In his *Poetics of Music*, Igor Stravinsky has written: “In everything that yields gracefully, G.K. Chesterton says somewhere, ‘there must be resistance. Bows are beautiful when they bend only because they seek to remain rigid. Rigidity that slightly yields, like Justice swayed by Pity, is all the beauty of earth. Everything seeks to grow straight, and happily, nothing succeeds in so growing. Try to grow straight and life will bend you.’” The law of gravitation together with the biochemistry of carbohydrate manufacture and metabolism operate invisibly yet the responses which they effect are molded by unanticipated events. Rigid adherence to principle as circumstances change can lead to premature death or extinction.

In his 2005 book, *Collapse: How Societies Choose to Fail or Succeed*<sup>2</sup>, the Pulitzer-Prize-winning and UCLA professor of geography, Jared Diamond, describes causes for the collapse of societies like the Vikings in Greenland, Easter Islanders, Mayans, the Anasazi, and modern-day Rwandans. Today we seem preoccupied with the historical fallout from cultural, political, and economic factors, overlooking what to him are the misinterpretation and mismanagement of environmental factors. This is not to say he represents a sort of environmental determinist. Rather, he would point out that many societies have collapsed because they have chosen to meet the unexpected or hostile aspects of the world in terms of a “cultural determinism,” an inflexibility arising from a conscious choice to stand on principle instead of practicality. For example, armed with food and social taboos plus a set of survival and social skills which in Norse culture had been essential to survival (cattle-raising, church-building, timber-cutting) the Vikings never assimilated into Inuit culture (caribou and seal hunting, fishing, home-building), had genuine contempt for the Inuit, and maintained trade with Northern Europe exchanging walrus tusks for

linen, wine and silver. Fish were never a part of their diet. Their Greenland colony was extinguished. In Diamond’s words, “The values to which people cling most stubbornly under inappropriate conditions are those values that were previously the source of their greatest triumphs over adversity.”

Richard St. Barbe Baker (1889-1982), known to many globally as the Man of the Trees, has addressed this issue from the perspectives of environmental restoration and reforestation. These lines about farming techniques and erosion remind one of Stravinsky’s writing and Chesterton’s quote: “It is strange that the cultivator has invariably suffered from the influence of straight lines. He is hypnotized by rectilinear culture, without any consideration for relief or gradient. Thus he prepares converging paths where rushing waters come together.”<sup>3</sup> One thinks as well of the disastrous consequences of the Everglades channelization project by the Army Corps of Engineers in the 1940’s where the sea crept in to replace fresh water, or of the ensuing storm damage from similar flood and levee projects affecting the mangroves in the Mississippi delta.

Bringing these thoughts into more modern context, this is what Rita Colwell, former head of NSF, had to say in July 2015 about Marcia McNutt, the nominee for President of the National Academy of Sciences and the first woman to be so chosen: “Climate change, energy, distribution and supply of water, and agriculture – these are the major challenges of the 21st Century, and we’ll have a leader at NAS who understands these.” Of course, she could well have referred to global issues as to national ones. This in itself is significant as every one of these issues is interdisciplinary and international in nature, requiring both broad understanding and teamwork.

“We shape our self to fit this world and by the world are shaped again,” the poet reminds us. Harmony and rhythm are twin aspects of the arts to which poet, painter, or musician are particularly sensitive. Illustrations of these features “working together in common cause” to create the miraculous can be

seen in the lives and work of Vincent van Gogh (1853-1890) and Antonín Dvořák (1841-1904).



In his work, Vincent van Gogh’s signature paintings of nature have borne out his words describing “the emotions that take hold of me in the face of nature.” His paintings, specifically “Starry Night at Saint-Rémy,” “Pine Trees at Sunset,” “Wheatfield Behind St. Paul’s Hospital,” and “Vineyards at Auvers” all show that rhythmic vitality which unites sky, hillsides, rock formations, olive trees and other plants. It is as though, even during the



extreme mental and emotional distress at the end of his short life, the intrinsic harmony and rhythms in life are expressed most vividly. He once wrote to his brother, Theo (with whom he often discussed astronomy), “many things in nature remain parallel.” That is especially evident in his “Rain-Auvers” where the horizontal brush strokes of fields, cypress trees and grain complement the diagonals of sky and verticals of falling rain. In the 1890’s the American painter, George Inness, described the “great spiritual principle of harmony – harmony in form, harmony in color, the general harmony arising from the nature of things to one another.”

Like the downward destiny of the root of the old beech tree, the Bohemian composer, Antonín Dvořák, was destined to follow his father’s profession to become a butcher, though in his late teens he was allowed to study to become an organist. The mid-19th Century European wars and revolutions signaled difficult times for anyone searching for a patron to support his interest and talent in music. Dvořák was in his twenties when he began composing, supporting himself as a church organist, memorizing all orchestral parts of works by Beethoven and Wagner as first violist in a Prague orchestra, and writing out parts by candlelight from the organ late at night. Despite the failure of his first work and cool receptions in Munich and Vienna, he was warmly received in England and America. Dvořák’s “folk tunes” were actually original with him (Slavonic Dances, New World Symphony) and, reversing the tradition of Schumann and Wagner, he wrote the music first for his Stabat Mater (a memorial to his three children who had died in the 1870’s), then set the harmonies and rhythms to the Latin 13th Century Roman Catholic poem. Both in his musical career and in his placing of musical form before text, Dvořák’s life surely represents responses to the molding forces of the world around him.

Artists, composers, or poets, like the old beech tree and its surrounding woodland, have recognized the rhythmic harmony present in the symbiosis between self and world where, like justice and mercy, one is bent by the other whilst trying to grow straight – truly “all the beauty of earth” in Chesterton’s words. As “an inventor of music” (his words), Stravinsky also adds, after the earlier quote:

The faculty of creating is never given to us all by itself. It always goes hand in hand with the gift of observation. And the true creator may be recognized by his ability always to find about him, in the commonest and humblest thing, items worthy of note. <sup>4</sup>

Could this not also describe the creative process in science and in education itself? The gift of observation of the common things has, in many minds, produced great insights: Copernicus and heliocentrism, Newton and the falling apple, Einstein and light, Fleming and antibiotics, Jenner and cowpox, Snow and cholera, Kekule and the benzene ring, Rosalind Franklin’s X-ray diffraction photo of DNA. Like the poet, do we not find in science the “visible and the invisible working together in common cause: often trusting “those elements we have yet to see or imagine?”

What might all this say to us about education? Fareed Zakaria in his recent book, *In Defense of a Liberal Education* <sup>5</sup>, offers

some cogent observations of his own. In this present time when politicians from both parties appear strangely united “that in today’s world, college graduates need to focus on the tools that will get them good jobs,” it would seem a liberal education might be a liability. Subsidies at state universities for liberal arts are being cut in the rush to promote education which might lead to a good job.

Although issued as a defense for an education based on the classics, a phrase from an 1828 Yale report has relevancy today: the goal of a liberal education was “not to teach that which is peculiar to any one of the professions; but to lay the foundation which is common to them all.” In the post-Civil War climate of rapid industrialization, Charles Eliot (a scientist and 40-year President of Harvard University) urged greater freedom of choice for undergraduates in pursuit of a liberal education leaving skills-based education to the graduate level. This freedom of choice for undergraduates persists today, even in the 150-odd colleges with “great books” programs, although few maintain an obligatory core curriculum.

Zakaria emphasizes that one can always find information he or she needs in a book or Google, but “the crucial challenge is to learn how to read critically, analyze data, and formulate ideas – and most of all to enjoy the intellectual adventure...” Historically, culminating perhaps with Darwin’s theory of evolution and the apparent conflict between science and religion, science was left more to scientists with science and technology occupying a more minor part in liberal education. The author, referring to the demands of today’s business leaders for skills increasingly lacking in college graduates, stresses the 21st century significance of a liberal education:

Resting upon the foundation of skill in **reading**, Zakaria isolates three pillars of a mind and attitude which are absolutely essential to survival or success in a world of ceaseless instability and changing needs: **writing** which makes one think; **speaking** which makes one communicate clearly, and love of **learning** which propels the whole process. An example of this creative endeavor can be found in a collaborative revival of liberal education by Yale University and the national University of Singapore, a new college of liberal arts and sciences. In one module, undergraduates find “a strong emphasis throughout on exposing students to scientific methods rather than scientific facts so that – whatever their ultimate major – they are aware of the way in which science works.” Though small, the student body represents 26 countries with a curriculum based on method of inquiry and teamwork.

These are the qualities of a liberal education in the 21st Century where adapting to the sudden and often unexpected changes nationally and globally becomes essential to our very survival. For us all, young persons especially, we need to be alert to “look for the true shape of our own self, by forming it well to the great intangibles about us.” Recall the interdisciplinary nature of the issues Rita Colwell identified as major ones for us today. Every one of them – climate change, energy, distribution and supply of water, agriculture – requires of us a poet’s, an artist’s, a musician’s, and a scientist’s sensitivity to the harmonies and the rhythms of

“the visible and the invisible working together in common cause, to produce the miraculous.”

The fate of an individual or a nation will always be determined by the degree of his or its harmony with the forces and laws of nature and the universe...the fullness of life depends upon man's harmony with the totality of the natural cosmic laws. Our individual evolution is a job that has to be carried on day by day by each individual. It is a lifelong task. <sup>3</sup>

– Richard St. Barbe

1. Printed with permission from Many Rivers Press, [www.davidwhyte.com](http://www.davidwhyte.com). David Whyte, “Working Together”, in *River Flow: New and Selected Poems* (2012). ©Many Rivers Press, Langley, WA, USA.
2. Jared Diamond. *Collapse: How Societies Choose to Fail or Succeed*.

(2005) Viking Press.

3. Richard St. Barbe Baker, selected writings. *Man of the Trees*. (1989) Ecology Action.
4. Igor Stravinsky. *Poetics of Music*. (1970) Harvard University Press.
5. Fareed Zakaria. *In Defense of a Liberal Education*. (2015) WW Norton & Co.

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](mailto:george.dewey@fcps.edu).



USA Biology Olympiad (USABO) Registration Opens!  
You and your students are invited to participate in the 2016 USA Biology Olympiad (USABO). Registration opens October 14, 2015. To register, please visit <https://www.usabo-trc.org/>. Registration closes January 15, 2016. If you have any questions, please contact Kathy Frame, USABO Director, at: [kframe@cee.org](mailto:kframe@cee.org).



2015 Team USA Wins FOUR Gold Medals Aarhus, Denmark



### Major (G5-16) STEM Opportunity for School Districts February 2016 - Student Spaceflight Experiments Program Mission 10 to the International Space Station

The National Center for Earth and Space Science Education and the Arthur C. Clarke Institute for Space Education announce Mission 10 to the International Space Station. A STEM opportunity, for grade 5-16 students. In teams students design and propose real microgravity experiments to fly in low Earth orbit on the International Space Station. The program nurtures ownership in learning, critical thinking, problem solving, navigation of an interdisciplinary landscape, and communication skills – all reflective of the Next Generation Science Standards, the skills needed by professional scientists and engineers, and the skills desired by 21st century employers.

Each participating community will be provided a real microgravity research mini-laboratory capable of supporting a single experiment, and all launch services to fly the experiment to

the International Space Station in Fall 2016, and return is safely to Earth for student harvesting and analysis. A 9-week experiment design competition in each community, held February through April 2016, and locally engaging typically 300 students (if a pre-college focus), allows student teams to design and formally propose real experiments vying for their community's reserved mini-lab on Space Station.

**TIME CRITICAL:** all interested communities are asked to inquire by **November 13, 2015**; this allows schools and districts the time to assess interest with their staff and, if appropriate, move forward with an Implementation Plan. Communities must be aboard by February 15, 2016, for a 9-week experiment design and proposal writing phase from February 22 to April 22, 2016. The flight experiment will be selected by May 26, 2016. Launch of the Mission 10 to ISS “Casper” experiments payload is expected in Fall 2016.

The SSEP Home page, provides an Executive Summary of the Program and the Mission 10 to ISS Flight Opportunity:  
<http://ssep.ncesse.org>

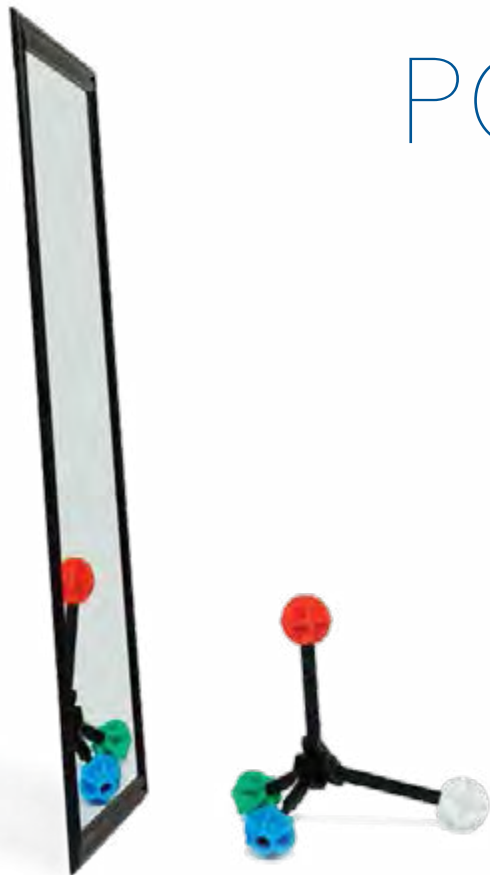
**Contact:** Dr. Jeff Goldstein, SSEP Program Director;  
cell 301-395-0770; [jeffgoldstein@ncesse.org](mailto:jeffgoldstein@ncesse.org)

[Table of Contents](#)

Reflect on our affordable solution...  
our new wireless

# POLARIMETER

for Chromebook™, iPad®, Tablets, and Computers



Measures the optical rotation of chiral compounds.

Ideal for introductory organic and  
biochemistry experiments with chiral  
compounds with no interface required.

[pasco.com/polarimeter](http://pasco.com/polarimeter)



# Edge of Yesterday: Inventing the Future of STEM Learning —Through Story

By Robin Stevens Payes, science interpreter and author, *Edge of Yesterday*

*I am not a STEM person. Or, at least, in school I wasn't. It was not until 20 years into my career creating social marketing and communications campaigns for government agencies and nonprofit organizations that I learned I have a gift for translating technical language in ways that make it understandable to non-technical people.*

That was my big Aha! Once I found I had this magical power to make science, health, education and technology more accessible to lay audiences, it radically transformed my professional work. I could promote evidence-based research and best practices that grow out of the research across media for consumption both online and off.

And not just any audiences, but teens, parents and educators.

I joined the editorial team for the National Institute on Drug Abuse (NIDA) teen-oriented Sara Bellum Blog <https://teens.drugabuse.gov/blog>. I was founding editor-in-chief of LearnNow ([www.learnnow.org](http://www.learnnow.org)), a Web portal on the science of learning for educators and parents. And I have written articles geared to teachers for Houghton Mifflin Harcourt.

## From Science Writer to Science Fiction

But growing up, no one could have prepared me for the adventure of a lifetime: writing a teen time travel adventure novel, *Edge of Yesterday*, about a STEM-smart teen girl whose great ambition in life—to become a modern-day Leonardo da Vinci—makes her determined to learn from the Maestro himself. When Charley Morton finds what she suspects are Leonardo's plans for a time machine that he had neither the science nor the technology to build (but she does!), her middle school science fair project turns into her chance to travel back 500 years to meet her Renaissance hero and interview him about the secrets of his success.

*Edge of Yesterday* is the novel—born of researching the life and science, history, art, music, engineering—and so much more—that the polymath Leonardo accomplished in his lifetime. But also, from those years watching my own children exploring, discovering and reaching for their dreams.

Now, the story has inspired a greater project: using story to inspire young people to be curious about, extend and explore the world to find their own dreams.

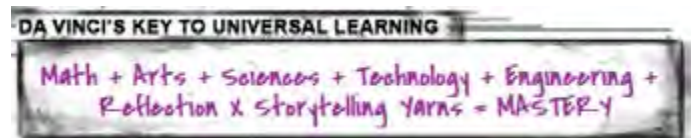
I aim this series particularly to reach those who, like me, may think they “can’t do” math; or “don’t get” the science. To inspire young people who may, instead, be turned on by literature and language, or history and government—or creating virtual worlds, tinkering with Legos and K’nex,

cartooning, or writing music.

It is this passion, and Leonardo's spirit of curiosity, discovery, and innovation that I plan to channel during my session at the VAST PDI, **Promoting STEAM Learning through Story**.

My theory is that there are many entry points to STEM (and STEAM) learning that may light a fire, if we can only spark a tiny flame. And this is something I need the help of educators to test out empirically.

In this alternate reality, in fact, Leonardo's equation could lead today's learners beyond STEM and STEAM to MASTERY:



Leonardo's pursuit of science, technology, engineering, art, and math shows how the unleashing of curiosity, creativity and discovery can lead to a lifetime of learning, innovation, and invention.

To expand the world this story opens up, and to spread the idea of learning like the master, I've created an accompanying interactive Web site with its own story: [www.edgeofyesterday.com](http://www.edgeofyesterday.com). Learning is not enough if one cannot capture engagement and, with a planned game, “Charley's Adventure”, puzzles, quizzicles, creative writing and drawing, articles and other interactive tools based on Learning Like Leonardo, there are enough portals for discovery for any student—young or old.

But we need to do this together. Please join me and let's explore the possibilities from 1-2 pm on Saturday in Jeffersonian Room 3 by going to the *Edge of Yesterday*, where we can begin to spark a brighter tomorrow. See you there!







## 2015 Virginia Naturally Schools School Recognition List



The schools listed below have been recognized for their efforts in supporting environmental conservation and stewardship. The years the schools have been recognized for continued effort is noted beside the name. Schools must submit a plan for the following year and carry it through in addition to meeting additional criteria in order to be recognized in additional years.

Bedford Hills Elementary School, Lynchburg City Schools, 2 years  
Belvedere Elementary School, Fairfax County Schools, 3 years  
Blue Ridge Middle School, Loudoun County Public Schools, 9 years  
Byrd Elementary School, Goochland County Schools, 5 years  
Caroline Middle School, Caroline County Schools, 1 year  
Castlewood High School, Russell County Schools, 5 years  
Cedar Lane Elementary School, Loudoun County Schools, 3 years  
Central Elementary School, Rockbridge County Schools, 4 years  
Central High School, Shenandoah County Schools, 8 years  
Chesapeake Bay Governor's School, Essex County, 9 years  
Churchill Road Elementary School, Fairfax County Schools, 2 years  
Clover Hill High School, Chesterfield County Schools, 8 years  
Coles Elementary School, Prince William County Schools, 4 years  
Cub Run Elem School, Rockingham County Schools, 1 year  
Daniels Run Elementary School, Fairfax County Schools, 9 years  
Dominion High School, Loudoun County Schools, 11 years  
Enderly Heights Elementary School, Buena Vista City Schools, 3 years  
Eureka Elementary School, Charlotte County Schools, 8 years  
Fairfield Elementary School, Rockbridge County Schools, 1 year  
Frederick Douglass Elementary School, Loudoun County Schools, 1 year  
Glenvar High School, Roanoke County Schools, 9 years  
Glenvar Middle School, Roanoke County Schools, 10 years  
Greenbrier Intermediate School, Chesapeake City Schools, 11 years  
Guilford Elementary School, Loudoun County Schools, 4 years  
Harrington Waddell Elementary School, Lexington City Schools, 1 year  
Highland Springs High School, Henrico County Schools, 2 years  
J Michael Lunsford Middle School, Loudoun County Schools, 4 years  
James River High School, Chesterfield County Schools, 7 years  
John Wayland Elementary School, Rockingham County Schools, 16 years

Kempsville Elementary School, VA Beach City Schools, 2 years  
Kersey Creek Elementary School, Hanover County School, 9 years  
Lanier Middle School, Fairfax County Schools, 4 years  
Lee Davis High School, Hanover County Schools, 7 years  
Linville-Edom Elementary School, Rockingham County Schools, 1 year  
Lylburn Downing Middle School, Lexington City Schools, 1 year  
Mill Run Elementary School, Loudoun County Schools, 1 year  
Maury River Middle School, Rockbridge County Schools, 1 year  
Montevideo Middle School, Rockingham County Schools, 1 year  
Mount Daniel Elementary School, Falls Church City Schools, 6 years  
Mountain View Elementary School, Rockbridge County Schools, 2 years  
Natural Bridge Elementary School, Rockbridge County Schools, 1 year  
North Branch School, Independent School Afton, 16 years  
Park View High School, Loudoun County Schools, 5 years  
Parry McCluer Middle School, Buena Vista City Schools, 2 years  
Patrick Copeland Elementary School, Hopewell City Schools, 8 years  
Peak View Elementary School, Rockingham County Schools, 1 year  
Peasley Middle School, Gloucester County Schools, 16 years  
Rivers Edge Elementary School, Henrico County Schools, 8 years  
Robious Elementary School, Chesterfield County Schools, 6 years  
Short Pump Elementary School, Henrico County Schools, 5 years  
Smart's Mill Middle School, Loudoun County Schools, 2 years  
Stafford Elementary School, Stafford County Schools, 9 years  
The Steward School Independent School, Richmond, 2 years  
Sutherland Elementary School, Dinwiddie County Schools, 5 years  
Twin Hickory Elementary School, Henrico County Schools, 5 years  
Ware Academy Independent School, Gloucester, 3 years

For more information about Virginia Naturally School Recognition Program contact:

Suzie Gilley, Virginia Naturally Schools Chairperson, VA Dept. Of Game and Inland Fisheries,

804-367-0188 [Suzie.gilley@dgif.virginia.gov](mailto:Suzie.gilley@dgif.virginia.gov) <http://www.dgif.virginia.gov/education/school-recognition/>



# Online STEM Programs for Secondary Students



**The Virginia Space Grant Consortium (VSGC)** would like to share the following information about the following FREE NASA-related programs for Virginia's High School students interested in STEM.

**Application deadline for all programs: Sunday November 8th, 2015.**

## **Virginia Space Coast Scholars (VSCS) Program:**

The Virginia Space Coast Scholars (VSCS) is a program for High School Sophomores focusing on the science, engineering, and technology integral to current missions at NASA Wallops Flight Facility and the Mid-Atlantic Regional Spaceport.

- Program for Virginia 10th Grade Students only at no cost
- Online modules covering NASA missions launched or managed by NASA Wallops Flight Facility
- Online Course runs from December 2015 through April 2016
- Students who perform well in the course may be selected for an exciting week long Summer Academy at NASA Wallops Flight Facility
- <http://vscs.spacegrant.org/> for application and more information

## **Virginia Aerospace Science and Technology Scholars (VASTS) Program:**

Virginia Aerospace Science and Technology Scholars (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.

- Program for Virginia 11th Grade Students only at no cost
- Online Modules focus on Mars Mission Design and Human Spaceflight
- Online Course runs from December 2015 through May 2016
- Students who perform well in the course may be selected for an exciting week long Summer Academy at NASA Langley Research Center to design a human mission to Mars
- College credits are available at no cost for both the Online Course and the Summer Academy.
- <http://vasts.spacegrant.org/> for application and more information

For more information on this program, please contact: Ian Cawthray, VASTS Education Program Coordinator [ian.m.cawthray@nasa.gov](mailto:ian.m.cawthray@nasa.gov) or visit: <http://vasts.spacegrant.org>

## **Virginia Earth Systems Science Scholars (VESSS) Program:**

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).

- Program for Virginia 11th and 12th Grade Students at no cost
- Online Modules focus on Earth System Science and Satellite Missions
- Online Course runs from December 2015 through May 2016
- Students who perform well in the course may be selected for an exciting week long Summer Academy at NASA Langley Research Center to design a NASA Earth Science Mission
- College credits are available at no cost for both the Online Course and the Summer Academy.
- Apply at: <http://spacegrant.net/apps/?pk=vesss>  
<http://vsgc.odu.edu/VESSS/>



**Question your world.**



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

Special thanks to our premier partner:

**Virginia529**  
College Savings Plan





**[www.everykidinapark.gov](http://www.everykidinapark.gov)**

## **Every Kid in a Park**

An administration-wide initiative, will provide an opportunity for every fourth grade child and equivalent free-choice learner to experience America's public lands throughout the 2015-2016 school year.

The **Every Kid in a Park** initiative is a federal administration-wide effort of the Department of the Interior, the U.S. Department of Agriculture, (U.S. Forest Service), the Department of Defense (Army Corps of Engineers) and the Department of Commerce (National Oceanic and Atmospheric Administration).

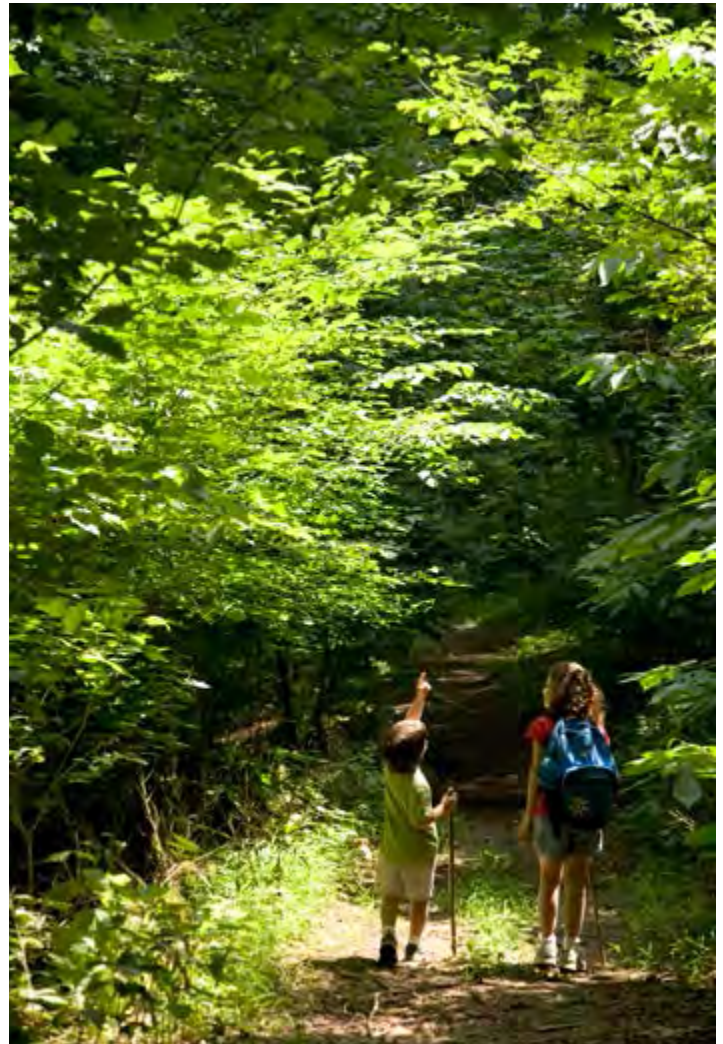
Each eligible student may apply for a 4th grade pass, which will provide access to multiple opportunities on public lands and waters throughout the country from Sept 2015 - August 2016. The awesome part is that the pass includes access for the summer after each child's 4th grade year when most families are vacationing.

### **Resources:**

George Washington and Jefferson National Forests offer great opportunities for families:  
<http://www.fs.usda.gov/gwj/>

Virginia National Wildlife Refuges:  
<http://www.fws.gov/refuges/profiles/ByState.cfm?state=VA>

**If you are a fourth grade teacher in Virginia, this is the year to take your students to a PARK!**



**Children walking on a wooded path. – Credit USFWS photo by Steve Hillebrand**

Lists of national public land and parks in Virginia:

<http://www.nps.gov/state/va/index.htm?program=all>

<http://www.virginiaplaces.org/parktour/natparks.html>

<http://www.virginia.org/directory/outdoorsandsports/nationalparks/>

Virginia has two Army Corps of Engineer sites:  
<http://corpslakes.usace.army.mil/visitors/states.cfm?state=VA>





# “Working Together to Promote Quality Science Education”

*Many thanks for the support of science education by our Corporate Benefactors and Corporate Members.*

## VAST Benefactors



### **Frey Scientific/CPO Science**

P.O. Box 3000  
Nashua, NH 03061  
www.cposcience.com  
www.freyscientific.com

### **Regent University School of Education**

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



### **Delta Education**

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

### **Science Museum of Virginia**

2500 West Broad Street  
Richmond, VA 23220  
www.smv.org



### **Dominion Foundation**

P.O. Box 26666  
Richmond, VA, 23261  
www.dom.com

### **Virginia Space Grant Consortium**

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



### **Jefferson Lab**

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

### **Vernier Software & Technology**

13979 SW Millikan Way  
Beaverton, OR 97005  
www.vernier.com



## VAST Corporate Members

**Associated Microscope P.O.**  
Box 1076  
Elon, NC 27244  
www.associatedmicroscope.com

**Biome in A Box**  
Makers of Worm Watcher  
4401 Wind River Run  
Williamsburg, VA 23188  
www.biomeinabox.com

**BioRad Laboratories**  
2000 Alfred Nobel Drive  
Hercules CA 94547  
www.bio-rad.com/

**Bowman Environmental  
Services, LLC**  
3170 Beaumont Farm Road  
Charlottesville, VA 22901  
BowEnvSer@embarqmail.com

**Busch Gardens/  
Water Country in USA**  
One Busch Gardens Blvd.  
Williamsburg, VA 23187-8785  
www.buschgardens.com  
www.buschgardens.org

**Frey Scientific/CPO Science**  
P.O. Box 3000  
Nashua, NH 03061  
www.cpo.com

**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.fivepondspress.com

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

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

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

**Regent University**  
1000 Regent University Drive  
Virginia Beach, VA 23464  
www.regent.edu

**Teacher Canvas, LLC**  
P.O. Box 7682  
Hampton, VA 23666  
www.teachercanvas.com

**Virginia Junior Academy  
of Science**  
2500 W. Broad Street  
Richmond, VA 23223  
www.vjas.org

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

## 2015 VAST Leadership



### President

Dr. Jenny Sue Flannagan  
757-531-5057  
president@vast.org

### Immediate Past President

Shirley Sypolt  
757-826-3573  
past.president@vast.org

### President-Elect

Kathy Frame  
703-476-6460  
president.elect@vast.org

### Vice President

Julian Barnes  
540-562-3900  
vice.president@vast.org

### Secretary

Robin Curtis  
757-903-4586  
secretary@vast.org

### Treasurer

Jimmy Johnson  
804-752-7727  
treasurer@vast.org

### Editor Science Educator

Jean Foss  
434-973-3709  
newsletter@vast.org

### Executive Director

Susan Booth  
757-897-3104  
executive.director@vast.org

### 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](mailto:membership@vast.org)

### VAST Regional Directors:

#### Director, Region 1,

TBA  
[region1@vast.org](mailto:region1@vast.org)

#### Director, Region 2, Adrienne Sawyer

757-546-9776  
[region2@vast.org](mailto:region2@vast.org)

#### Director, Region 3, Sherrie Roland and Leslie Lausten

[region3@vast.org](mailto:region3@vast.org)

#### Director, Region 4, Susan Bardenhagen

703-338-9589  
[region4@vast.org](mailto:region4@vast.org)

#### Director, Region 5, Eric Pyle

540-574-0483  
[region5@vast.org](mailto:region5@vast.org)

#### Director, Region 6, Tom Fitzpatrick

540-314-4522  
[region6@vast.org](mailto:region6@vast.org)

#### Director, Region 7, Diane Tomlinson

276-889-4421  
[region7@vast.org](mailto:region7@vast.org)

#### Director, Region 8, Pam Aerni

[region8@vast.org](mailto:region8@vast.org)



Join the VAST community on line. "LIKE" the Virginia Association of Science Teachers so that the latest science educational news will appear on your page.

Region 2 has a new Facebook page. Please visit and join our community at:

<https://www.facebook.com/Region2VAST>.

Please consult the website for up to date information, VAST forms for awards and mini-grants, advertising and current PDI information. [www.vast.org](http://www.vast.org)



VAST's Mission:

***Excellence in Science Education Through Innovation***

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

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