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The Science Educator

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Meet Me Under the Star: Roanoke VAST PDI

Are you ready to go to the Star City in November? Virginia science educators will be traveling to Roanoke in November and are excited to meet colleagues who shared enthusiasm for science.

Why is it called “The Star City of the South”? On top of Mill Mountain an eighty-eight and a half foot tall neon star shines down on the city. You can see it every evening, but just until midnight.

Originally built by the Roanoke Merchants Association in 1949, its purpose was to announce the Christmas shopping season. It was so



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popular that the Chamber of Commerce and the Merchants Association decided to make it a permanent fixture.

The original all white star has changed colors since it was built in 1949. To celebrate the 1976 Bicentennial with the nation, the star was changed to red, white and blue. For nearly six years after September 11, 2001, the star shone red, white, and blue symbolizing national unity. For a month after the Virginia Tech massacre in April 2007, the star was all white to represent a “symbol of hope”. In May 2007 the star returned to red, white and blue, but after a renovation in 2011 the star has returned to its original white.

On Your Way to the PDI with the Three P’s

Pack Your PDI Program - Have you searched the concurrent session files? Go to the VAST website, select the Annual PDI tab and download the Concurrent Session file (updated 10.2.14) and try searching for the sessions you find most interesting. Use the “find - command F” keys in Adobe PDF to search for key words of interest. Make a list of the sessions you wish to attend.

Pack Your Items for the Auction - Start collecting items now to donate to the VAST PDI Auction that will be held on Friday night. (See page 8 for more information.) If you are nearing retirement this is a wonderful opportunity to make your “clutter” useful. Plan to bring a donation, collect VAST Bucks, investigate what others have brought and participate. You may go home with treasures for your classroom!

Pack Your Interests with Great Speakers....

Pack your best dress for the Friday evening. After the ticketed dinner, everyone should attend the Award presentations and General Session 3. *Flip Your Classroom: Reach Every Student in Every Class Every Day*, will be

presented by Jonathan Bergman. Bring your VAST bucks with you so that you will be ready for the Auction and dance that are scheduled immediately afterwards.

Map Your Trip - Use Goggle or other map applications to locate your hotel and map your trip. Input the addresses of your hotel and the Hotel Roanoke to make your arrival and travel in Roanoke easier.

Discover More About Roanoke - Are you bringing your family? How about staying the whole weekend and exploring the area?

The Roanoke Valley Convention & Visitors Bureau :

<http://www.visitroanokeva.com/>

Downtown Roanoke:

<http://www.downtownroanoke.org/>

Roanoke (Wikipedia):

http://en.wikipedia.org/wiki/Roanoke,_Virginia

The Science Museum of Western Virginia:

<http://smwv.org/>

Members Make Memberships



Please consider reaching out to a non-member this year and have them become part of our team. We need you to recruit others to help spread the word of the good things we are doing in our state. Consider this year, extending a membership as a gift that keeps giving.

See you at the PDI where members enjoy membership.

Susan Booth, EdS



Your Help is Needed!

One of the tasks identified at the VAST retreat this summer was to re-write the VAST mission statement. Please select the text of this form and paste it into an email with your choices.

Core Values

For VAST core values, please identify the top 4-5 core values for our organization. Circle your choices.

Mission Statement

Please choose the best Mission Statement for VAST:

1. VAST's Mission is to be a community of science educators who want to inspire students; provide professional development opportunities for teachers to learn science concepts and pedagogy to teach it; form partnerships with businesses, higher education organizations, and government; and to be advocates at the state, county, national, and school level.
2. The Mission of VAST is to Engage, Encourage, and Enrich science education.
3. The Mission of VAST is to Inspire Science Excellence.
4. The Mission of VAST is science education for all.
5. The Mission of VAST is to advance superior science education.
6. Suggest another: _____

- | | |
|-----------------------------|------------------------------|
| Lifelong Learning | Trust |
| Action | Various Backgrounds |
| Synergistic | Creative |
| Knowledge Base | Student Centered |
| Inspire | Best Practices |
| Innovation | Passion |
| Connections | Reflection |
| Adaptable | Networking |
| Honest | Growth |
| Professional | Transparency |
| Use of Scientific Practices | Effectiveness |
| Purposeful | Excellence |
| Quality | Collaboration |
| Excellence | Accessible |
| Supportive and Empowering | Endurance |
| Community | Inclusive |
| Engaged | (add more suggestions below) |

Please click on the link below to go to an interactive form to send your suggestions:
https://docs.google.com/forms/d/1Ypi0MAFcS0fls1YaLiVxsUXWFZCyBDf_rFbwnsq4SI/viewform

Make your tax-deductible gift today. Make a real difference by supporting VA Science Educators!

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From the desk of the VAST President



The Virginia Association of Science Teachers (VAST) is here for you!



Shirley Sypolt, VAST President

VAST Leadership Retreat 2014 Your Organization at Work!

What an awesome year as the President of VAST!

I have enjoyed being your VAST president this past year and I wish you a successful 2014-2015 school year, full of truly awesome “science” moments. This year has been a great learning experience for me. I appreciate all the help and support that I have received from my VAST Board of Directors and I especially enjoyed receiving support and well wishes from our general VAST members. I look forward to seeing each and every one of you at the upcoming state PDI.

If you are not already signed up to attend the VAST PDI (Professional Development Institute) that will be held this November 20-22 at the Hotel Roanoke, please take a moment and go onto the VAST web site and sign up. I look forward to seeing you there!

At the VAST PDI you’ll find lots of great speakers to listen to, general sessions to attend, and concurrent sessions to participate in; there is plenty to do, no matter the age of the students that you work with. While at the PDI take the time to attend sessions and get ideas about how you can spark innovation with your students and enhance their learning about science.

Many of the members of your VAST Board met this past summer at Camp Piankatank in Middlesex County at a VAST Retreat to begin strategic planning to look at how our organization is organized and how we can do a better job of supporting science education in Virginia. A great time was had by all of the participants and we managed to get a great start on looking at how we can improve our organization. As a follow-up to the summer retreat we continued to do more strategic planning at our recent October VAST Board Meeting at the Virginia Museum of Science In Richmond. The strategic planning will be an on-going effort as we move our organization forward, to better serve you, as our members.

Please consider joining our VAST board, either as a visitor or as an official member of our board. If you’re interested and looking for a way to further share your love of science, please contact me at ssypolt@hampton.k12.va.us.

Shirley R. Sypolt

VAST President, 2014



SMOKEY IS COMING TO THE VAST PDI

PLAN TO HAVE YOUR PICTURE TAKEN WITH SMOKEY!

SMOKEY’S STORY

Dressed in a ranger’s hat, belted blue jeans, and carrying a shovel, he has been the recognized wildfire prevention symbol since 1944.

One spring day in 1950 in the Capitan Mountains of New Mexico, a little cub had been caught in the path of the fire. He had taken refuge in a tree that was now nothing but a charred, smoking snag. His climb had saved his life but left him badly burned on the

paws and hind legs. The firefighters removed the little bear cub from the burned tree and a rancher, who had been helping the firefighters, agreed to take the cub home. The cub needed veterinary aid and was flown to Santa Fe where the burns were treated and bandaged. The firefighters who rescued the little bear cub call him Hot Foot Teddy but his name quickly was changed to Smokey Bear.



Ballot

The Nominating Committee presents the following slate of officers for election at the VAST Annual Meeting, Saturday, November 17, 2014 in Roanoke. Elected officers will begin their terms January 1, 2015.

Nominating Committee for 2014: Brita Hampton, Andy Jackson, Eric Pyle, Juanita Jo Matkins, and Shirley Sypolt
Nominating Committee Chair for 2014: Brita Hampton

For President Elect (2015) This officer will become President in 2016

Kathy Frame Yes No

Kathy Frame is a lifetime educator with 15 years of classroom experience in biology and chemistry. She has 25 years of national experience with teachers, students, and the public in microbiology, biotechnology, independent science research and other sciences as a professional curriculum designer and provider, author, and speaker. Her national experience includes nine years as the National Association of Biology Teachers' Director of Education and six years as the Vice President of Education and Your World Editor-in-Chief for the Biotechnology Institute. She is currently the director of the USA Biology Olympiad for the Center for Excellence in Education, president of the Virginia Association of Biology Teachers and director of the Virginia Outstanding Biology Teacher Award. Kathy is a lifetime member of VAST and serves as the Biology Chair on the VAST Board.

For Secretary (2015-2018)

Robin Curtis Yes No

Robin is currently adjunct faculty at the College of William & Mary as a University Supervisor and Instructional Coach. She was the NSTA District VIII Director from 2006-2009. She was a nationally recognized science teacher in 2005 and VAST President in 2002. She has served on several NSTA and VAST committees.

For Director, Region 2 (2015-2017)

Adrienne Sawyer..... Yes No

For Director, Region 4 (2015-2017)

Susan Bardenhagen..... Yes No

Susan is a grade 2-5 elementary and grade 6-8 Math & Science teacher. Susan has been a VAST member since the '80s, PDI presenter, Region 4 Director since 2011, and Regional Director Coordinator since January, 2014; as an Educator Associate of AIAA and Conference Coordinator for AAUW, she coordinates judging of Science Fairs/STEM Festivals. Susan coordinated the Region 4 2012 STEM and 2014 STEAM conferences.

For Director, Region 6 (2015-2017)

Tom Fitzpatrick..... Yes No

Tom is starting his 28th year with Roanoke City Public Schools, twenty-one years as a middle school science teacher and seven years as PK-12 Science Supervisor. He was a Virginia Regional Teacher of the Year in 2006 and he is a state facilitator for Project WILD, Growing up WILD, and Project Learning Tree.

For Director, Region 8 (2015-2017)

Pam Aerni Yes No

Pam is an educator with 23 years of experience teaching science and math in preschool through middle school. She is a former assistant professor in teacher preparation and is passionate about science and math education with others.

Proposed additions to VAST's Operating Procedures:

At its July 26, 2014 meeting, the VAST Board approved the following:

1. A change of the definition of VAST members: "Regular members are those currently in the field of science education or other individuals interested in improving science education."
 Approve Do Not Approve
2. A change in the role of the President Elect: The President Elect shall serve as the co-Chairperson of the standing Conference Committee (working closely with the PDI chair) for the purpose of planning, scheduling, and execution of the conference scheduled for the year of his/her term of office."
 Approve Do Not Approve

If you will not be present at the Annual Meeting, please cast an absentee ballot. Deadline for receipt of ballots is November 2, 2014. Return your completed ballot to: Brita Hampton, 1401 Goose Landing, Virginia Beach, VA 23451



VAST MEMBERS WILL MEET AT THE VAST PDI

You are asked to attend two VAST membership meetings at the PDI in November. The first membership meeting will be held at 8:00 a.m. on Friday, November 21st. On Saturday November 22nd, at the Morning General Session will be the second.

The agendas are as follow:

Friday Agenda Item: Election of VAST Officers for 2015

Saturday Agenda Item: Installation of New VAST Officers for 2015

From Our Nationally Recognized Classrooms to Her Own

Just four years after receiving her master's degree from nationally ranked Regent University, 4th grade teacher LaKeshia Ames was named one of the nation's top educators for 2012. She's the only teacher in Virginia to receive the prestigious National Milken Educator Award for leadership, quality and innovation in education. Discover how Regent's Master of Education programs—recognized by *U.S. News & World Report*—can help you succeed.

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School of Education

VAST PDI 2014 PRECONFERENCE



The VAST Preconference will be value intensive this year. Please make the effort to come to Roanoke on Thursday and stay through Saturday. There will be over a hundred concurrent sessions on Friday and Saturday, but Thursday workshops will offer opportunities for more in-depth learning of skills and experiences.

Pre-Conference Workshop- Thursday November 20, 2014

Dr. Carol Tomlinson

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

Academic diversity is a given in most classrooms today. Students from varied cultures, language groups, and economic strata sit side-by-side and bring with them a broad range of readiness levels or entry points, interests, approaches to learning, and motivations to learn. Understand how in many settings, the goal of teachers is to help the full range of students succeed with complex, high-level curriculum.

Participants will:

- Explore the non-negotiable of effective differentiation using classroom video clips, lesson plans, articles, discussion, and presentation.
- Investigate the implications of those non-negotiable for classroom practice.
- Leave with strategies for developing more challenging and responsive heterogeneous classrooms.

Cost:

VAST Members: \$75

Non-Members: \$95

Students: \$75

(registration required)

Teams: \$150 for 4 (Administrator +3 Teachers)* This price is only for attendance at the pre-conference event.

This price includes a continental breakfast. Lunch will be on your own.



Free Short Course Workshops- Thursday November 20, 2014

3:45 p.m.-5:15 p.m.

• Why are Pencils Yellow? - Elementary Teachers

Presenter: Dr. Jenny Sue Flannagan

Why are pencils yellow? How were diapers made and how do they connect to matter?

Thinking critically begins the moment we become curious, ask questions, and seek to find the answers to questions. Through experiments associated with topics such as matter, electricity, and other great activities, teachers will learn how to build research opportunities to unlock the scientific discoveries of the past. (grade level focus - elementary) Free Materials!

• Who asks the QUESTIONS?- Middle School Teachers

Presenter: Anne Moore

The content may be different, but the inquiry process is the same! Come experience various lessons and topics across the grade levels of middle school that will support teams in building a vertical articulation of inquiry modules. Hands-on activities will guide your tour through general, life, and physical science topics.

• Student Research: Yes, There Is a Role in Today's Classrooms! - Middle/High School Teachers

Presenter: Dr. Julia Cothron

The Next Generation Science Standards advocate scientific research experiences for all students, with such experiences an integral part of course-related classroom and field experiences at the secondary level. Building upon her classic work, Dr. Cothron will offer updated strategies for helping students move from investigation to experimentation, modifying classroom labs to emphasize scientific inquiry practices, a "scientific research brief" to support team mini-projects within the classroom and using multiple forms of assessment to support student growth and success.

Free Short Course Workshops- Thursday November 20, 2014 (continued)

3:45 p.m.-5:15 p.m.

• Leadership Matters:

Building a Differentiated Science Program by Developing Teacher Expertise - Administrators

Presenter: Dr. Kelly Hedrick

If the goal is the development of expertise in responsive teaching, how do we all get there? Some folks will take the expressway, while others need the scenic route. It is important to understand the stages and needs of the learner at every step toward expertise in responsive teaching. Everyone will need support, information, and opportunities for growth along the way. In this session, participants are given a tool for thinking about the journey toward expertise in differentiation and methods for guiding colleagues. For anyone who is responsible for staff development and assisting others in responsive teaching, this session provides a framework for developing expertise in differentiation among a wide range of educators including administrators.

• Inquiry: How Simply Changing the Question Can Shift the Focus - Biology Teachers

Presenter: Stephen Biscottee

Repeat after me: “All students can do inquiry. Inquiry is not a one-time thing. Inquiry increases student interest and learning. I will attend this short course.” The presenter will take the participants through the process of turning a traditional cookbook lab lesson into a student-centered inquiry-based learning opportunity grounded in the Virginia Standards of Learning (and not just the inquiry ones). Working in small groups by content area, participants will develop (and leave with) an inquiry activity for their classroom based on their own standards, resources, and students. Samples for each content area will be provided, but participants are encouraged to bring their own materials (lessons, cookbook labs) to reconstruct.

• Exploring Inquiry with Factors Affecting Enzyme Activity - Biology Teachers

Presenter: Jeremy Dove

In this short course teachers will examine different ways their students can use the various levels of inquiry to explore several factors affecting enzyme function. Teachers will explore how cook book labs can be modified to allow for students to truly “investigate and understand” SOL topics and gain a deeper understanding of content.

• Creating Inquiring Minds in a Limited Time Frame - Chemistry Teachers

Presenter: Tammy Stone

Science teachers know that authentic experiments and experiences are the paramount way to develop critical thinking and foster the nature of science. In today’s age of assessments though, how does a teacher make chemistry real and relevant so that their students are inquiring, and investigating while covering all of the chemistry standards of learning. This session will explore lesson plan ideas and labs that have been successfully used in chemistry classes to help all students inquire and investigate while being successful on the standards of learning.

Free Short Course Workshops- Friday, November 21, 2014

10:00 am.- 12:00 p.m.

• Rigor and Learning Engagement through Quality Curriculum & Instruction - Administrators

Presenter: Dr. Kelly Hedrick

Where do rigor and engagement come from? With science standards as our platform, but we have to align them with big ideas, student-centered learning strategies, and scaffolding techniques to support a range of learner needs. This is a tall order, but completely possible. In fact, when working with a range of learners it is a moral imperative! In this session, participants will identify where big ideas come from through concept-based curriculum and look at a model for aligning worthy learning targets with instructional strategies and scaffolding methods in the science classroom. The result is a rigorous curriculum delivered through differentiated instruction.

• Analyzing Experimental Data: Looking Through Different Lenses - All

Presenter: Dr. Julia Cothron

For years, I’ve listened to their arguments: science teachers say they integrate mathematics in the classrooms, mathematics teachers say “no, it’s not mathematics, its computation”. Building upon her classic work with data analysis, and using recommendations from the Next Generation Science Standards, Dr. Cothron will offer strategies for going beyond algorithmic approaches for data analysis including defending data collection techniques, explaining methods of data analysis, using mathematics and arguing from evidence.

Special Friday Night Event 2014 PDI

November 21, 2014

8:00 pm - 10:00 pm • Auction

**DANCE • DISK JOCKEY
AUCTION
MUSIC • FUN**



SCIENCE AUCTION

How about an 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

Everybody that registers for the PDI will find in their packet a bundle of money! Now mind you, it is not real money! They are VAST Bucks, good only at the auction to be held Friday night, November 9th, during the breaks in the evening mixer. 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:

- (a) Register for the conference,
- (b) Visit the exhibitors during the open hours of the Exhibit Hall up through Friday evening. You may need remind them to give you some VAST Bucks!!
- (c) Take advantage of various activities noted in the program, or
- (d) Donate some items for the auction.

Everytime you do any one of these things you will earn more VAST Bucks to spend!

A FEW RULES TO FOLLOW

- 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!

Position Statement on The Role of the Laboratory in K-12 Science for Your Review

The Role of the Laboratory in K-12 Science

To the VAST membership,

At the May VAST Board meeting, the following position statement was approved. Pursuant to the approved procedures for adopting position statements, the Board now makes the statement available for your review and comment:

The Virginia Association of Science Teachers, Inc (VAST) is a comprehensive professional organization dedicated to the advancement of superior science education in the Commonwealth. Consistent with VAST's mission to promote an environment in which all students experience science, in which teachers provide high quality science instruction, and in which members of the science education community are provided an avenue for communication, it is in the interest of VAST's membership and those whom it serves to have available a clear and comprehensive position statement on the Role of the Laboratory in K-12 Science.

Input from the VAST membership is now requested. After finalizing the draft, a final vote will be made at the annual meeting in November 2014 at the PDI in Roanoke. If accepted it will become a document for teachers, administrators, and school divisions to use to support the essential Role of the Laboratory in K-12 Science.

Virginia Association of Science Teachers Position Statement

The Role of the Laboratory in K-12 Science

Science is not just a body of knowledge that reflects current understanding of the world; it is also a set of practices used to establish, extend, and refine that knowledge.

—*A Framework for K-12
Science Education,*
National Research Council, 2012

Background and Introduction:

The laboratory provides the environment in which all science is studied. Science in this setting is not a check list of items to be covered or content to be mastered. We want students to learn science by doing it rather than by simply reading about it. The usefulness to learning through experiences lies at the heart of what it means to be human; we are wired to learn through the manipulation of objects. The laboratory is the means for the process of inquiry and provides an essential way to show comprehension, understanding, and application of knowledge. In the sense that sound science requires the active participation of the practitioner in discovering and verifying the principles upon which it depends, it could be said that science begins and ends in the laboratory. It involves multiple senses and approaches.

As an organization of, by, and for science teachers, the Virginia Association of Science Teachers (VAST) maintains that the role of developmentally appropriate laboratory explorations is crucial for students to clarify the experiential nature of science. Much of current work in revising science standards and approaches [NRC, 2006; NGSS, 2013; AP Science Revisions, 2012] stresses the importance of engaging students in the process of inquiry including experimental design, data collection strategies, analysis and evaluation of data, and interpretation of scientific explanations and theories. For example, four of the seven overarching practices in Advanced Placement (AP) science revisions involve inquiry-based laboratory (lab) experiences.

VAST also maintains that rigorous inquiry-based experiences provide students the means to develop the essential hands-on practices of science during their K-12 development of critical thinking and problem-solving skills, habits much in demand in today's and tomorrow's world. Moreover, students show improved ability to cooperate and communicate with others, share responsibilities, assume different roles, and contribute and respond to ideas. [NSTA, 2007] Some lab experiences are exploratory in nature while some are confirmatory; however, lab experiences should be neither rote nor tangential to students' understanding of science. Well-designed rigorous laboratory experiences will give students actual exposure to both the empirical and the theoretical facets of science. In addition, students are exposed to the complexity and ambiguity of scientific research as they gain experience in manipulation, appropriate arrangement, and troubleshooting of apparatus. Research has shown that students at all levels learn science best by doing it rather than by being told about it [Donovan, 2005], an appropriate extension of David Kolb's well-known work on learning styles and the learning cycle.

Although demonstrations, computer simulations or analyses of data provided by others have their value, they must not replace the actual process of manipulating appropriate equipment and apparatus, collecting valid data, analyzing results, and communicating findings to others either verbally or in writing. [NRC, 2006] VAST is committed to the importance of making such lab experiences available to all K–12 students regardless of background, ability, or physical or academic need.

Declarations:

Integration of laboratory experiences into the science program:

Students need to understand science is a discipline whose theories and laws are subject to continual experiential examination and verification. Therefore, lab experiences should take a prominent position in any curriculum, serving as the core of every major topic or strand. Consistent with the increased emphasis on laboratory time in the revisions in AP science [College Board, 2012], multiple opportunities must exist for all K-12 students to collect and analyze data in the lab or field on a weekly basis. This is especially true of students enrolled in distance-learning science courses where local school- or laboratory-based opportunities need to be available for frequent hands-on lab experiences. Emphasis should be upon student-structured explorations over teacher-led activities.

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Data Interpretation and Analysis [NRC 2012]:

Meaningful organization and interpretation of data are crucial to the expansion of laboratory experiences into everyday life. This includes:

- Asking questions and defining problems
- Developing mental and conceptual models
- Presenting data to show patterns and relationships
- Communicating these relationships with clarity
- Using mathematical and computational reasoning
- Constructing explanations and designing solutions
- Engaging in arguments from evidence
- Reflecting on significance of data and error analysis.

Structure:

Not only does there need to be sufficient time in the weekly schedule to permit genuine laboratory experience, but class size must be appropriate for the physical arrangement and safety in a class or laboratory. The Virginia Department of Education guidelines as published in *Safety in Science Teaching* recommend a minimum of 4.2 square meters (45 square feet) per student in a laboratory setting. Furthermore, studies have shown a dramatic rise in accident rates where student-teacher ratios exceed 24:1 regardless of physical space [NSELA 2013]. Higher ratios also have a detrimental effect on student-teacher and student-student interactions, both vital components of successful laboratory experiences.

Administrative support:

Administrative support is vital to the effectiveness of K-12 laboratory experience. Supportive measures must take a variety of forms:

- Scheduling (class size and location) must permit adequate time and space for safe and supportive laboratory work. Load limits need to adhere to all fire and occupancy codes.
- Budgetary allowances must exist for provision of sufficient equipment (apparatus, computer hardware, software, and probe-ware) for each student to have a reasonable chance for personal data-gathering.
- Adequate storage space and location of equipment should provide convenient access to all teachers in a team.

- Strong professional development programs should be provided for both pre-service and in-service training. Teachers need both the time and financial support to attend and conduct hands-on experiences either during or after school hours, including the availability of summer workshops.
- Safety training must be provided for teachers and students, including chemical storage and handling, equipment maintenance, and periodic safety checks.
- Liability protection is needed for the teacher as well as the school. [NSTA 2000]

Assessment:

Teachers need the time and training to construct appropriate and challenging authentic assessment vehicles to measure student understanding and interpretation of laboratory experiences. They should emphasize students' ability to communicate results and analyze data and conclusions for peer review in a classroom setting. Students' ability to demonstrate creative solutions and critical thinking is particularly important, the depth depending on their level of proficiency and advancement through the K-12 spectrum. In addition, teachers should review annually the set of laboratory investigations which they have used in order to strengthen, add, or discard exercises based on student success rates in understanding and analyzing data. Success should be measured not only by formative and summative assessment, but also in the setting of lab practica; in all cases both assessment of learning and assessment for learning should occur.

Further Reading:

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4. Donovan, M.S., & Bransfield, J.D. (Ed.). (2005). *How Students Learn*. Washington, D.C.: The National Academies Press.
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Please Send Your Position Statement Comments

VAST members are invited to provide their comments, which will be considered and incorporated as deemed appropriate by the committee for this position statement. All member comments will be filed. Comments will be accepted until November 10th, 2014.

To respond to this position statement, please submit them in writing to the address below:

Email to: George W. Dewey, Committee Chairperson, george.dewey@fcps.edu

Thank you for your time and comments!

In Honor of Dr. Donna Sterling



Born: 1949
Death: June 24, 2014

VISTA and George Mason University reflect upon the life of Dr. Donna Sterling, the principal investigator of VISTA and a professor of science education in the College of Education and Human Development. Sterling died on June 24 at her home in McLean, Virginia, after a battle with pancreatic cancer. She was 65.

Sterling joined the faculty in 1993, and was named a Distinguished Service Professor by the University in 2013, one of only eight to hold this academic honor at Mason. Reserved for outstanding professors whose scholarly and service contributions are far reaching and have had an extraordinary level of impact, the honor is among the highest conferred by the university.

“Dr. Sterling’s research over the course of her career has significantly advanced science education throughout the Commonwealth of Virginia and across the United States,” said Mason President Ángel Cabrera. “We mourn the loss of a leading researcher and educator whose leadership profoundly benefited students and broadened the educational impact of the university.”

Former VAST President, Dr. Don Grimes



Born: December 18, 1942
Death: July 20, 2014

VAST was sad to learn that Dr. Donald R. Grimes, 71, of Penn Laird, passed away Sunday, July 20, 2014 in Harrisonburg. Don was born on December 18, 1942 in Petersburg, VA and was the son of the late Wiley and Dorothy Rigby Grimes. He graduated from the University of Virginia, the University of Arizona, and Virginia Tech.

For over 30 years he taught in the Harrisonburg City Public Schools, Rockingham County Public Schools, Shenandoah County Schools, at JMU, and Virginia Tech and was actively involved in many different educational organizations. He served as VAST President in 1998 and on the VAST Board for several years.

TeacherResources and Opportunities



Save the Date

Physics Professional Development Available

The Virginia Instructors of Physics will be holding a free workshop with a focus on all things rotational! This workshop is designed to assist instructors with the shift from AP Physics B to AP Physics 1 and 2 and the addition of rotational kinematics and dynamics. Save the date for Saturday January 24 at St. Catherine's School in Richmond! Jeff Steele

U.S. National Model STEM Education Program Opportunity

Announcing the Student Spaceflight Experiments Program (SSEP)

Tenth Flight Opportunity

SSEP Mission 8 to the International Space Station, Starting February 2015

This is an opportunity for a School District, or an individual large school, to engage a few hundred students in grades 5-12 in the designing of real microgravity experiments. Students will design experiments for a 'weightless' environment that will be performed on a flight to the International Space Station (ISS).

- **PROGRAM START:** February 23, 2015
- **TIME CRITICAL:** Interested school districts are directed to inquire about the program no later than November 15, 2014.
- **Experiment Design and Proposal Writing Phase:** February 23 - April 24, 2015
- **Flight Experiment Selection:** May 28, 2015
- **Launch of Your Community's Selected Fight Experiment:** Fall 2015

Note: This program is not for an individual class or small group of students.

Contact Dr. Jeff Goldstein, Director of the (501c3 non-profit) National Center for Earth and Space Science Education in the U.S: (<http://ncesse.org>) and the Arthur C. Clarke Institute for Space Education internationally (<http://clarkeinstitute.org>), and creator of the SSEP initiative.

U.S. EPA Launches New Radiation Education Website, RadTown USA

The U.S. Environmental Protection Agency's student-focused radiation website, RadTown, is an interactive, virtual community that provides information for students and teachers about different radiation sources, links to additional information and all new graphics and content. A new addition to RadTown is EPA's Radiation Education Activities for middle and high school students (grades 6-12) that includes lesson plans covering radiation basics, sources of radiation, radiation protection, exposure

The Virginia Junior Academy of Science Scholarships



The Virginia Junior Academy of Science encourages your participation. Please look (<http://www.vjas.org>) at the opportunities that are available to your students. We would like to hi-light the Virginia Environmental Endowment SPECIAL SCHOLARSHIPS. These scholarships are determined by special panels of judges at the VJAS Research Symposium.

THE FRANCES AND SYDNEY LEWIS ENVIRONMENTAL SCIENCE SCHOLARSHIP

Description: This \$14,000 four-year college scholarship may be awarded to the student whose project presented at the VJAS Research Symposium evidences the most significant contribution in the field of Environmental Science. The purpose of the award is to stimulate interest in environmental sciences and to enable promising young students to pursue undergraduate studies in a related field. The Virginia Environmental Endowment (VEE) and the VJAS offer this scholarship in tribute to the outstanding and generous services of VEE Directors Emeriti, Frances A. Lewis and Sydney Lewis.

THE HENRY W. MACKENZIE, JR. ENVIRONMENTAL SCHOLARSHIP

Description: This \$5,000 four-year college scholarship may be awarded to the student whose project presented at the Research Symposium evidences the most significant contribution in the field of Environmental Science dealing with the James River Basin and Chesapeake Bay. The purpose of the award is to stimulate interest in environmental sciences and to enable promising young students to pursue undergraduate studies in a related field. Virginia Environmental Endowment (VEE) and the VJAS offer this scholarship in tribute to the outstanding and generous services of Judge Henry W. MacKenzie, Jr. one of the founding directors of VEE who has a great interest in the James River and the Chesapeake Bay.

versus contamination, uranium mining methods, radon and more. All educational activities are aligned with the Next Generation Science Standards and the Vocabulary Materials are aligned with the Common Core State Standards.

Please visit the all new RadTown USA at

<http://www.epa.gov/radtown/>

If you have any questions or comments, please direct them to Angela Shogren at:

Shogren.angela@epa.gov

Bring Evolution To Your School/Community For Darwin Day 2015!

Interested in bringing cutting-edge evolutionary science to your school and community? Apply to be a stop on NESCent's 2015 Darwin Day Roadshow.

NESCent (The National Evolutionary Synthesis Center) is an NSF-funded evolution research center. To celebrate Charles Darwin's contributions to science and society, we send our scientists on the road every year around "Darwin Day" (the annual, world-wide celebration of Darwin's birthday on Feb. 12th) to talk to students, teachers and the general public about their research and career opportunities in science. Our focus is on small, rural communities (i.e., places that wouldn't likely have a Darwin Day celebration if they weren't a stop on our Roadshow) and any schools with traditionally under-served students. There is no cost to you, the teachers, and we'll even leave you with a collection of evolution teaching resources!

For more information, and to apply to have your school considered, please visit:

<http://roadshow.nescent.org/> or contact Jory Weintraub (jory@nescent.org). Applications are being accepted now through Friday, November 21st.

A VA Geological Survey (DGMR) Request!

We are requesting feedback from K-12 teachers, especially Earth Science Teachers. Please go to the link below for our very brief survey. You will be asked to comment on our services, and you will have an opportunity to request additional services.

<https://www.surveymonkey.com/s/VAGeologicSurvey>

The Division of Geology and Mineral Resources (DGMR) serves as Virginia's geological survey. DGMR performs investigations aimed at reducing risk from geologic hazards and encouraging sustainable development through the wise use of mineral, land, water, and energy resources. In addition to publishing maps and reports, DGMR maintains repositories of geological and geophysical data, as well as rock, fossil, and core samples. With our staff of experienced geoscientists, we are uniquely positioned to provide expert assistance in matters pertaining to the geology and mineral resources of the Commonwealth.

<http://www.dmme.virginia.gov/dgmr/divisiongeologymineralresources.shtml>

DMME: Lorrie.Coiner@dmme.virginia.gov
Division of Geology and Mineral Resources
Virginia Department of Mines, Minerals, and Energy

[Table of Contents](#)

FLOWER GARDEN BANKS

NATIONAL MARINE SANCTUARY



Are You Missing Summer and the Ocean?

We know that heading back to school is sometimes hard for all of you students and teachers out there. But, don't fret, we've got a few items that will help get you back in the school groove in a fun way.

First, practice your Sanctuary ABCs by searching for the letter shapes in images from the sanctuary. After you find the shapes, see if you can identify what objects provided them.

Next, stop by our Students and Teachers pages where we have information and ideas to help you with school projects and planning.

Finally, be sure to check out our Education Documents page to find a variety of activities, lessons, crafts and puzzles that can be incorporated into all sorts of classroom experiences.

So, no more grumbling about being back in school. Just remember, fish are in schools all year round!

<http://flowergarden.noaa.gov>

http://flowergarden.noaa.gov/document_library/eddocs/sanctuaryalphabet.pdf

<http://flowergarden.noaa.gov/education/students.html>

<http://flowergarden.noaa.gov/education/teachers.html>

http://flowergarden.noaa.gov/document_library/edddocuments.html

Get up to Speed on Engineering Design in the Classroom, and the NGSS from WGBH PBS

Are you putting the “E” into your curriculum? Teachers, discover how to implement the Next Generation Science Standards (NGSS) in your curriculum. A webinar on teaching engineering design using digital media resources to meet the NGSS. Presented by Dr. Martha Cyr of Worcester Polytechnic Institute is available for you to view on line. Even if you are not using NGSS, this informal Professional Development webinar will give you ideas and tips for teaching engineering design and using media in the science classroom.

Click the link to view the webinar: <https://wgbh1.adobeconnect.com/a826376135/p94zlla9ljs/?launcher=false&fcsContent=true&pbMode=normal>

The webinar features our collection Teaching NGSS Engineering Design Through Media, available on PBS LearningMedia™. This FREE collection of resources was funded by Raytheon and was developed to help educators introduce NGSS concepts and practices into their classrooms.

Check out the sample resources below, and view the full collection of activities for students grades K-5, 6-8, and 9-12. http://www.pbslearningmedia.org/collection/ngss-eng/?topic_id=893

Designing a Wheelchair for Rugby <http://www.pbslearningmedia.org/resource/adptech12.sci.engin.design.ds302/designing-a-wheelchair-for-rugby/>

U.S. Paralympic athlete and wheelchair rugby player Kerri Morgan asks Design Squad teams to build an automated wheelchair that simulates a defensive player on the attack. The teams use the engineering design process to create adaptive technologies.

Smart Bridges <http://www.pbslearningmedia.org/resource/nsn08.sci.engin.systems.smartbridge/smart-bridges/>

This video resource from NovaScienceNOW looks at two engineering innovations designed to improve structural safety in bridges: sound waves and a paint-on “sensing skin” made of microscopic carbon nanotubes that use electrical currents. Both methods can reveal damage or weaknesses undetected by the human eye.

Questions? Contact Julia Anderson at WGBH. julia_anderson@wbgh.org

The U.S. EPA Launches Radiation Education Website, RadTown USA

The U.S. Environmental Protection Agency's student-focused radiation website, RadTown, has launched with a new look and feel. This interactive, virtual community provides information for students and teachers about different radiation sources, links to additional information and all new graphics and content. A new addition to RadTown is EPA's Radiation Education Activities for middle and high school students (grades 6-12) which includes lesson plans covering radiation basics, sources of radiation, radiation protection, exposure versus contamination, uranium mining methods, radon and more. All educational activities are aligned with the Next Generation Science Standards and the Vocabulary Materials are aligned with the Common Core State Standards.

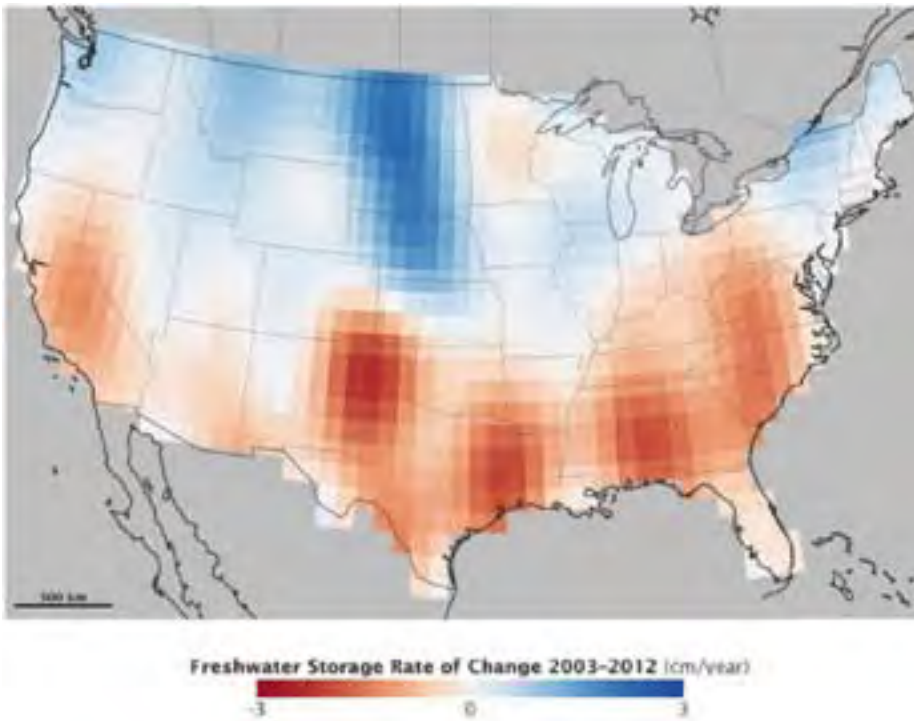
Please visit the all new RadTown USA at:

<http://www.epa.gov/radtown/>

RadTown education activities at:

<http://www.epa.gov/radtown/educational-materials.html>

If you have any questions or comments, please direct them to Angela Shogren at Shogren.angela@epa.gov



Droughts, Floods and the Earth's Gravity, by the GRACE of NASA

By Dr. Ethan Siegel

NASA Earth Observatory image by Jesse Allen, using GRACE data provide courtesy of Jay Famigleitti, University of California Irvine and Matthew Rodell, NASA Goddard Space Flight Center. Caption by Holli Riebeek.

When you think about gravitation here on Earth, you very likely think about how constant it is, at 9.8 m/s^2 (32 ft/s^2). Only, that's not quite right. Depending on how thick the Earth's crust is, whether you're slightly closer to or farther from the Earth's center, or what the density of the material beneath you is, you'll experience slight variations in Earth's gravity as large as 0.2%, something you'd need to account for if you were a pendulum-clock-maker.

But surprisingly, the amount of water content stored on land in the Earth actually changes the gravity field of where you are by a significant, measurable amount. Over land, water is stored in lakes, rivers, aquifers, soil moisture, snow and glaciers. Even a change of just a few centimeters in the water table of an area can be clearly discerned by our best space-borne mission: NASA's twin Gravity Recovery and Climate Experiment (GRACE) satellites.

Since its 2002 launch, GRACE has seen the water-table-equivalent of the United States (and the rest of the world) change significantly over that time. Groundwater supplies are vital for agriculture and provide half of the world's drinking water. Yet GRACE has seen California's central valley and the southern high plains rapidly deplete their groundwater reserves, endangering a significant portion of the nation's food supply. Meanwhile, the upper Missouri River Basin—recently home to severe flooding—continues to see its water table rise.

NASA's GRACE satellites are the only pieces of equipment currently capable of making these global, precision measurements, providing our best knowledge for mitigating these terrestrial changes. Thanks to GRACE, we've been able to quantify the water loss of the Colorado River Basin (65 cubic kilometers), add months to the lead-time water managers have for flood prediction, and better predict the impacts of droughts

worldwide. As NASA scientist Matthew Rodell says, "[W]ithout GRACE we would have no routine, global measurements of changes in groundwater availability. Other satellites can't do it, and ground-based monitoring is inadequate." Even though the GRACE Follow-On satellites will be launched in 2017, providing us with this valuable data far into the future. Although the climate is surely changing, it's water availability, not sea level rise, that's the largest near-term danger, and the most important aspect we can work to understand!

Learn more about NASA's GRACE mission here:
http://www.nasa.gov/mission_pages/Grace/

Kids can learn all about launching objects into Earth's orbit by shooting a (digital) cannonball on NASA's Space Place website. Check it out at: <http://spaceplace.nasa.gov/how-orbits-work/>

Space Place in a Snap: Where Does the Sun's Energy Come From?

On the next page Space Place is doing something a little bit different by providing you with a beautifully informative and educational poster about the mechanics of our sun. This poster accompanies our latest "Space Place in a Snap" animation. This "Snap" series is a set of narrated videos and posters that, together, explain basic scientific concepts in a dynamic new medium. Entertaining in their own right, we also wish to bring this new resource to your attention as an educational tool. In this edition, we address the important question of why our sun is so hot.

To see the video that goes along with this poster, visit:
<http://spaceplace.nasa.gov/sun-heat>

Where does the sun's energy come from?

National Aeronautics and Space Administration



Every 1.5 millionths of a second, the sun releases more energy than all humans consume in an entire year. Its heat influences the environments of all the planets, dwarf planets, moons, asteroids, and comets in our solar system.

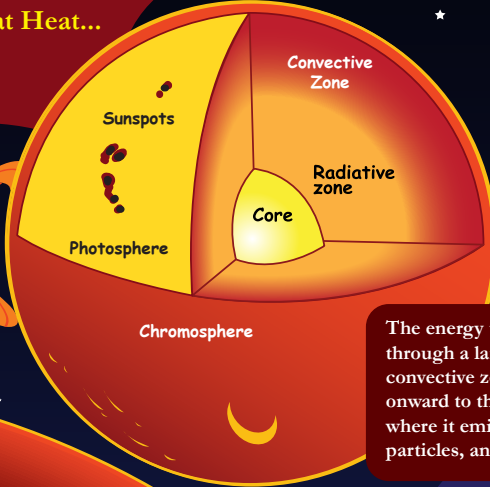
And that light travels far out into the cosmos—just one star among billions and billions.

Create a 'solar wind' that pushes against the fabric of interstellar space billions of miles away.

Allows gases and liquids to exist on many planets and moons, and causes icy comets to form fiery halos.

Powers the chemical reactions that make life possible on Earth.

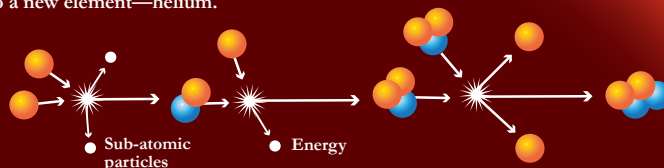
That Heat...



The energy travels outward through a large area called the convective zone. Then it travels onward to the photosphere, where it emits heat, charged particles, and light.

How does a big ball of hydrogen create all that heat? The short answer is that it is big. If it were smaller, it would be just be a sphere of hydrogen, like Jupiter. But the sun is much bigger than Jupiter. It would take 433,333 Jupiters to fill it up!

That's a lot of hydrogen. That means it's held together by a whole lot of gravity. And THAT means there is a whole lot of pressure inside of it. There is so much pressure that the hydrogen atoms collide with enough force that they literally meld into a new element—helium.



Nuclear Fusion

This process—called nuclear fusion—releases energy while creating a chain reaction that allows it to occur over and over and over again. That energy builds up. It gets as hot as 15 million degrees Fahrenheit in the sun's core.



Virginia Space Grant Consortium



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 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.

Virginia Space Coast Scholars is a NASA-based STEM program for 10th grade students who are interested in NASA's space and Earth and airborne science-related missions.

For high school juniors, 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. Offered at no cost to the student, VASTS consists of eight modules and a final project to be completed from December 2014 through May 2015 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 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://www.vasts.spacegrant.org>.

The deadline for the application is November 2, 2014.

For more information on this program, please contact: Mr. Ian Cawthray, VASTS Education Program Coordinator:

ian.m.cawthray@nasa.gov

The Virginia Space Coast Scholars (VSCS) is a program for sophomores 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 and their partners about the latest cutting edge technologies and missions.

Program Information:

- FREE Program for 10th Grade Students
- Online modules covering NASA aircraft, balloon, and rocket missions launched or managed at Wallops Flight Facility
- Online course runs from December 2014 through March 2015
- Highly successful students will be selected for a week long Summer Academy at NASA Wallops Flight Facility (Chincoteague, VA)
- Application Deadline: November 2, 2014
- [http://vscs.spacegrant.org/](http://vscs.spacegrant.org) for application and more information

Thanks in advance for your support. For more information, please contact Elizabeth Joyner, STEM Education Program Coordinator, at: ejoyner@odu.edu

Vernier STEM Teacher Contest

Vernier Software & Technology is now accepting applications for its 2015 Engineering Contest, recognizing STEM teachers for their innovative teaching of engineering concepts and practices using Vernier sensors in the classroom. Three winning teachers — one each in MS, HS teacher, and one college instructor will each receive prizes valued at \$5,500.

Applications for the contest are due by **January 15, 2015**. To apply for the contest, teachers must complete an online application form, produce and submit a short video showcasing their engineering project involving Vernier sensors. The sensors may be used in conjunction with Vernier's Logger Pro software, NI LabVIEW software, LEGO NXT, VEX, or any other system incorporating Vernier sensors. Applications judged on innovation, engineering objectives, and the ease by which others can replicate the project. MS and HS applicants need to explain how the project addresses the engineering practices in the Next Generation Science Standards (NGSS).

The winners will be announced on March 5, 2015. Each winner receives \$1,000 in cash, \$3,000 in Vernier technology, and \$1,500 toward expenses to attend the 2015 National Science Teachers' Association (NSTA) STEM conference in Minneapolis, MN or the 2015 American Society for Engineering Education (ASEE) conference in Seattle, WA.

For information on the 2015 Vernier Engineering Contest and to submit an application, visit:

<http://www.vernier.com/grants/engineering/>

Opportunity Links:

Stanford Hollyhock Fellowship for High School Teachers with two to seven years experience.
<https://cset.stanford.edu/fellowships/hollyhock>

USA Biology Olympiad Registration Opens:
<https://www.usabo-trc.org>.

NASA's BEST activity guides help teach students the engineering design process. The guides accommodate three grade groups (K-2, 3-5 or 6-8)

Please review the NASA BEST Website:

<http://www.nasa.gov/audience/foreducators/best/#.VEAMHb770yA>



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

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www.regent.edu



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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



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www.education.jlab.org

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www.bio-rad.com/

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www.flinnsci.com

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www.lab-aids.com

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www.vjas.org

**Bowman Environmental
Services, LLC**
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Fisher Science Education
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Is Your Address Changing?

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

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region8@vast.org



Join the VAST community on line. "LIKE" the **Virginia Association of Science Teachers** so 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



VAST is a comprehensive educational organization dedicated to the nurturing and advancement of superior science education.

A. The objective of VAST shall be to advance the study of science, to promote excellence in the teaching of science, and to provide an opportunity for communication among science educators in the Commonwealth of Virginia.

B. Mission Statement: On October 19, 1991 the Advisory Board (henceforth the Board of Directors) developed the following statement:

"The Virginia Association of Science Teachers is a comprehensive educational organization dedicated to the nurturing and advancement of superior science education. VAST provides leadership by:

1. promoting the study of science at all grade levels;
2. supporting conditions which ensure an optimal environment for the teaching of science;
3. advocating high quality science instruction for all students at all levels; and
4. providing an avenue for communication among the members of the science teaching community."

This Mission Statement was reaffirmed on July 29, 2000 and March 8, 2014.

Please update any changes in your P.O. or e-mail addresses by sending in a new membership form as an update. P.O. will not forward the newsletter.

Please send articles, letters to the editor, or labs by the submission deadline, January 1, 2015, 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.