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# The Science Educator

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## Nearly 800 Attend the VAST Professional Development Institute, November 17-19, 2011



VAST recognized exemplary contributions to science education through its annual awards program at the November Professional Development Institute (PDI) held in Roanoke. Awards were presented to outstanding educators at all levels. In addition, school administrators and businesses are eligible to be recognized for their support of, and contributions to, quality science education. The recognition consists of an attractive engraved plaque and a reimbursement for PDI expenses up to \$150. The presentations are made as part of the annual PDI. VAST was pleased to recognize the following recipients for 2011. Likewise, Kathy Frame of the National Biology Teachers Association (NABT) presented the Outstanding Biology Teacher Award (OBTA) for Virginia recognizing an outstanding biology educator (grades 7-12). OBTA recipients are honored at a special event during the NABT Professional Development Conference sponsored by BIOZONE; microscopes from Leica Microsystems, Inc.;

and certificates and a complimentary one-year membership from NABT.

Congratulations to the following award winners: 2011 Virginia OBTA: **Stephen Biscott**, Cave Spring High School, Roanoke; VAST Community Partnership: **Big Brothers Big Sisters of The Greater Virginia Peninsula**; VAST Elementary School: **Rebecca W. Schnekser**, Virginia Beach PS; VAST Middle School: **Kathy Applebee**, Suffolk PS; VAST Earth Science: **Joyce Corriere**, Hampton PS; VAST Science Educator (C/U): **Dr. Randy Bell**, University of Virginia; VAST Science Educator (Other): **Cindy Mears**, Nasemond-Suffolk Academy; President's Distinguished Service Award: **Dr. Donna Sterling**, George Mason University; and Outstanding Support for Virginia Science Teachers: **Kip Bisignano**, Delta Education/FOSS. **Robert Benway** from Chesterfield PS, was honored for Physics but was not present.



# VAST ELECTION RESULTS

The following slate of officers were elected at the VAST Annual Meeting, Saturday, November 19, 2011, at the Hotel Roanoke and will begin their terms January 1, 2012.

<b>Brita Hampton</b> - President Elect (2012) (will become President in 2013)	<b>Jerri Piacsesi</b> - Region 3 Director (2012-2013)
<b>Celeste Paynter</b> - Secretary (2012-2014)	<b>Andrew Jackson</b> - Region 5 Director (2012-2013)
<b>Kim Dye</b> - Region 1 Director (2012-2013)	<b>Diane C. Tomlinson</b> - Region 7 Director (2012-2013)

Next Issue of *The Science Educator* will be a “Green” Digital issue. Watch your email on March the 6th! It will also be posted on the VAST website.

## From the Exectutive Director:

### Alphabet Soup

All during the 2011 VAST Professional Development Institute (PDI), I heard STEM (Science, Technology, Engineering and Mathematics), STEAM (Science, Technology, Engineering and Applied Mathematics) and STREAM (Science, Technology, Reading, Engineering, Art, and Mathematics). As I heard these terms, I was filled with visions from plants to trains to waterways. As a science teacher who has heard some of these acronyms, I can only imagine what non-educators are thinking.

All of the disciplines make a difference in education today. Our students will not be able to compete in the global workforce of this century if they are not able to think critically, creatively, or problem solve. Each of these skills can be found in all of the disciplines that make up STEM, STEAM, and STREAM. We should value all the disciplines and show the students how all of these disciplines work together to make them who they are and how they are used to solve problems or questions in our world. The subjects do not work in isolation. At times they do outweigh the other but in the end it is the balance that they must strike. It is the ability for them to work in unison.

I hope that we as educators can do the same and work together to provide the best for all students because when we look into our classroom they are individuals not just students stamped with a letter or a discipline, but a learner. Good luck to all of us as we enter a new year. Hopefully, we will all be going up STREAM.

*Susan Booth*

#### Contents:

VAST Award Recipients	p 1	VJAS	p 14
VAST Election Results	p 2	“Partners in Science”	p15
Executive Director	p 2	Photos of the 2011 PDI	p 16-17
President’s Page	p 3	Teacher Resources	p 18-19
The Missing E - STEM	p 4-5	Space Place: “The Grey Cubical”	p 20
VDOE - Timeline Instruction & Assessment	p 6	Grades 5-12 STEM Program	p 21
Nominations for 2012 SOL Test Review Committees	p 7	“Science for All”, George Dewey	p 22-23
Kid Wind Challenge	p 7	Space Place: “Strange Case: 55 Cancri e”	p 24
NSTA Regional Director, Bonnie Embray	p 9	Mars Science Lab	p 25
Region 2 Director, “Going Upstream”	p 10	Reflections of the National NSTA Congress	P 27
Region 2 Physical Science Night	p 10	Science Museum of Virginia	p 28
Why Join a Professional Organization ?	p 11	VAST Benefactors and Corporate Members	p 29
VAST Journal Call for Submissions	p 11	VAST Leadership	p 30
Green Ribbon Schools	p 12	PDI Friday Night Auction	p 31
PAEMST Awardees	p 12- 13		

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## From the desk of the President

Outreach Initiative for VAST – Superintendents, Principals, and Supervisors, Oh My!



Anyone reading this letter probably knows that, once a year, VAST offers a Professional Development Institute (PDI) for the teachers of Virginia. However, readers might not know that VAST is embarking on outreach beyond the PDI. Two weeks after the VAST PDI in Roanoke, four VAST members stepped out on a journey where VAST had not gone before. The journey began two summers ago when members of the VAST Board determined that we needed to bring administrators and supervisors into our conversations about good science instruction in K-12 schools. A group of five volunteers, Steve Thornton (Past President), Andy Jackson (Region 5 Director), Eric Pyle (Earth Science Chair), Jason Calhoun (VSELA Vice-President) and myself, laid out plans to develop a presentation and take it to conferences and other venues where we hoped to involve others in productive conversation about how to achieve effective science instruction in our schools. After much back and forth, including the development of a slideshow and adoption of a set of three activities for use in the presentation, we took our presentation titled “Moving STEM from Buzzword to Meaningful Science



Slide One from VAST presentation at VASCD, Dec. 2, 2011.

Instruction” on the road for the first time. Our first audience was administrators and supervisors, members of the Virginia Association for Supervision and Curriculum Development (VASCD). STEM (Science, Technology, Engineering, and Mathematics) seemed a good way to spin our message, since administrators all over the nation are hearing of the need to incorporate STEM instruction into K-12 content. It is also time for Virginians to address STEM since that is an emphasis with the Next Generation Science Standards (NGSS) coming out nationally in 2012. According to the Framework document that is serving as the foundation for the NGSS, engineering and engineering tasks should be embedded in K-12 science in science classrooms all over the USA.

Our presentation was a success! The audience was a wide range of administrators and supervisors from across the state, specializing in all areas of the content including reading, special education, social studies, mathematics, and science. We introduced the session with some basic information about inquiry-based science and the importance of supporting the development of critical thinking and higher-level thinking in our students. Then we offered our participants their choice of three activities to join. The activities were divided by grade level range. I led the K-3 activity, which involved investigating factors that affect how wooden race cars travel. We had a blast, and I was reminded of the deeply satisfying nature of scientific investigation. None of the folks in my group were science specialists, and they jumped right into the idea of varying aspects of the design and then testing the effect of their change on the movement of the cars. While we were laughing and racing our cars, another group was working on designing a hair dryer (high school), and yet a third group was trying to determine whether adding salt to a sugar solution changed the solubility of sugar in the liquid (middle school). With 15 minutes left in our session, we practically had to threaten the middle school group with afterschool detention if they did not stop their experiment and join the discussion. They wanted to run some more tests and gather more data! After the session, the VAST team read through the evaluations from the participants --they were uniformly very positive.



Two VASCD members adjust their rubber bands on their cars.

We are planning on presenting our ideas about coordinating science investigations with STEM, K-12, at other conferences throughout Virginia in 2012. If your school system’s administrators are wondering about “STEM” and what this means for your school district, why not suggest they look for a presentation from VAST on this topic, at their next state conference? We are seeking out education professionals in Virginia to have a conversation about this thing called “STEM” and what we can all do, together, to ensure that meaningful science instruction is in our children’s future.

See photos in color! Download newsletter from the VAST web site @ [www.vast.org](http://www.vast.org)!





# The Missing E: Engineering in STEM

## George Meadows

Associate Professor • College of Education  
University of Mary Washington • Fredericksburg, VA



### A Silent E?

Any discussion of STEM education seems to deal comfortably with the idea of the close integration of science, technology, and mathematics, the S, T, and M. The field represented by the third letter in STEM though, E for Engineering, rarely appears in these discussions. The National Academy for Engineering (2010) has even referred to engineering as the “silent E” in STEM.

It’s hard to explain why this would be so. Engineering can be seen as the application of science concepts to solve real world problems. Many teachers have their students engage in the practice of engineering through hands-on projects dealing with the construction of simple and compound machines, demonstrations of force, motion, and energy, and even finding ways to deal with problems revolving around the use of natural resources. We might call it problem solving or constructivism, but engineering methods and ideas are clearly present.

Recent developments in this area seem to indicate that this is an issue that we cannot ignore. In 2009, the Committee on K-12 Engineering Education published *Engineering in K-12 Education: Understanding the Status and Improving the Prospects*, describing the place of engineering in STEM education. This work was followed in 2010 by the National Academy of Engineering’s *Standards for K-12 Engineering Education?* The National Academy noted that while standards exist for three areas in STEM education – science, technology, and mathematics – no such standards exist for engineering. Their report makes several recommendations regarding the development of such standards.

In 2011, the National Research Council, in *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*, strongly emphasized the need for a very close integration of science education and engineering education. Their report recommended that K-12 science education be “built around three major dimensions”:

- Scientific and engineering practices;
- Crosscutting concepts that unify the study of science and engineering through their common application across fields; and
- Core ideas in four disciplinary areas: physical sciences; life sciences; earth and space sciences; and engineering, technology, and the applications of science.

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They further note that “all three dimensions need to be integrated into standards, curriculum, instruction, and assessment.” We should carefully note that the report recommends that “K-12 science education” be built on science and engineering practices. There is no separation of science and engineering.

It seems as though the E will no longer remain silent.

### Finding the missing “E”

I think it is critical that organizations such as VAST take the lead in addressing this issue. We must work with engineering professionals to bring their field into science classrooms – there are very, very few K-12 engineering classrooms. We must make sure that engineering not be seen as just “one more thing” that must be addressed in the classroom. To do this we must provide an understanding of just what the “E” in STEM means, and provide ideas and guidelines in terms of bringing that “E” into the science classroom. Jean Foss, in a recent e-mail, provided a very good way to think about the relationship of science and engineering: “As mathematics is the language of science, engineering is the application of science.” I don’t think we’ve hesitated to build a science – mathematics connection, now it’s time to work on the science – engineering link.

#### Understanding

- An understanding of the basic concepts and ideas of engineering
- An understanding of the relationship between science and engineering; how they are similar, how they differ
- And understanding of the benefits gained by students when engineering is brought into the classroom

We can build this understanding through the following steps:

- Developing curriculum that includes all four STEM areas
- Professional development opportunities that focus on the integration of engineering
- Undergraduate and graduate level coursework that introduces engineering concepts and ideas to pre-service teachers

The references noted above provide an excellent foundation

Continued:

for this work. In addition, important steps have been taken in the development of an integrated science-engineering curriculum. Intel has developed web-based *Design and Discovery* curriculum that closely integrated science and engineering concepts. PBS has a web-site with engineering activities, resources, and video clips taken from their *Design Squad* television series. Many engineering programs already exist for K-12 students. The Sea Perch program, sponsored by the Office of Naval Research, has a number of participant schools, including many in Virginia. A number of similar programs are described in the Engineering in K-12 Education text.

### An Example of Science – Engineering Integration

Building and Testing a Cardboard Crane. This activity, available through the *Design Squad* link below, was developed by *Design Squad* in collaboration with NASA. The challenge is described as follows:

“Design and build a crane and see how heavy a load it can lift. In this challenge, kids follow the engineering design process to: (1) design and build a crane out of cardboard; (2) figure out ways to reinforce the arms so they don’t collapse under a heavy load; (3) build a crank handle; and (4) improve their cranes based on the results of their testing.”

The plan provides detailed descriptions and suggestions as to how the activity would be carried out in a classroom. The activity is developed around the design process as defined by *Design Squad*:

- Identify the problem
- Brainstorm
- Design
- Build – Test & Evaluate – Redesign (a cyclical process)
- Share Solution

Lists of materials needed, a teacher guide, extension activities, and standards links (simple machines, forces and motion) are provided. There is no step-by-step guide – students must be fully involved in all aspects of the process. The teacher’s guide does provide some very good hints about how to get things started. For example, there is a very simple design that could be quickly demonstrated and would provide students with a basic framework for their cranes.

I’ve tested this activity in my elementary science methods class and it works very well. Students appreciate the opportunity to plan, build, and test – coming up with their own ideas, as opposed to following a “recipe” type set of instructions. I did find that demonstrating the basic



mechanism (as suggested in the plan) is important. It does provide a starting point in a process that is unfortunately rarely experienced by students, and as such goes a long way in avoiding frustration.

Students were also very happy to see that something they had designed and built “actually worked.” I’ve found this satisfaction in building and testing in other activities as well, especially one that involves making string phones. Students are very pleasantly surprised that something they built, out of very simple materials, works.

Students also appreciate the use of simple, inexpensive materials (cardboard and string) that are quickly modified and/or replaced. The links to Virginia Science Standards are clear, especially for simple machines and forces and motion, and students can easily describe how such an activity could be assessed and where it might fit in a relevant teaching unit.

### Sources:

National Academies Press. The following resource documents are available for free download as PDF files. To access the files you must create a login for the site (all that is required is an e-mail address and a password.)

- *Engineering in K-12 Education: Understanding the Status and Improving the Prospects*, (2009): Committee on K-12 Engineering Education, [http://www.nap.edu/openbook.php?record\\_id=12635&page=R1](http://www.nap.edu/openbook.php?record_id=12635&page=R1)
- *Standards for K-12 Engineering Education*, (2010), Committee on Standards for K-12 Engineering Education; National Academy of Engineering, [http://www.nap.edu/catalog.php?record\\_id=12990](http://www.nap.edu/catalog.php?record_id=12990)
- *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*, (2011), Committee on Conceptual Framework for the New K-12 Science Education Standards, National Research Council. [http://www.nap.edu/catalog.php?record\\_id=13165](http://www.nap.edu/catalog.php?record_id=13165)

### Engineering Curriculum:

- The website for PBS’ Design Squad show. The site has links for educator resources with free, downloadable PDF materials, video clips, and activities. The emphasis is on designing and building in response to problems. <http://pbskids.org/designsquad/>
- Design and Discovery. An Intel web site. “*Design and Discovery* is an academic enrichment curriculum that engages students in hands-on engineering and design activities that enhance knowledge, and problem solving skill in the areas of science and Engineering.” <http://educate.intel.com/en/DesignDiscovery>

5.



Science Instruction and Assessment Timeline

2010-2011			
	Fall	Spring	Summer
Instruction	Curriculum Framework adopted		Begin planning for development of Enhanced Scope and Sequence Review Committees (anticipated)
	Finalize CF		Finalize Crosswalk
Assessment	Live items (2003 SOL)	Live Items (2003 SOL)	Live Items (2003 SOL)
	Field test items (2003 SOL)	Field test items (2003 SOL)	Field test items (2003 SOL)
			SOL Content Review Committees

2011-2012 Cross Over (both 2003 and 2010 Science SOL)			
Fall		Spring	Summer
Instruction	VDOE Textbook/Instructional Materials		Divisions Textbook/Instructional Materials Review Committees (anticipated)
Assessment	Live items (2003 SOL)	Live items (2003 SOL)	Live items (2003 SOL)
	Field test items (2003 SOL)	Field test items (2010 SOL)	Field test items (2010 SOL)
			SOL Content Review Committees

2012-2013			
Fall		Spring	Summer
Instruction	Divisions Textbook/Instructional Materials Review Committees (anticipated)		
Assessment	Live items Grade 6-8 (2003 SOL) EOC (2010 SOL)	Live items (2010 SOL)	Live items (2010 SOL)
	Field test items Grade 6-8 (2010 SOL) EOC (2010 SOL)	Field test items (2010 SOL)	Field test items (2010 SOL)
			SOL Content Review Committees

Nominations for the 2012 Standards of Learning Item and Test Review Committees



Superintendent’s Memo #307-11

The Office of Assessment Development is seeking nominations for the 2012 Standards of Learning (SOL) Item and Test Review Committees. The committee meetings will be held in Richmond, Virginia, according to the attached schedule. Approximately fifteen members are needed for each of the 34 committees, and school divisions may nominate one or more representatives for each committee.

All individuals who wish to serve on the 2012 committees, including those who have previously served, must submit an online application through the Assessment Committee Application Processing System (ACAPS). The application will require a professional reference and division approval. The procedure for submitting the online application is available at <https://p1pe.doe.virginia.gov/acaps/>. Completed applications are due to the Virginia Department of Education by February 10, 2012.

Many of you have requested the Vertical Alignment document Barbara and Paula produced for the 2010 Science Standards of Learning Institutes held in October 2010. This document shows the progression of concepts within strands. Please see attached PDF.

Several of you were intereseted in learning more about the Framework for K12 Science Education. Please go to [http://www.nap.edu/catalog.php?record\\_id=13165](http://www.nap.edu/catalog.php?record_id=13165) to download the Framework. We would like to offer an opportunity for the science community to learn more about the Framework. We will be sharing opportunities in the near future.

The Framework for K-12 Science Education outlines a broad set of expectations for students in science and engineering in grades K-12. These expectations will inform the development of new standards for K-12 science education and, subsequently, revisions to curriculum, instruction, assessment, and professional development for educators. This book identifies three dimensions that convey the disciplinary core ideas and practices around which science and engineering education in these grades should be built. These three dimensions are: cross-cutting concepts that unify the study of science and engineering through their common application across these fields; scientific and engineering practices; and core ideas in four disciplinary areas: physical sciences, life sciences, earth and space sciences, and engineering, technology, and the applications of science. The overarching goal is for all high school graduates to have sufficient knowledge of science and engineering to engage in public discussions on science-related issues; be careful consumers of scientific and technological information; and have the skills to enter the careers of their choice.

NEW!!! Virginia Green Ribbon Schools

[http://www.doe.virginia.gov/support/facility\\_construction/healthy\\_buildings/green\\_ribbon/index.shtml](http://www.doe.virginia.gov/support/facility_construction/healthy_buildings/green_ribbon/index.shtml)

Application and timeline on the wessite

February 21, 2012 - Deadline for schools to submit application to the VDOE for nomination.

See page 12 for more information!

The Kid Wind Challenge

A website for educational resources related to alternative energies: <http://aeer.cisat.jmu.edu/>  
For more information: [http://learn.kidwind.org/workshops\\_events/state/virginia/event/2671](http://learn.kidwind.org/workshops_events/state/virginia/event/2671)

NOTE: Registration closed early for this year due to high interest.

The Kid Wind Challenge is a wind turbine design competition for teams of 2-4 middle and high school students. Students incorporate engineering and science to build powerful small-scale wind turbines and compete with other students from around the state to generate the most electricity. This event is a chance to get students involved and excited about alternative energy and sustainability. On top of gaining teamwork, leadership, and problem-solving skills, students will learn key scientific concepts during their constructions.

For more information or questions or if you would like to be put on our mailing list, please contact Remy Pangle at: [panglerm@jmu.edu](mailto:panglerm@jmu.edu) or 540-568-8768





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*Seeds of Science Roots of Reading™* books can open doors to STEM careers for your students. These engaging, informational texts highlight the practices of scientists from a variety of fields. Students learn about the scientific processes and technology that experts use in their field.

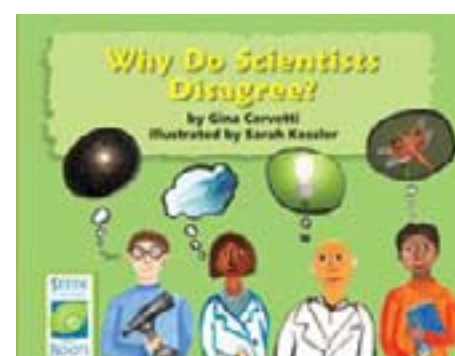
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Contact your sales representative for **correlations** to the Virginia Science Standards of Learning (grades 2-8) and assigned **reading levels**.

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Delta Education is a proud Corporate Sponsor of the VAST Professional Development Institute and Corporate Benefactor of VAST.



**National Updates on Science Education**  
**Bonnie Embry - NSTA District VIII Director**  
November 26, 2012

## Standards Update:

Following the release of the *Framework for K-12 Science Education* NSTA worked to arrive at 9 recommendations that were provided to Achieve to guide work on the Next Generation Science Standards. They are as follows:

1. Maintain or reduce the number of endpoints and other outcomes included in the core disciplinary ideas.
2. Ensure the standards are written, and clearly described, as outcomes that are to be accomplished by all students. Use the disciplinary ideas as the organizing structure of the performance expectations.
3. Clearly develop each standard as an outcome that incorporates all three dimensions. This will entail the clarification of the use of crosscutting concepts and the scientific and engineering practices in the integration of these two dimensions with the core ideas.
4. Clarify further the nature of scientific and engineering practices. Clearly delineate between *what* students are to know and be able to do and how they should be taught those things.
5. Make use of the *National Science Education Standards*, *Benchmarks for Science Literacy*, and *Atlas of Science Literacy*.
6. Explicitly include Nature of Science in the standards.
7. The standards should include multiple examples of performance expectations to be included in a standard and should be carefully crafted to ensure the performance is a clear indication understanding the endpoint described in the core idea.
8. Carefully attend to the K-2 grade band as the foundational set of the rest of the standards.
9. Include supporting chapter or section in standards document that addresses relationship between science and engineering practices and inquiry.

It is not known at this time the extent to which the work on the Next Generation Science Standards will reflect these recommendations. It is expected that the first draft of NGSS will be available for review in late spring of 2012.

## NSTA Resources Update:

1. NSTA Journal Series--A special series of articles focusing on the Framework will appear in upcoming NSTA journals. The first article by Rodger Bybee will address science and engineering practices and will appear in December. Other authors include Cary Sneider, Rick Duschl and Joe Krajcik who will explore other dimensions of the Framework.
2. Reader's Guide--An NSTA Reader's Guide to the Science Framework written by Harold Pratt is now in

development. The Guide will be published online as an eBook and will appear as an insert in the January issues of NSTA journals.

3. Web Seminars--Several web seminars are planned to exploring the Framework and NGSS. Web seminars can be accessed at: [http://learningcenter.nsta.org/products/symposia\\_seminars/nsta/webseminar4.aspx](http://learningcenter.nsta.org/products/symposia_seminars/nsta/webseminar4.aspx).
4. Conferences--Sessions on the Framework and NGSS will be presented at all three area conferences. Representatives from NRC will give an overview of the Framework, Harold Pratt and Francis Eberle will explore the three dimensions of the Framework, and Stephen Pruitt of Achieve will give a featured presentation addressing the standards development process. Be sure to check times and locations in the conference programs.
5. Grant Proposal submitted: NSTA has submitted a grant proposal to be a major provider of support for teachers through collaboration with key organizations and utilizing the web. We should know early in the new year whether we can move forward with this exciting project.

All these resources, and more, can/will be found on the NSTA webpage [www.nsta.org/ngss](http://www.nsta.org/ngss).

## Legislative Update on STEM Education

After three days of debate on October 20 the Senate education committee approved a draft bill to reauthorize the Elementary and Secondary Education Act (No Child Left Behind) that was introduced by Senate leaders earlier this month.

The language in the ESEA bill on STEM education, which was introduced by Senators Merkley, Begich, Gillibrand, and Franken on October 6, remained unchanged during the debate and many amendments offered during the mark up process

The STEM legislation in the draft ESEA, which is supported by NSTA and the STEM Education Coalition, would reauthorize and strengthen the current Math and Science Partnership Program (Title II B) at the Department of Education by providing competitive grants to states and districts to improve student achievement in the STEM fields.

The Senate education committee has set a hearing on the ESEA bill for Nov. 8th before it goes to the full Senate floor for debate (possibly before Thanksgiving) and a final vote. Chairman Tom Harkin has indicated he would like to see final Senate action on the bill before Christmas.

## Going Up STREAM . . .

By Brita Hamilton, Region II Director,  
VAST President -Elect 2012

Believe me, I know how difficult it is to be a classroom teacher in the state of Virginia! From meetings to lesson plans; from parent conferences to pacing guides . . . more and more keeps getting put on an over-flowing plate. I know the frustrations, aggravations and even the once-in-a-blue-moon surprises of being a classroom teacher. Sometimes it just seems like we keep fighting to go up stream . . . augh!

Going up stream . . . now there is a thought. What if this stream was STREAM ~ Science, Technology, Reading, Engineering, Arts and Mathematics. What if they were somehow connected? Are they? Do I make those connections in my classroom? What lessons could be combined to help my students grasp the concepts easily? What lessons do I already teach this way?

How do you connect science and reading in your classroom? How are the arts incorporated in your lessons? How are the principles of engineering helping students understand those pesky math concepts?

### Region II Physical Science Teacher Night for Elementary and Middle School Teachers

April 11, 2012 • 6:30 p.m. - 8:00 p.m.

#### *Come for the FUN!*

You won't want to miss the annual Virginia Region II Teacher Night at Jefferson Lab.

This year's focus is on physical science activities for upper elementary and middle school teachers.

#### *Format for the Evening*

Think of a Science Fair with enthusiastic students lined up at tables waiting to show you their projects.

Teacher Night will be similar, except enthusiastic teachers will be waiting to share one of their favorite classroom activities with YOU! All teachers will have handouts and many will have starter supplies to accompany the handouts - that's right, FREE MATERIALS!

#### *Activity Topics*

Friction ~ Electrolysis ~ Water Cycle ~ Engineering Design Challenge

Exothermic Demos ~ Energy Conservation ~ Electricity ~ Polymers

Scientific Investigation ~ Science Games ~ Sound ~ Force & Motion

Periodic Table ~ Diffraction ~ Solar System ~ Static Electricity

10. Renewable Energy ~ Compounds & Mixtures



We know you have lots of incredible ideas and those are translated into lessons. Perhaps it's a hands on activity your students love. Maybe it those higher level thinking skills that make the light bulb turn on for your students. We want to know about those! Other teachers need to learn how to make those STREAM connections in their classroom. We need you . . . we need you to present at the 2012 VAST PDI!

The 2012 PDI will be held on November 7 – 10 at the Williamsburg Marriott in Williamsburg, Virginia. Presenter forms and other information will be available soon on our website, VAST.org

Grab a colleague and start brainstorming about what you might present at the next PDI. Bring your math teacher! Bring your music teacher! Bring them all! Together, we can . . . travel up STREAM!

#### *Who will be there?*

Teachers participating in the Jefferson Science Associates' after school program, JSAT (JLab Science Activities for Teachers) will be presenting many of the activities they have used in their classrooms. These teachers have spent many hours learning new science and teaching methods - now they want to share it all with YOU!!

#### *Event Location*

This event will be held at the Thomas Jefferson National Accelerator Facility (Jefferson Lab) in Newport News. The address is 12000 Jefferson Avenue, Newport News, VA 23606

Please help Jefferson Lab buy the correct number of supplies! Please contact Brita R. Hampton @ 757-269-7633 or hampton@jlab.org before April 4 to sign-up.

See you on the 11th ~ Eat a light dinner ~ We will have lots of munchies!!

***Door Prizes ~ Door Prizes ~ Door Prizes***

## Why Join a Professional Organization?

Melinda Mericle, is the Middle School Science teacher at Star of the Sea Catholic School in Virginia Beach, Va.

You've made it through your Undergraduate program, or maybe you are a Career Switcher embarking on a new journey teaching; either way, you have just secured that first teaching contract. You are set and ready to go. You have lesson plans to write, activities to explore and labs to prep, so why add one more thing to your already full slate? Why consider membership in a professional organization such as VAST (Virginia Association of Science Teachers) or VESTA (Virginia Earth Science Teachers Association)? Why add attending a professional conference to that overflowing schedule? You don't have the time or maybe you don't perceive a need, you just completed educational courses. This is WHY!

Professional organizations such as VAST network you to other educational professionals who are the forefront of enhancing classroom instruction. They have walked the road you are on and can affirm your chosen path and provide you with additional resources and supplies; you can provide new insights to those already on the journey; and together you can develop new ways of accomplishing the desired educational goals.

Attendance at conferences opens the doors to an array of topics and experiences, both within your area of expertise and to other areas of science. Explore your area of expertise or

venture into the realms of the unknown and discover new areas of interest. And of course there are the FREEBIES! Freebies in workshops: materials and ideas for lessons, activities and labs; loads of stuff from vendors or groups dedicated to educating the public; and, of course new resources being marketed for your classroom.

Members of professional organizations such as VAST or VESTA are eager to share and assist you as an educator. I have singled out VAST and VESTA because these are the groups that I joined as a brand new teacher for 2010-2011. As a career switcher, I understood the importance of professional organizations in keeping you connected to developments in the field.

Now it is up to you. All you have to do is step up, sign up and participate. You and your students will reap the rewards of you saying YES. Have an idea or activity that works well for you? Consider presenting in a share-a-thon at the next convention.

Melinda Mericle, is the Middle School Science teacher at Star of the Sea Catholic School in Virginia Beach, Va. She is a member of VAST and VESTA and wrote an article about why educators should join professional organizations.

## Journal of Virginia Science Education Call for Submissions



**The peer-reviewed journal of the Virginia Association of Science Teachers**

### **Spring/Summer 2012 – Creating Quality Science Programs**

Across the United States, our education system is being impacted by the loss of financial support. The funding for many educational programs is often decreased or cut to save money. How do educators maintain quality science instruction on limited resources? What is quality science instruction? Are you successful in creating quality science programs without the high dollar ticket price? Have you found ways to implement quality science programs that can be replicated easily on a shoestring budget? How have

you changed the way you teach science to adjust to the financial limitations of today? Maybe some of you have not experienced programs being cut, so how did you continue to produce quality programs? What defines a quality science program and how do we measure it? In this journal, we seek articles de-scribing how educators create or maintain quality science programs.

The deadline for submissions is March 1, 2012. Additionally, we are always accepting submissions outside the current call.

We are developing a more comprehensive list of upcoming themes for the Journal. If there are themes you wish to see highlighted, please develop a Call for Submissions and submit it for consideration to journal@vast.org

PDI Pictures in color, live links to resources, and searchable ! Download newsletters from the VAST website. See “Virginia Association of Science Teachers” FaceBook Page for more photos! Watch for the “Green” Digital Newsletter on March 6th, 2012.



## NEW!!! Virginia Green Ribbon Schools

[http://www.doe.virginia.gov/support/facility\\_construction/healthy\\_buildings/green\\_ribbon/index.shtml](http://www.doe.virginia.gov/support/facility_construction/healthy_buildings/green_ribbon/index.shtml)

**Application and timeline are on the wessite  
February 21, 2012 - Deadline  
for schools to submit application to the  
VDOE for nomination.**

I am pleased to announce that the Virginia Department of Education (VDOE) will participate in the Green Ribbon Schools program and will soon invite public and private schools in Virginia to apply for this national recognition.

The Green Ribbon Schools program was recently launched by the U. S. Department of Education (USED) to recognize schools that save energy and reduce operating costs, create environmentally friendly learning spaces, promote student health, and provide environmental education to incorporate sustainability into the curriculum.

According to the guidance released from USED, Green Ribbon Schools must have achieved or made considerable progress toward the three goals established for the program: 1) energy efficient buildings; 2) healthy students and healthy school environments; and 3) environmental literacy of all graduates. The combined achievement in these three areas will be the basis for the Green Ribbon Schools award.

Both public and private schools in Virginia will make their applications to the VDOE. A Green Ribbon Schools review panel, convened by the VDOE, will nominate up to four schools to the U.S. Department of Education. If four are nominated, one of the four must be a public school with a 40 percent disadvantaged population and one must be a private school. All schools must meet high college- and career-ready standards, be in compliance with federal civil rights laws, and all federal, state, and local health and safety standards and regulations.

The Virginia Department of Education will release additional details shortly, including the program timeline and application. For more information on Green Ribbon Schools, please visit <http://www2.ed.gov/programs/green-ribbon-schools/index.html>.

For additional information, please contact Eric M. Rhoades, science coordinator, Office of Standards, Curriculum, and Instruction, by e-mail at [Eric.Rhoades@doe.virginia.gov](mailto:Eric.Rhoades@doe.virginia.gov), or by telephone at (804) 786-2481.

NEW!!! Virginia Green Ribbon Schools [http://www.doe.virginia.gov/support/facility\\_construction/healthy\\_buildings/green\\_ribbon/index.shtml](http://www.doe.virginia.gov/support/facility_construction/healthy_buildings/green_ribbon/index.shtml)



## Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST) Program

The Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST) Program was established in 1983 by the White House and is administered by the National Science Foundation (NSF) on behalf of the White House Office of Science and Technology. The program identifies outstanding science and mathematics teachers, kindergarten through grade 12, in each state and the four United States jurisdictions. These teachers will serve as models for their colleagues and will be leaders in the improvement of science and mathematics education.

Recognition is given to teachers of kindergarten through grade 12 in four award groups: elementary mathematics (K-6), elementary science (K-6), secondary mathematics (7-12), and secondary science (7-12). In 2012, up to six state finalists at the elementary level will be selected (three in each elementary group). From these 2012 state finalists, a national committee will choose up to two national-level awardees (one in each award group) from Virginia. Each national awardee will receive a \$10,000 personal award and an all-expense paid trip to recognition events and other activities in Washington, DC.

Both the nomination form and the application packet must be submitted electronically. The nomination form and the application packet as well as complete directions are available on the NSF Web site at <http://www.paemst.org>. A completed nomination form must be submitted electronically with each application. All applications are due May 1, 2012.

For more information, contact Eric Rhoades, science coordinator, Office of Standards, Curriculum, and Instruction, by e-mail at [Eric.Rhoades@doe.virginia.gov](mailto:Eric.Rhoades@doe.virginia.gov) or by telephone at (804) 786-2481

## 2011 Presidential Awards for Excellence in Mathematics and Science Teaching: Science State Finalists

The 2011 PAEMST Awardees will be announced in the Spring of 2012. Each state's Presidential Awardee will receive a \$10,000 award from the National Science Foundation. Each PAEMST Awardee will also be invited to attend, along with a guest, recognition events in Washington, D.C. during a weeklong recognition in 2012. These events will include an award ceremony, a Presidential Citation, meetings with leaders in government and education, sessions to share ideas and teaching experiences, and receptions and banquets to honor recipients.

The three PAEMST Virginia state finalists for grades 7-12 science are **Nancy Bort**, a sixth grade general science and seventh grade life science teacher at Francis C. Hammond One Middle School in Alexandria, **Dianne Clowes**, an eighth grade physical science and math teacher at Ni River Middle School in Spotsylvania County, and **Jacqueline Curley**, a ninth grade integrated science teacher and an eleventh and twelfth grade Independent Research science class facilitator at Loudoun County Academy of Science in Loudoun County.

“These teachers are national role models for educators to emulate; for students to admire; and for parents, administrators, and communities to nurture,” notes Rita Colwell, NSF director. PAEMST Awardees have been shown to devote more time to professional development, to incorporate innovative approaches into their classroom teaching, and to be more likely to use computers and other technologies in their classrooms.

***For more information about the PAEMST program or to nominate a teacher, please visit [www.paemst.org](http://www.paemst.org) or contact Eric M. Rhoades ([eric.rhoades@doe.virginia.gov](mailto:eric.rhoades@doe.virginia.gov)).***

PAEMST Awards were presented by, Dr. Linda Wallinger, VDOE Assistant Superintendent, Eric Rhodes, VDOE Science Coordinator and Barbara Young, VDOE Science - Elementary (who is not in the picture) at the VAST PDI in November.







# Invitation to Judge the Virginia Junior Academy of Science

The Virginia Junior Academy of Science will hold its 2012 VJAS Research Symposium in conjunction with the Virginia Academy of Science Annual Meeting at the Norfolk State University, Wednesday, May 23. The purpose of this meeting is to give approximately 750 students in grades seven through twelve from throughout the commonwealth the opportunity to present papers, which will report original research they have conducted. On Wednesday, twenty-two papers will be presented every 15 minutes from 9 a.m. through 4:30 p.m. You will be invited to come early that morning to prepare for the arrival of the young scientists. A detailed schedule of events will follow in May as well as the delivery of their papers for your review.

How can we accomplish this goal? In order to achieve this monumental task many volunteers are needed. Each of the sections requires three judges and a chair. Judges are needed in all fields. We have separated into middle and high school competition this year, so you will note different categories below that you can choose to judge. Judging requires one to read and evaluate no more than twenty-two papers, which will be received approximately three weeks prior to the date of the meeting. The judges are asked to be present,

with those papers, at a briefing on Wednesday morning. A detailed schedule will be posted online closer to the event. Judges and chairs will receive breakfast and lunch and can choose to participate as a representative scientist at “Dinner with the Scientists” during which they can interact with the students.

Please help us to make this an event to remember. So register today and secure your first choice in categories. Please fill out and mail the bottom portion of this letter to Mrs. Susan Booth. You will, at a later date, receive notification of the category you will be judging, parking permits, scoring rubric, schedule, and other important information. We will update you with more details as the logistics are worked out. We truly appreciate all that you do and hope that you will be willing to contribute your time and effort. If you know of any others who may also be interested in assisting VJAS, then please pass this information on to them. The entire program is made possible by your volunteer efforts, and its success rests on your willingness to help. If you have any questions then, please do not hesitate to contact me at 757-897-3104. Thank you in advance for your assistance.  
Susan Booth, VJAS Director, Susan.science@gmail.com

.....  
Please detach, print and email or mail to: Susan Booth, 134 Twin Lake Circle, Newport News, VA 23608

Name: \_\_\_\_\_ Phone #: \_\_\_\_ (\_\_\_\_) \_\_\_\_\_

Address \_\_\_\_\_

E-mail: \_\_\_\_\_

I will participate in \_\_\_\_ or I will not participate in \_\_\_\_ Dinner with the Scientists on Wednesday.

Please circle or mark across the categories you are interested in and rank order:

Middle School (Grades 7 and 8)		High School (Grades 9 – 12)	
• Animal & Human Sciences	• Animal Behavior & Genetics	• Math, Statistics & Computer Science	
• Behavioral Sciences	• Botany	• Medicine & Health	
• Chemical Science	• Chemistry	• Microbiology & Cell Biology	
• Ecology & Earth Sciences	• Engineering	• Physics	
• Physical Science, Engineering & Math	• Environmental Science	• Psychology	
• Plant & Cellular Sciences		• Zoology	



**“PARTNERS IN SCIENCE”**

**VAST PDI SPONSORS in the EXHIBIT HALL**





Friday Night Dance

Welcome to VAST PDI & Exhibit Hall

Juanita Jo Matkins, VAST President 2012-2013



Barbara Young, DOE, Barbara Young, Science Specialist, Denny Casey

Delores Dunn, VAST President 2010- 2011

All Aboard!



“Alternative Energy Panel”, R.Bodnar, K.Moss, and R.Luersen

Kathy Frame Presents Va. OBTA

Friday Night Dance



Friday Night Dance

Clarence Cocroft - “CSI Effect”

Alberto Malinverno - “Ocean Drilling & Earth History”

## 16. VAST Professional Development Institute - 2011 - Roanoke

PDI Pictures in color: Download newsletter on VAST web site or See “Virginia Association of Science Teachers” Facebook Page for more photos!



Friday Night Dance

Dining at the VAST Board of Director's Dinner

George Dewey experiments at VSELA



Denny Casey meets an ancient Ancestor.

Ancient human ancestor from the Virginia Museum of Natural /history

Auctioneer, Eric Pyle, at the Fridat Auction



George Dewey & Bonnie Embray, NSTA Reg. Director

VAST Pres. D. Dunn, VSELA Pres. Jean Young, Lawrence Lowery - “Sparks That Ignite Inquiry”

Joe Keiper & Noel Boaz - “Human Evolution: Challenge to Educators”



Jackie McDonnough, Reg 1 Director, Poses a question to the Energy Panel

Friday Night Dance

Brett Moulding - “Ready, Set, Science!”

## VAST Professional Development Institute - 2011 - Roanoke

PDI Pictures in color: Download newsletter on VAST web site or See “Virginia Association of Science Teachers” Facebook Page for more photos!



## News from the Virginia DEQ



## Project WET

is a nationally  
developed,  
supplementary

water education program for educators -- public and private school teachers, youth club leaders, museum staff and others. In September, Project WET released their new K-12 Curriculum and Activity Guide which will be available through a free 6 hour workshop offered throughout the state by 11 host organizations. To see a map of the host organizations and their contact information please go to **Virginia Office of Environmental Education - Project WET**

To sign up to be notified of a WET workshop in your area, go to <http://www.surveymonkey.com/s/ProjectWorkshop-RequestForm>. You may also check the [VA Naturally Calendar of Events](#).



**Principals' Memo**  
**Virginia Junior Academy of**  
**Science**

It is my pleasure to announce that the 2012 Virginia Junior Academy of Science (VJAS) Research Symposium will be held at Norfolk State University May 22-24, 2012. VJAS, a state chapter of the American Academy of Science, is dedicated to the advancement of science by discovering and encouraging scientific aptitude among Virginia's middle and high school students. VJAS has been ranked among the top three Junior Academies in the nation for nearly three decades and serves over 40,000 students per year. For more information, including the VJAS Handbook and how students can become involved in the VJAS, please visit <http://www.vjas.org> or contact Susan Booth, VJAS director, at [susan.science@gmail.com](mailto:susan.science@gmail.com).

[http://www.doe.virginia.gov/administrators/principals\\_memos/2011/1033-11.shtml](http://www.doe.virginia.gov/administrators/principals_memos/2011/1033-11.shtml)

**NASA Funded Astronomy  
Outreach Project -  
CLUSTER:  
Loaning UVa's Telescopes to  
Educators**



**The University of Virginia**  
**Department of Astronomy** is

loaning telescopes to teachers in Virginia and providing training on how to use them. For a small fee of \$50.00, teachers can borrow one of the Meade 8-inch Schmidt-Cassegrain telescopes for six weeks and use them to host an evening star party at their school, to conduct experiments with their students, and other projects. The project is managed by Steve Layman.

Partial funding for this project is provided by an education and public outreach supplemental grant from the **Chandra X-ray Center** which is operated for NASA by the **Smithsonian Astrophysical Observatory**.

Steve Layman, Project Manager, Cluster  
**Chandra: Loaning UvaS Telescopes to  
EducatoRs**

## Biology Challenge: Become part of the USA Biology Olympiad

The USA Biology Olympiad (USABO) is the premiere US biology competition for high school students. After two rounds of challenging exams, 20 students are invited to a residential training program at Purdue University where they experience labs and lectures with advanced biological concepts and exacting lab skills. The top four students go on to represent the USA at the International Biology Olympiad (IBO) in Singapore July 8 to 15, 2012. Online registration is open from October 24, 2011 to February 3, 2012 at <http://www.usabo-trc.org>. For more information on how your students may participate in the USABO, please contact Kathy Frame at [kframe@cee.org](mailto:kframe@cee.org).

## GIS Site License Now Available Through JMU

## Background

In 2006 the Virginia Department of Education (VDOE) secured a statewide license to put ESRI's GIS Software in all schools to develop analytical and higher order thinking skills. When the VDOE declined to renew the license, JMU took on the responsibilities of managing the Virginia K-12 GIS Site License and I wanted to make you aware of how to obtain the software. If you are not familiar with Geographic Information Systems (GIS), it is a computer mapping software that allows one to take data and organize, display, and analyze it visually or spatially. Used in a variety of content areas including Science, Geography, Civics/Government, Business, Marketing, and Architecture, students not only reinforce content understanding, but get the opportunity to explore real world issues and further develop critical thinking skills.

## Details

School systems participating in this state wide GIS consortium have the ability to procure ESRI's ArcGIS software for every computer for every school in their district AND on teacher home computers. Additionally, school systems can participate in this program at either an academic level or at both an academic and district administrative level.

The new licensing arrangement consists of a consortium of school districts with an affordable annual fee. While normal, single use copies would cost thousands of dollars, entire school systems can obtain district wide licenses starting from \$100 - \$2,000, depending on the size of the district. What is also unique about this program is that all proceeds stay in Virginia and are used to develop and offer

both online and “face to face” GIS training and professional development. Let me say it again, ESRI receives none of the consortium fees!

While nearly 20 school districts are already participating in this program as of this year, spreading the word about this consortium has been slow. This is an attempt to reach out to educators, simply to let you know that this opportunity exists. There are also two websites: one that further explains the VA GIS K-12 Program (<http://gs.cisat.jmu.edu/software/>) and another that describes The Geospatial Semester, (<http://www.isat.jmu.edu/geospatialsemester/>) an innovative dual enrollment partnership with JMU that provides the opportunity for participating schools to host GIS-focused classes that will earn students college credit.

Working with Dr. Bob Kolvoord at JMU, I'm helping to administer this new version of the site license. As someone who has used this software in both the industry and in a high school classroom for ten years, I personally can say this is one of the most unique, real-world, and enriching opportunities I've come across. I hope you'll take a moment to investigate this further. Please explore the websites and call or email me if you have questions or would like to discuss this opportunity further.

Paul Rittenhouse  
Geospatial Projects Coordinator and  
Instructor | Geographic Science  
James Madison University  
MSC 4102 | Harrisonburg, VA  
| 22807 434.960.9943(mobile) |  
540.568.275(office)

## Large Asteroid Captured in NASA Photos

## NASA Captures New Images of Large Asteroid Passing Earth

On Nov. 7 at 11:45 a.m. did your students followed the asteroid that passed by Earth? You can find images on the following link.

[http://www.nasa.gov/mission\\_pages/asteroids/news/yu55-20111107.html](http://www.nasa.gov/mission_pages/asteroids/news/yu55-20111107.html)

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Catherine Webb, Alumna  
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## The Gray Cubicle You Want to Work In

By Dr. Tony Phillips

It's another day at the office.

You're sitting in a gray cubicle, tap-tap-taping away on your keyboard, when suddenly your neighbor lets out a whoop of delight.

Over the top of the carpeted divider you see a star exploding on the computer screen. An unauthorized video game? No, this explosion is real. A massive star just went supernova in the Whirlpool Galaxy, and the first images from Hubble are popping up on your office-mate's screen.

It's another day at the office ... at NASA.

Just down the hall, another office-mate is analyzing global temperature trends. On the floor below, a team of engineers gathers to decode signals from a spaceship that entered "safe mode" when it was hit by a solar flare. And three floors above, a financial analyst snaps her pencil-tip as she tries to figure out how to afford just one more sensor for a new robotic spacecraft.

These are just a few of the things going on every day at NASA headquarters in Washington DC and more than a dozen other NASA centers scattered around the country. The variety of NASA research and, moreover, the variety of NASA people required to carry it out often comes as a surprise. Consider the following: NASA's Science Mission Directorate (SMD) supports research in four main areas: Earth Science, Heliophysics, Astrophysics, and Planetary Science. Read that list one more time. It includes everything in the cosmos from the ground beneath our feet to the Sun in the sky to the most distant galaxies at the edge of the Universe. Walking among the cubicles in NASA's science offices, you are likely to meet people working on climate change, extraterrestrial life, Earth-threatening asteroids, black holes or a hundred other things guaranteed to give a curious-minded person goose



*Some of the employees of NASA's Science Mission Directorate may work in gray cubicles, but their jobs are anything but dull. They get to study Earth, the Sun, the Solar System, and the Universe!*

bumps. Truly, no other government agency has a bigger job description.

And it's not just scientists doing the work. NASA needs engineers to design its observatories and build its spacecraft, mathematicians to analyze orbits and decipher signals, and financial wizards to manage the accounts and figure out how to pay for everything NASA dreamers want to do. Even writers and artists have a place in the NASA scheme of things. Someone has to explain it all to the general public.

Clearly, some cubicles are more interesting than others. For more information about the Science Mission Directorate, visit [science.nasa.gov](http://science.nasa.gov). And for another way to reach the Space Place, go to <http://science.nasa.gov/kids>.

Some of the employees of NASA's Science Mission Directorate may work in gray cubicles, but their jobs are anything but dull. They get to study Earth, the Sun, the Solar System, and the Universe!

## Teach STEM? NASA Explorer Schools Can Help With That!

Teachers across the country, regardless of school size, type, or geographic location, have seen the benefit of participating in the NASA Explorer Schools (NES) project. These teachers have access to free NASA classroom materials and student engagement activities, as well as educator support resources, through the NES Virtual Campus. NES classroom resources are designed to help teachers increase student interest and achievement in science, technology, engineering, and mathematics (STEM) subjects.

Are you looking for fun, exciting and interactive ways to connect your students to NASA? Designed for teachers in grades 4–12, NES provides a forum for accessing free lessons, student engagement activities, and professional development opportunities centered on NASA missions and STEM topics and careers. NES also offers multiple pathways for you to connect with other motivated STEM educators across the country to share best practices and classroom implementation ideas. Visit the NASA Explorer Schools website to read firsthand stories from participating teachers about the benefits of joining the NES project and implementing NASA resources in the classroom!

20. <http://www.nasa.gov/offices/education/programs/national/nes2/recognition/profiles-index.html>

## New Remarkable Grade 5-12 STEM Education Program Opportunity for School District and School Communities

Announcing the Student Spaceflight Experiments Program (SSEP) Fourth Flight Opportunity - SSEP Mission 2 to the International Space Station (ISS) The National Center for Earth and Space Science Education (<http://ncesse.org>), in partnership with NanoRacks (<http://nanoracks.com>) invites communities across the U.S. to participate in SSEP Mission 2 to ISS. Each participating community will be provided all launch services to fly a real microgravity research mini-laboratory on ISS from September 28 to November 12, 2012, and a kit for assembly of their mini-lab. An 8-week experiment design competition in the community, held Spring 2012, will allow grade 5-12 student teams to design real microgravity experiments vying for their community's reserved mini-lab slot on ISS.

SSEP immerses a community of students in real scientific research of their own design (grade level appropriate), using a highly captivating spaceflight opportunity on ISS - America's newest National Laboratory – which will garner the community significant media attention.

SSEP is a true STEM education program. It addresses a wide range of biological and physical science disciplines (thus appropriate for all teachers of science), including: seed germination, crystal growth, physiology of microorganisms and life cycles (e.g. bacteria), cell biology and growth, food studies, and studies of micro-aquatic life. Students design experiments to the technology and engineering constraints imposed by a real research mini-lab and flight operations to and from Earth orbit.

### HERITAGE:

Through the first two SSEP announcements of opportunity on the final flights of Space Shuttles Endeavour and Atlantis (STS-134 and STS-135), 27 communities joined the program, providing a combined 30,700 grade 5-14 students in 101 schools the opportunity to design and propose real spaceflight experiments; 1,027 student team proposals were received; and 27 experiments were selected and flown on the Shuttles - one for each participating community.

For SSEP Mission 1 to ISS, the third flight opportunity, 12 communities are providing 41,200 students, across 92 schools, the opportunity to design and propose experiments. Mission 1 is currently ongoing.

### SOME SSEP BASICS:

1. Typically a minimum of 300 grade 5-12 students across a community engage in experiment design. The school district is free to determine the participating grade levels. SSEP is not designed for a single class or a small number of students.
2. Implementation is straightforward and well defined; all



needed curricular materials are fully developed; and we provide ongoing, proactive support for your educator implementation team.

3. Well designed content resources for teachers and students support

foundational instruction on science in microgravity and experimental design.

4. SSEP is flexible enough to be tailored to your community's strategic needs in STEM education.
5. A suite of SSEP program elements - the Community Program - leverages the flight experiment design competition to engage the entire community, embracing a Learning Community Model for STEM education. Elements include flying up to 2 Mission Patches resulting from an art and design competition across your community, and a SSEP Community Blog for each community.
6. Students can take part in their own research conference where they can report on experiment design and results. The conference is held in Washington, DC, in early July, and likely at the Smithsonian's National Air and Space Museum, the site of the 2011 conference.

SSEP is about a commitment: to the joys of learning; to student ownership in exploration through immersive and REAL science experiences; to science as journey; to rich experiences for teachers in real science; and to science as an interdisciplinary tapestry that extends to vital written and oral communication skills.

**CRITICAL DEADLINE:** all participating communities must be aboard by February 27, 2012, and to do that we need to start working with interested communities right away.

### NEXT STEPS - WE ARE ON A FAST TRACK:

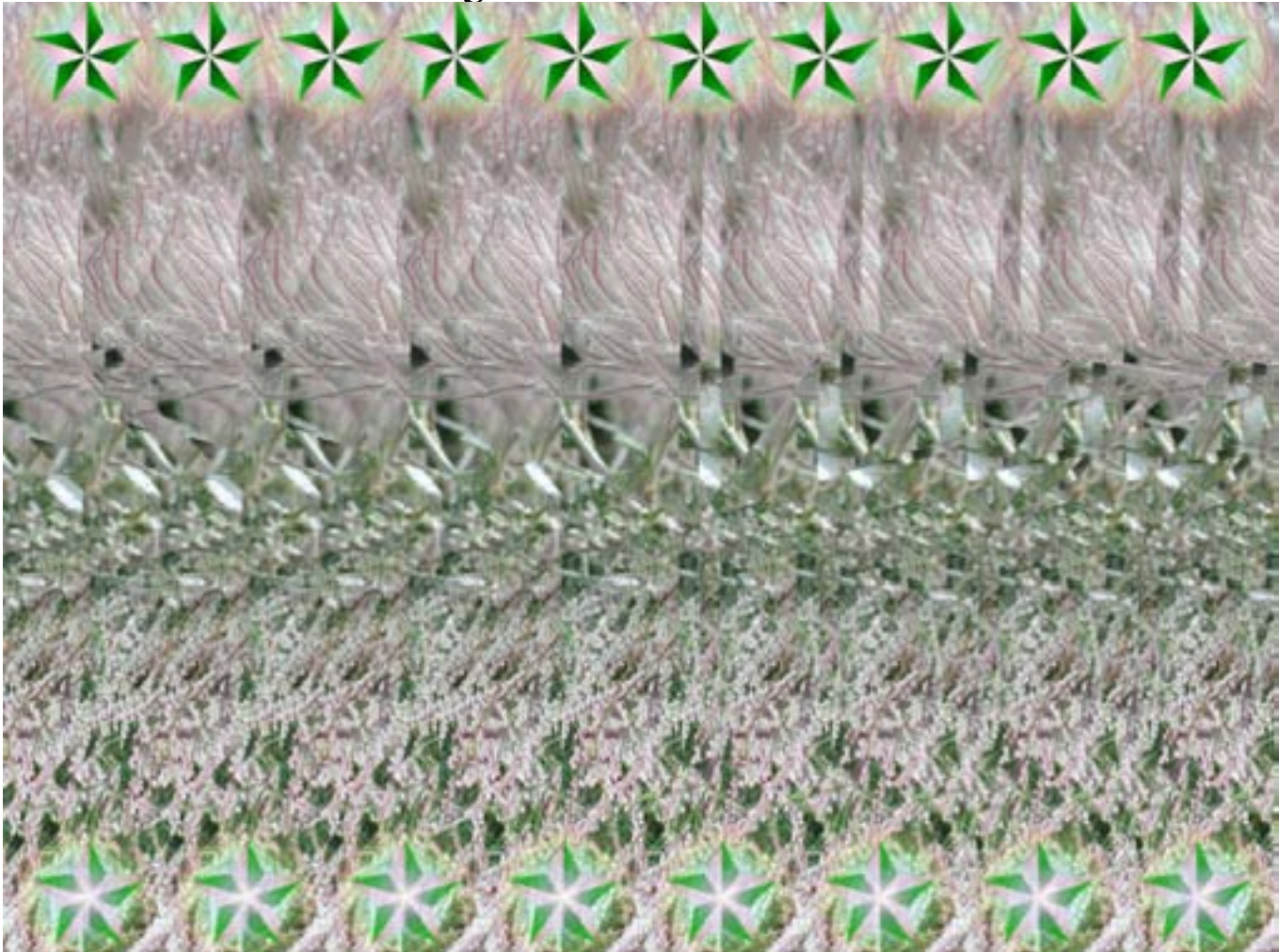
1. CAREFULLY review the National Announcement of Opportunity (link below), which includes links to all aspects of the program.
2. Contact us at [ssep@ncesse.org](mailto:ssep@ncesse.org) or call at: 301-395-0770

**GO TO NATIONAL ANNOUNCEMENT OF OPPORTUNITY:**  
<http://ssep.ncesse.org/?p=7954>

*Be part of history by making history*



Making the Invisible Visible, Part 2



Dancing Stars” © Gary W. Priester (2003); link [www.Custom-Stereograms.com](http://www.Custom-Stereograms.com)

There are two kinds of intelligence: one acquired, as a child in school memorizes facts and concepts from books and from what the teacher says, collecting information from the traditional sciences as well as from the new sciences.

With such intelligence you rise in the world. You get ranked ahead or behind others in regard to your competence in retaining information . You stroll with this intelligence in and out of fields of knowledge, getting always more marks on your preserving tablets.

There is another kind of tablet, one already completed and preserved inside you. A spring overflowing its springbox. A freshness in the center of the chest. This other intelligence does not turn yellow or stagnate. It’s fluid, and it doesn’t move from outside to inside through the conduits of plumbing learning.

This second knowing is a fountainhead From within you, moving out.

At this time of year, as the sun reaches the nadir of its southward migration in its slow but inexorable annual journey, nature seems to slip underground as if hiding herself from view. Leaves have fallen and much of life’s sap has retreated so that the warmth and riot of life might be celebrated in the summer elsewhere. And yet in the chill and starkness of solstice silence, we can see more clearly and appreciate more fully the basic essence of things, like the skeletal beauty of trees laid bare, as if the curtains were drawn aside to reveal the truth behind our notions and thoughts. As Christina Rossetti’s poem has it: “In the bleak midwinter, frosty winds made moan; earth stood hard as iron, water like a stone...”

So much of nature and the cosmos, both physical and psychological, is invisible to us, from the world of the atom to the cosmic universe. Science does its best to make visible what is hidden from our view either by space or by time. Sometimes in the chill and winter of our understanding we need to recognize the gift of light. We are told by cosmologists that there was a time in our earliest history when the universe was a quark fog, before photons of light had made their appearance and elements had not evolved. In this sense, visibility takes on a whole new level

of meaning. X-ray and infra-red telemetry are revealing previously hidden features in a universe where visible light is only partial. Like the bleakness and chill of winter, as conditions make visible the core of our own understanding, only then do we move from Rumi’s frozen or stagnant intelligence to the fluid intelligence, the “freshness in the center of the chest.”

Just as much of life is conceived in darkness and borne into the light as the invisible genetic code works its silent wonders, so do our schooling and educational institutions help make what lies dormant or invisible visible for the benefit of the child or society. At least this is the plan or mission of our profession. Yet, how often we succumb to the sort of intelligence which ranks others ahead or behind in regard to “competence in retaining information,” strolling as we do “in and out of fields of knowledge” — plumbing learning instead of a fountainhead. For those of us who have built or used a springbox, it was never designed to confine the waters, but to make them accessible and the spring waters were constantly overflowing. The same is true in education.

This is how an eighth grader reacted to Rumi’s poetic philosophy: “Like Rumi talked about, what’s most effective for me is when there is room for my inner voice. So much of our time is just spent repeating what the book says, or what the teacher says. It’s not very often we get to actually say what we think. I think I really learn when I can share my own thoughts.” <sup>2</sup>

In early December I was present at the premiere of an inspiring film, *Mitchell 20*, which told the story of twenty teachers in Mitchell Elementary School in Arizona who committed themselves to transforming their school and their teaching skills by working as a team toward National Board Certification. It is a film about re-committal and about teachers’ attempts to own their own profession. As the leader of the team, Daniela Robles, explained, “We were teachers who got tired of complacency” or, “If we teachers don’t do it, who will?” Do what? [See their website, [www.mitchell20.com](http://www.mitchell20.com)]

Mitchell Elementary School was a school where 99% of the students had free or reduced lunch, a high crime and high unemployment area. Students saw a model of someone who stands for something he or she can do, the powerful message of teachers trying to improve themselves. What is most remarkable in the film is the perseverance of teachers who did not make certification the first time, who believed students needs came first and as one teacher commented after her initial failure to achieve, “This is not what I expected, but I’m not going to quit.” She achieved certification the second time and two years after the

twenty teachers began their work, for the first time their school made the No Child Left Behind distinction of AYP. The film makes a sharp contrast between the efforts and determination of the principal and teachers and the obstacles of legislative and district roadblocks where programs and budgets were cut, immigration sweeps and teacher transfers out of the school were forced upon them. The principal was forced to resign and the project leader cited for insubordination, yet despite such setbacks, as Robles commented, “When you build teachers up and they believe in themselves, great things happen.” National Education Association President, Dennis Van Roekel, thoughtfully commented, “Some say heroes are defined by position or title; I think heroes are defined by what they do.”

The Mitchell 20 were teachers whose priority was making the invisible visible in their students. Under harsh or even frozen conditions they persevered by holding to the core beliefs, the mission of their profession: to serve their kids. They were not interested in getting more marks on their “preserving tablets,” but in the fluid intelligence which flows from inside out, not from outside in: “a fountainhead from within you moving out.” Thoughtful educators – leaders at whatever level they may exist – have always been concerned and committed to making the invisible visible, the very best in themselves and in others. Can there be any nobler calling for a teacher?

Winter is the perfect time to concentrate on what lies in the heart, in the core of things. The light and sharp shadows can help us to identify and correct structures which are weak or a sham, and to focus on the tablet “already completed and preserved inside you.” Like the stereogram at the beginning of this piece, there are many images whose details are only visible to those whose focus is right, to those teacher heroes who accept nothing but the best from their children. Patterns become visible in the stereograms of our students’ talents and complexities only when we have the patience and an eye trained to see another dimension.

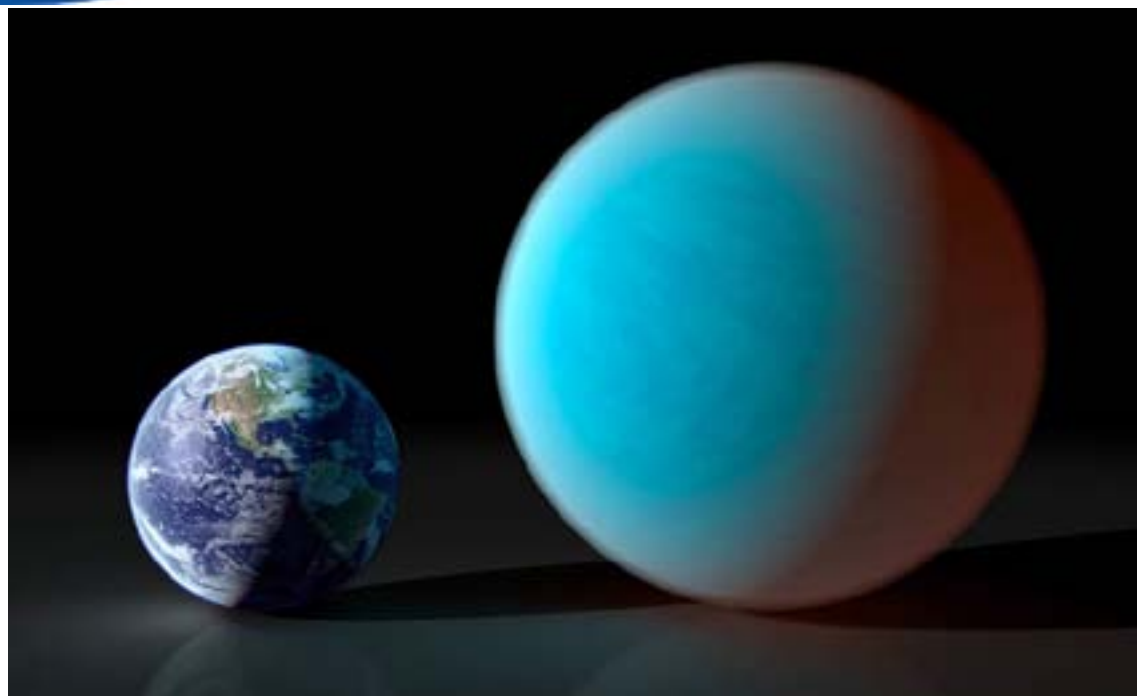
1. “Dancing Stars” © Gary W. Priester (2003); link [www.Custom-Stereograms.com](http://www.Custom-Stereograms.com) or [www.eyetricks.com/3dstereo.htm](http://www.eyetricks.com/3dstereo.htm) Stare at the center of the stereogram, de-focus your eyes, and see the two stars dancing. For Gary Priester’s new book (available Feb 2012) go to <http://www.amazon.com>; in the book section search for *Startling-Stereograms-Gary-Priester*.
2. From “Making Contact” in *Teaching with Fire*, Sam M. Intrator and Megan Scribner, Eds. 2003. Jossey-Bass. Quoted by Marianne Houston, retired Michigan middle school teacher.

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).



Artist's rendering compares the size Earth with the rocky "super-Earth" 55 Cancri e. Its year is only about 18 hours long!



## Re-thinking an Alien World: The Strange Case of 55 Cancri e

Forty light years from Earth, a rocky world named "55 Cancri e" circles perilously close to a stellar inferno. Completing one orbit in only 18 hours, the alien planet is 26 times closer to its parent star than Mercury is to the Sun. If Earth were in the same position, the soil beneath our feet would heat up to about 3200 F. Researchers have long thought that 55 Cancri e must be a wasteland of parched rock.

Now they're thinking again. New observations by NASA's Spitzer Space Telescope suggest that 55 Cancri e may be wetter and weirder than anyone imagined.

Spitzer recently measured the extraordinarily small amount of light 55 Cancri e blocks when it crosses in front of its star. These transits occur every 18 hours, giving researchers repeated opportunities to gather the data they need to estimate the width, volume and density of the planet.

According to the new observations, 55 Cancri e has a mass 7.8 times and a radius just over twice that of Earth. Those properties place 55 Cancri e in the "super-Earth" class of exoplanets, a few dozen of which have been found. Only a handful of known super-Earths, however, cross the face of their stars as viewed from our vantage point in the cosmos, so 55 Cancri e is better understood than most.

When 55 Cancri e was discovered in 2004, initial estimates of its size and mass were consistent with a dense planet of solid rock. Spitzer data suggest otherwise: About a fifth of the planet's mass must be made of light elements and compounds—including water. Given the intense heat and high pressure these materials likely experience, researchers think the compounds likely exist in a "supercritical" fluid state.

24.

A supercritical fluid is a high-pressure, high-temperature state of matter best described as a liquid-like gas, and a marvelous solvent. Water becomes supercritical in some steam turbines—and it tends to dissolve the tips of the turbine blades. Supercritical carbon dioxide is used to remove caffeine from coffee beans, and sometimes to dry-clean clothes. Liquid-fueled rocket propellant is also supercritical when it emerges from the tail of a spaceship. On 55 Cancri e, this stuff may be literally oozing—or is it steaming? —out of the rocks.

With supercritical solvents rising from the planet's surface, a star of terrifying proportions filling much of the daytime sky, and whole years rushing past in a matter of hours, 55 Cancri e teaches a valuable lesson: Just because a planet is similar in size to Earth does not mean the planet is like Earth.

It's something to re-think about.

Get a kid thinking about extrasolar planets by pointing him or her to "Lucy's Planet Hunt," a story in rhyme about a girl who wanted nothing more than to look for Earth-like planets when she grew up. Go to <http://spaceplace.nasa.gov/story-lucy>.

The original research reported in this story has been accepted for publication in *Astronomy and Astrophysics*. The lead author is Brice-Olivier Demory, a post-doctoral associate in Professor Sara Seager's group at MIT.

*This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.*



## Mars Science Laboratory (MSL) launches to Mars

Article submitted by Bonnie Murray, VAST Informal Education Chair; written by: Kathy Barnstorff, NASA Langley Research Center

On Nov. 26th, the Saturday after Thanksgiving, more than 200 people crammed into the IMAX theatre at the Virginia Air & Space Center in Hampton. On the big screen - the ultimate adventure video - an out-of-this-world reality show. It was the launch of the Mars Science Laboratory (MSL) and its Curiosity rover. The spacecraft is heading to the Red Planet in search of evidence that Mars may be able to support life or may have once had environments favorable for life.

Curiosity, which is about the size of a Mini-Cooper car, carries 10 science instruments with a total mass 15 times larger than the science-instrument payloads on the Mars rovers Spirit and Opportunity.

More than 100 researchers and technicians at NASA's Langley Research Center have worked on the MSL mission, some for more than 10 years. One of their contributions is a science instrument package, built primarily at Langley, which will fly 352 million miles from Earth to Mars to gather data during the last eight minutes of the flight next August.

"We designed and developed a set of sensors called MEDLI (for MSL Entry, Descent and Landing Instrumentation)," said Langley's Neil Cheatwood, MEDLI principal investigator. "MEDLI is installed on the spacecraft's heat shield and will measure the heat and atmospheric pressure of entry into the Martian atmosphere. That information could be used to build better spacecraft in the future."

"This is the first time we've ever had sensors that will collect accurate, high fidelity data of atmospheric entry at another planet," said Jim Pittman, head of the Hypersonics Project, which is part of the Fundamental Aeronautics Program in NASA's Aeronautics Research Mission Directorate (ARMD). "Having that knowledge is of great interest to the hypersonics community - especially when it comes to being able to design future entry systems that are safer, more reliable and lighter weight."

The final minutes of MSL's long journey is NASA Langley's expertise. NASA Langley leads the entry, descent and landing research and computer simulation effort. The team has practiced millions of computer landings on Mars, trying to include all the variables that could affect the MSL landing.

If everything goes according to plan and practice, Mars Science Laboratory will land in August, 2012. A number of Langley's Mars team members will physically move across the country to the Jet Propulsion Laboratory (JPL) in Pasadena, Calif., the month before to monitor the spacecraft and fine tune its entry to help Curiosity land safely on the Red planet.

"When we get to Mars, we'll have 7000 lbs of spacecraft traveling at 13,000 mph," said David Way, Langley entry, descent and landing team lead. "In just about seven minutes, we'll slow the spacecraft all the way down to just under two miles an hour gently landing Curiosity right on her wheels. To do that the onboard computer will have to autonomously execute a complex sequence of events, first using atmospheric drag, then a parachute, and finally rocket engines to slow down."

And the worst part may be is they won't know immediately if they have had success - it takes 10 to 20 minutes for a communications signal to travel from Mars to Earth.

The Mars Science Laboratory mission is managed by JPL for NASA's Science Mission Directorate in Washington. Curiosity was designed, developed and assembled at JPL. Launch management for the mission is the responsibility of NASA's Launch Services Program at the Kennedy Space Center in Florida. NASA's Space Network, managed by the Goddard Space Flight Center in Greenbelt, Md., will provide space communications services for the rocket. NASA's Deep Space Network will provide MSL spacecraft acquisition and communication throughout the mission.

To learn more about the MSL mission, visit the mission home page at:

<http://www.nasa.gov/msl>

For more information about NASA's Langley Research Center, please go to:

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## Teach STEM? NASA Explorer Schools Can Help With That!

Teachers across the country, regardless of school size, type, or geographic location, have seen the benefit of participating in the NASA Explorer Schools (NES) project. These teachers have access to free NASA classroom materials and student engagement activities, as well as educator support resources, through the NES Virtual Campus. NES classroom resources are designed to help teachers increase student interest and achievement in science, technology, engineering, and mathematics (STEM) subjects.

Are you looking for fun, exciting and interactive ways to connect your students to NASA? Designed for teachers in grades 4–12, NES provides a forum for accessing free lessons, student engagement activities, and professional development opportunities centered on NASA missions and STEM topics and careers. NES also offers multiple pathways for you to connect with other motivated STEM educators across the country to share best practices and classroom implementation ideas. Visit the NASA Explorer Schools website to read firsthand stories from participating teachers about the benefits of joining the NES project and implementing NASA resources in the classroom!

<http://www.nasa.gov/offices/education/programs/national/nas2/recognition/profiles-index.html>

## Stargazing at the VAST PDI

**Bonnie Murray**

Teachers attending the Virginia Association of Science Teachers Professional Development Institute had the opportunity to observe the night sky through telescopes, and explore how telescopes have been used throughout history. NASA Langley Research Center, along with the Roanoke Valley Astronomical Society and Hampton City Schools, took Virginia educators on a tour of the night skies during the recent VAST PDI. The activities included sharing information on NASA’s use of telescopes and educational resources related to the study of the solar system and the universe, as well as opportunities to view the night sky through telescopes and within the StarDome. They experienced the changing constellations of the night sky by going into the Star Dome which was staffed by Heather Greer from Hampton City Schools Science Department. Teachers also learned how to make a simple version of the dome from household materials, from National Institute of Aerospace educator Gay Reilly.

Langley Educators Bonnie Murray, NASA Aerospace Education Specialist Brandon Hargis and National Institute of Aerospace educator, Becky Jaramillo, engaged teachers in activities from NASA eClips and NASA and You educational videos on the Hubble and James Webb telescopes. The activities included lessons on the electromagnetic spectrum, a tour of the Year of the Solar System website and other online resources.

## Reflections from the National Congress on Science Education (NCSE)



Brita Hamilton, Region II Director, VAST President -Elect 2012



I had the honor of representing Virginia at the 2011 National Congress on Science Education (NCSE), which was held in Baltimore this past July. It was such an amazing experience to be a part of this group of talented, passionate and committed science educators!

The NCSE meets annually to discuss relevant topics and issues that may be of interest to NSTA (National Science Teacher Association) and the science education community at large. NCSE is a collection of delegates from NSTA’s 94 Chapter and Associated Groups (CAGs). Each CAG is allowed one voting delegate and one alternate. The voting delegate represents their CAG’s on resolutions proposed to the Congress by way of a vote.

The theme for the 2011 NCES was “Spirit, Opportunity, Innovation: Science Education for a Smarter Planet.” From that theme, four Issue Forums were developed: #1: 21st Century Skills; #2: STEM Education; #3: pK-8 Science Education; and #4: The 3 R’s of Teaching Careers: Recruitment, Retention and Resources. Delegates and alternates were encouraged to pick an issue that resonated with them and read provided materials to prepare for the Issue Forum breakout sessions.

Being a middle school science teacher, my heart has always been focused on PreK-8 Science Education, so I picked that forum. The focus of this forum was to identify and determine action steps that would increase the teaching of science at the PreK-8 levels and assist our PreK-8 teachers with their science professional development at pre-service and in-service levels.

The science educators who chose Forum 3 had a diverse background ~ there were elementary classroom teachers, Science Supervisors, as well as college professors. It was wonderful to have such a variety of expertise at the table creating resolutions that would guide NSTA and CAG’s in helping shape PreK-8 science education.

Some of the resolutions passed will hopefully directly affect PreK-8 classroom teachers. The goal of these resolutions was to assist classroom teachers by helping them learn more about the resources available.

Resolution 7/11CNG2 states that CAG’s should create a link on their existing websites that provides resources aligned to national and state standards as well as providing reliable resources for teachers.

VAST has numerous links on their website to assist teachers with content area questions, as well as state and national museums, organizations and other educational websites. By having these links, VAST is committed to helping our science educators find information when they need it.

Resolutions 7/11CNG3 & 7/11CNG4 states that CAG’s and NSTA should make a concerted effort to reach out to PreK-8 educators (through teacher preparation programs, colleges, informal science centers, etc.) so they are aware of the resources the CAG’s and NSTA have to offer.

Being a teacher, I am not always aware of the resources available to me. Thankfully, VAST uses many avenues to get information out to its members. There is the VAST Newsletter, the emails, the on-line Journal and let’s not forget the VAST website. By complying with this resolution, VAST’s is committed to helping our PreK-8 educators know what is out there, how to access it and how to put it into action in their classroom.

Resolution 7/11CNG7 states that CAG’s, to the best of their ability, coordinate and facilitate training and mentoring aligned to state standards and/or frameworks.

VAST is committed to helping our teachers receive the training and mentoring they need to help them become the teachers they want to be. The VAST website has links to organizations that provide training as well as a calendar that can be used to spread the word about other professional development opportunities. You can help us by letting us know about workshops and other professional development activities in Virginia. Let us help you get the word out!

By participating in the NCSE, I have a better appreciation for how NSTA and CAG’s work together in order to improve science education. By implementing these resolutions, VAST is committed to helping all teachers of science in Virginia become the best teachers possible!





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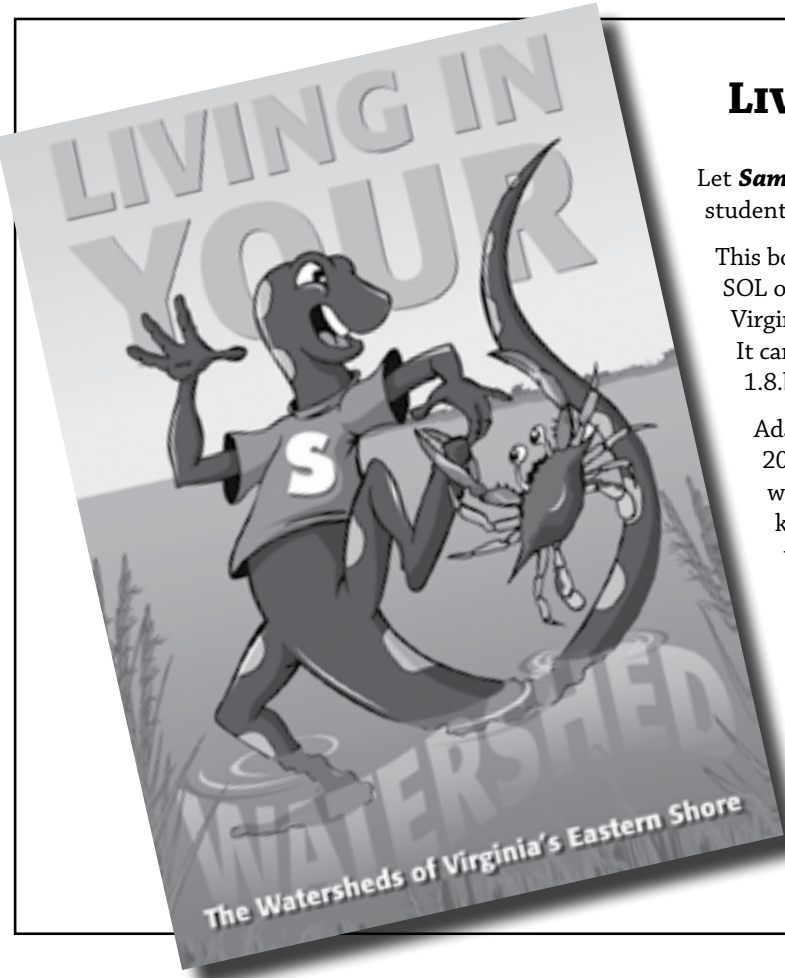
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- Affiliated with the Virginia Math Science Coalition
- A State Chapter of the National Science Teacher's Association

***The next issue of The Science Educator will be a digital "Green" issue, emailed to you on Tuesday, March 6th. Please look for it at that time and check the VAST website if you do not receive your copy.***

VAST newsletter is sent bulk rate, therefore VAST apologizes for any time sensitive information that you may receive late. Please consult the website for up to date information, VAST forms for awards and mini-grants, and current PDI information. [www.vast.com](http://www.vast.com)



## ***Encourage New Science Teachers by Supporting the Eduware "First Timers" Awards!***

Your contribution to the Eduware "First Timers" Awards Endowment for excellence in science education will make a difference. VAST hopes to honor and support those whose accomplishments enhance science education. A donation from Bill Stevens of Eduware, Inc., has made it possible for VAST to award to new teachers the cost of the registration to a VAST PDI. By contributing to these efforts, you are supporting the attendance of new, vibrant members to our professional development institute, (PDI). This fund supports those PDI registrations from teachers who have three years of experience or less.

In order to increase the endowment's principle, we need your support for this program. VAST members and non-members may make a voluntary pledge to the endowment. Together we can all make a difference by helping to support the expenses of the new educators so that they may continue in the field.

Please make a pledge today. This is just one way to support new science educators and quality science education for years to come. VAST is a 501c3 organization and is eligible to receive tax exempt donations.

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

To make a tax-deductible contribution please send your donation directly to the treasurer, Jimmy Johnson at :

Mr. Jimmy Johnson, 12141 Winns Church Rd, Glen Allen, VA, 23059 and make your check payable to VAST. Please let Jimmy know that your check is a contribution for the "First Timers Award Endowment".

Thank you!!!