



The Science Educator

Late Spring 2015 A publication of VAST, The Virginia Association of Science Teachers Vol. 63, No.5

PDI REGISTRATION OPENS MAY 18th!



PreCon Events: Donna R. Sterling Institute VAST PDI • Chantilly



Dr. Donna R. Sterling 1948-2014

For more than 20 years, Dr. Donna R. Sterling was a pioneer and leader in science education in Virginia. As part of her legacy, VAST is proud to offer a day devoted to continue Dr. Sterling's legacy of "challenging the status quo." We hope you will be able to join us to learn, grow, and change teaching practices in order to reach a new generation of future scientists!

Plan to attend, preferably with your team of three teachers and an administrator. Registration for the preconference may be added to your PDI registration and special charges are available for just the preconference or for your team of three teachers and an administrator.

Registration Price includes 1 free book, lunch, and access to short courses as well as speaker Thursday night!

Session 1: Uncovering Student Thinking in Science Through Formative Assessment

Location: Lincoln Forum Auditorium, Westfields Marriott
A full day course.

Description:

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

Join us as we:

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

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

President's Message



Welcome to May!

I don't know where time is going, but it seems to be flying these days! Summer is almost here!

Thanks for all you do for students here in Virginia. I have been attending several events sponsored by VAST and have enjoyed meeting such fabulous science teachers. This month your VAST board will be working to select the presentations for this year's PDI. Please talk to your principal about sending you to the PDI. We have a wonderful event planned with many different options for learning and of course will have fabulous concurrent sessions. I look forward to seeing you at this year's PDI!

Jenny Sue Flannagan, Ed.D.
VAST President

Save the Date! Register Today!

The 2015 VAST PDI!

When: Thursday November 19 to Saturday November 21, 2015

Where: Westfields Marriott Washington Dulles,
14750 Conference Center Drive, Chantilly, Virginia

MAKE SURE YOU SHARE THIS NEWSLETTER WITH YOUR PRINCIPAL BECAUSE OUR
PRECON AND FUTURE SPEAKERS WILL HAVE ADDED VALUE FOR THEM.

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

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Donna R. Sterling Institute

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Session 2: Short Courses

3:30 p.m.-5:00 p.m. (Subject to change)

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

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

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



Dr. Donna R. Sterling Teaching

Session 3: Keynote Session and Opening of the 2015 VAST Professional Development Institute

5:30 p.m.-6:45 p.m. (Subject to change)

Speaker: Dr. Fredrick Bentley, The Franklin Institute

From the Executive Director

May Day!

May Day, May Day...you heard the ship coming sailing in from the VAST horizon.....make way for a proposal....the time is ending fast...make way for an art entry from your students....before there is no space....make arrangements for a hotel room so you have a place to rest.

Do not worry if you don't think your presentation will be good enough. You have lots to share and if you don't share then why come...be a part of the winds in our sails.

Most of all plan your travels....Happily on Friday morning I left the Hampton Roads Areas at 7:30 am to get to the hotel in under 3 hours when it was projected to be 4...just remember to take the Lorton exit.

See you soon....and May the Sun be at your back and the winds in your sails.

Susan Booth, EdS



Namaste!

Kathy Frame
VAST President-elect



As I write this, I am thinking of the people of Nepal. I was fortunate to be there for a few weeks. I cannot image the beautiful temples and buildings no longer there, much less what has happened to the people that I met and developed friendships with. It is too soon to know all that has been lost. I just know that the people are so kind and so beautiful. In particular, the young mother and her small son who were on the street corner down from where I lived. I passed her each day. She roasted corn for sale in a small metal round pan on a fire. She always smiled and always was kind. I have heard from a friend that Sachin, the young man who was my driver while I was in Nepal, is alive; as is the professor I met and was to work with at Tribhuvan University. In the 2008 fall issue of *The Science Educator*, I wrote about the incubator that the Nepalese had designed for classroom use...quite a difference from what we use here even with what we call “old” equipment. Note, I said I was to work at Tribhuvan University, but when I arrived in country, the communists were taking control. There were demonstrations in the street and the university was closed. So, I had a very different experience in Nepal than interacting with the students.

The theme of the 2015 VAST PDI is “**Designing Inquiring Minds**”. We are very fortunate in this country to be able to have the opportunity to attend a conference that is full of rich opportunities that you can share with your students and open opportunities for them that may not have been possible before. Register right now and take advantage of as many opportunities as possible:

Thursday Preconference: The Donna Sterling Institute: *Discover how to uncover student ideas in science – and – what do to do once they are known in this preconference session.*

Students come to the classroom with preconceptions about how the world works. There is a growing body of research showing if we do not gather and interpret evidence of students’ thinking, they will not build a bridge from their existing ideas to new concepts and information.



Thursday Field Trips that will have Designing Inquiring Minds

Janelia Farms was designed to inspire a vibrant scientific community with a culture that is intentionally self-assembling, not top-down.



Image: Research Facilities, Janelia Farms

Geology of Great Falls National Park is located along the boundary between the Piedmont Plateau and the Atlantic Coastal Plain, in an area known as the fall line.

Fractures in a metamorphic rock formation at Mather Gorge.

Image: National Park Service.



Chesapeake Bay Foundation Stream Side. CBF saving the Bay through education, advocacy, litigation, and restoration.



Student Leadership Program. Image: CBF Staff

Continued...

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Namaste!

Continued:

2015 VAST Speakers, Field Trips, Exhibitors and Concurrent Sessions!
Check the VAST website to view these updates in the summer.

General Session Speakers



Principal Kafele - An internationally known and an outstanding educational speaker and consultant. Principal Kafele is in demand as a speaker for transforming the attitudes of at-risk student populations in America. He regularly conducts conference keynote addresses and professional development workshops. He works to close what he coined, the “attitude gap” – the gap between those students who have the will to strive for academic excellence and those who do not.



Dave Burgess - New York Times Best-Selling author Dave Burgess uses a unique combination of magic and humor to create a program that will transform the way you look at your role as an educator. You will learn how to dramatically increase student engagement, design wildly creative lessons, and build a course that is a life-changing experience for your students.



Shah Selbe - Sponsored by National Geographic, Shah created FishNET, to detect and track illegal, unreported, and unregulated fishing worldwide. He is a satellite propulsion systems engineer at Boeing Space and Intelligence Systems and the Southern California region representative of Engineers Without Borders. Shah Selbe believes technology is the one tool powerful enough to catch the culprits who catch the fish, and threaten the populations of the world’s fish populations by illegal fishing.



Dr. Fredrick Bertley - Dr. Bertley is a scientist from the Franklin Museum in New York . He will speak on the need to develop inquiring minds in our students and how to motivate students into STEM careers. At the Franklin Museum Dr. Bertley oversees both research-based projects and program development and implementation projects. He has directed K-12 Professional Development, Learning Technologies, and Youth Programs that include STEM Scholars, Partnerships for Achieving Careers in Technology and Science (PACTS) and The Franklin Institute’s magnet high school, Science Leadership Academy.

The professors at Tribuhuvan would be overwhelmed with these opportunities that you have at your fingertips. Register for the conference for YOU and renew yourself as a Teacher. Be the best TEACHER that you can be!

Kathy Frame,
VAST President-elect

2015 VAST Professional Development Institute (PDI)

Westfields Marriott
November 19 to 21, 2015



Schedule

Wednesday November 18, 2015

5:30 p.m. – 8:30 p.m. VAST Board Meeting & Dinner

Thursday, November 19, 2015

8:00 a.m.-8:30 a.m. Registration Desk for Pre-Conference/Short Courses Opens
8:30 a.m.-3:00 p.m. Field Trips: Janelia Farms, Geology of Great Falls Park, and Chesapeake Bay Foundation Field Study.
8:30 a.m.-5:00 p.m. **Donna R. Sterling Institute**
8:30 a.m.-3:00 p.m. Session 1: Uncovering Student Thinking in Science Through Formative Assessment
PDI Presenter: Joyce Tugel
3:00 p.m.-7:30 p.m. Registration Desk Opens for Short Courses/ Conference Registration
3:15 p.m.-5:15 p.m. Session 2: Short Courses 1, 2, 3 **Pre-Registration and tickets required.
5:30 p.m.-6:45 p.m. VAST Professional Development Institute Opening
Keynote Session I: Frederic Bertley, Franklin Institute
7:00 p.m.-8:30 p.m. Night with Exhibitors
Reception

Friday, November 20, 2015

7:00 a.m.-8:30 a.m. Continental Breakfast
7:30 a.m.-6:00 p.m. Registration Desk Open
8:00 a.m.-9:30 a.m. General Session II- Business Meeting
General Session II Speaker: Baruti Kafele
9:00 a.m.-6:00 pm Exhibit Hall Open Pick up Raffle ticket for Friday's Exhibitor Raffle
10:00 a.m.-11:00 a.m. Concurrent Session 1
11:15 a.m.-12:15 p.m. Concurrent Session 2
12:30 p.m.-1:00 p.m. Ticketed Lunch I (Orange Ticket)
1:15 p.m.-1:45 p.m. Ticketed Lunch II (Green Ticket)
1:30 p.m.-2:00 p.m. Exhibitors Lunch (Blue Ticket)
1:45 p.m.-2:45 p.m. Concurrent Session 3
2:45 p.m. -3:15 p.m. Exhibit Hall Raffle
3:15 p.m.-4:15 p.m. Concurrent Session 4
4:30 p.m.-5:30 p.m. Concurrent Session 5
5:45 p.m.-6:15 p.m. Meet your Regional Directors (Pay as you go bar)
6:15 p.m.-7:15 p.m. Ticketed Dinner
7:30 p.m.-8:30 p.m. Awards Ceremony
Guest Speaker HHMI
8:45 p.m.-10:30 p.m. General Raffle and Dance.

Saturday November 21, 2015

7:30 a.m.-10 a.m. Registration Desk Open
8:00 a.m.-10:00 a.m. General Session III VAST Membership Meeting.
Keynote: Shah Selbe, National Geographic Explorer.
8:30 a.m.-12:00 p.m. Exhibits
10:05 a.m.-11:05 a.m. Concurrent Session 6
11:20 a.m.-12:10 p.m. Concurrent Session 7
12:15 p.m.-1:00 p.m. Ticketed Lunch
1:00 p.m.-2:00 p.m. Concurrent Session 8
2:15 p.m.-3:30 p.m. **General Session IV Teach Like a Pirate?: Dave Burgess, Dave Burgess**

DRAFT



Hotel Registration - VAST PDI 2015



Westfield Marriott Conference Center

Virginia Association of Science Teachers 2015 PDI

Hotel Information Westfields Marriott Chantilly, VA Westfields Marriott Reservation Deadline October 28, 2015

Location: Westfield Marriott 14750 Conference Center Drive
Chantilly, VA 20151 Room Reservations

Room rate: \$109.00 for single and double occupancy.

Taxes: 12% occupancy tax (totaling \$122.08). S

Parking: Complimentary self-parking. valet parking is \$25.00 for overnight guests and \$15.00 for event day parking.

Check in: 4:00 PM

Check out: 12:00 PM

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Guest rooms: Wireless for Marriott Rewards Members. Others: \$12.95/day.

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Reserve your room NOW online by clicking the link below:

http://www.marriott.com/meeting-event-hotels/group-corporate-travel/groupCorp.mi?resLinkData=VAST%20Professional%20Development%20Institute%202015^IADWF%60VPDVPDA%60109.00%60USD%60true%6011/18/15%6011/22/15%6010/28/15&app=resvlink&stop_mobi=yes

Or call 1.800.635.5666

2015 VAST PDI

Registration Information and Important Dates.

Mark your calendar!

Registration

Online at <http://www.vast.org/annual-pdi.html> Please see the Website for the most up-to-date information about availability, fees and dates.

Payment Methods

Secure credit card, check payable to VAST, or purchase order.

Important dates

August 1 to September 5, 2015. Presenter (Member, Nonmember, Commercial) PDI Registration.

April 30 to September 30, 2015. Field Trip Registration.

April 30 to October 18, 2015. Early Bird Registration.

October 19 to October 28, 2015. Standard Registration.

Fee Structure

VAST Membership (Due on the anniversary of your subscription) \$25

Thursday Preconference

 (Includes 1 free book, lunch and access to short courses and Thursday night speaker)

\$100 With paid registration to the VAST PDI

\$120 Preconference Only (Thursday)

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

Thursday Short Course Fee

\$5 per Short Course

Field Trip Registration due September 30, 2015

- Janelia Farms: Limit:15. Cost \$24.
- Geology of Great Falls National Park: Limit 15. Cost: \$36.
- Chesapeake Bay Foundation Stream Side: Limit 15. Cost: \$36.

Professional Development Institute (PDI)

- **Presenter** (Member, Nonmember, Commercial) Registration. Deadline: September 5, 2015

Member Presenter Registration: \$155

Nonmember Presenter Registration: \$200

Commercial Presenter Registration: \$150/hour

Early bird-Registration. Deadline: October 18, 2015

Member Registration (this includes Life Members and Retired Members): \$170

Nonmember Registration \$220

Student Registration: \$100

- **Standard-Registration.** Deadline: October 28, 2015

Member Registration: \$205

Nonmember Registration: \$250

Student Registration: \$130

Spouse/Guest: \$100

Saturday Only: \$100

2015 Donna Sterling Exemplary Science Teaching Award Elementary (K-6)



Deadline for applications: July 15, 2015

To apply:

(1) In no more than two pages, single-spaced, describe an inquiry-based science unit that the applicant taught. Give evidence that the unit was effective. Evidence documents such as student work can be submitted separately, and will not count toward the two-page limit.

In no more than two pages, single-spaced, describe the plan for professional development, using the funds received through the Sterling award. These plans may include summer courses, study abroad opportunities, instructional materials development under the guidance of experts on-site, etc. Submit the professional development description with anticipated outcomes, including plans for a presentation at the 2016 VAST PDI. Tell how this award will help the awardee become a better teacher of science.

(2) Submit three letters of recommendation based on direct observations of teaching. One letter must be from the science supervisor or someone serving in that capacity, a second letter must be from the principal, assistant principal, or instructional leader, and a third letter must be from a fellow teacher or a parent. Letters should address the following: Why is this teacher a good candidate for this award? What qualities do they exhibit as teachers that make the recommender think they will use the funds from the award to improve their practice as teachers of science?

All materials must be submitted by 5 p.m. on July 15, 2015. Submit applications and letters of recommendation to Dr. Juanita Jo Matkins, jjmatk@wm.edu

Donna Sterling was a visionary science educator with a passion for working with science teachers and developing habits of inquiry-based teaching. Most recently, her leadership in the Virginia Initiative for Science Teaching and Achievement (VISTA) focused on elementary and secondary teacher professional development. This award recognizes that exemplary teachers engage in continuous improvement, and is designed to support a professional development plan for the improvement of science teaching. In 2015, the award will be given to an exemplary elementary teacher. The award will alternate between elementary and secondary in future years.

The awardee will receive a total of \$4000. In addition, travel costs will be reimbursed to attend the 2015 VAST PDI to receive the award and to the 2016 VAST PDI to present a session on the professional development experience and outcomes. The awardee will receive \$3000 at the VAST PDI in 2015. The remainder will be awarded after the awardee presents at the next VAST PDI and also submits an article to either the newsletter *The Science Educator* or the *Journal of Virginia Science Education*.

2015 Biotechnology Educators Conference for High School and Community College Educators

Fralin Life Science Institute and Virginia Bioinformatics Institute at Virginia Tech are excited to offer the 2015 Biotechnology Educators Conference for high school and community college educators! The goal of the conference is to provide technical and content updates for science educators, including new applications in medicine, infectious disease, and agriculture.

The conference is July 29-31st. Participants may choose from an array of workshops and come together for 2 talks and a social dinner. On July 29th, there will be a pre-conference Biotech

Bootcamp available for educators new to biotechnology.

Registration is currently open (late registration starts May 1st-\$100). CEUs will be given.

For more information on registration, schedule, talk/workshop information, and housing options see:

<http://vbi.vt.edu/resources/biotech> .

Kristy M. Collins, Ph.D.
Education and Outreach, Virginia Bioinformatics Institute,
Virginia Tech

Nominations Open for the 2015 VAST RISE Awards

Know someone who should be recognized for their work in science education?

The Virginia Association of Science Teachers is now seeking nominations for the 2015 VAST Recognition In Science Education (RISE) awards.

VAST recognizes excellence in the following categories:

- Elementary (preK-5)
- Middle school (6-8)
- Biology
- Chemistry
- Earth Science
- Physics
- Environmental Science
- At-Risk Students (K-12)
- Resource Teacher (examples: Technology, Science Resource, Etc.)
- Science Educator (non K-12 classroom) Examples Science Supervisor, Information Education, Principal, Etc.)
- University/College Faculty
- Community Partnership (example: Local Business, Government, Non-profit Organizations, Etc.)

Note: Nominees do NOT need to be a member of VAST.

Awardees will be recognized at the November 2014 VAST PDI and will be reimbursed up to \$150 to attend the conference.

The deadline for nominations is August 20, 2015. The nomination forms are available on the VAST website:

<http://www.vast.org/vast-awards.html>

Help us celebrate individuals who deserved to be recognized for the wonderful work they do in our schools.

Join me in acknowledging their contributions to the greater good.

Timothy Couillard

VAST Awards and Grants Committee Chair

VAST Mini-grant Program Accepting Applications for 2015

Got an innovative idea that needs some seed money? Need support for an innovative professional development activity?

The VAST Awards and Grants committee is now taking applications for the 2015 Mini-grant program.

The VAST grant program includes the VAST Education Mini-grant, the Tidewater Alliance of Chemistry Teachers' (TACT) Chemistry Education Mini-grant, and the American Institute of Professional Geologists (AIPG) Mini-grant.

Team applications are welcome, however one person must be designated as the Project Director. To qualify for the Mini-grant program, the Project Director must a) be a current member of VAST (dues paid for 2015), b) have a minimum of three years of experience as an elementary or secondary science classroom teacher, and c) be currently employed as a classroom teacher in the Commonwealth of Virginia.

The Awards and Grants committee is looking for projects that will directly impact student learning in the science classroom. Proposals will be evaluated the originality, creativity, and cost effectiveness of the proposals. Ideally, the projects that are funded will provide the students with new experiences and make possible new scientific investigations.

Mini-grant funds may be spent for supplies, equipment, printing, and other materials essential to the project. Mini-grant funds are not intended for student travel (field trips) or for the personal remuneration of the grant recipients. All materials will become the property of the school/school system in which the Project Director is employed at the time the grant is awarded.

The deadline for submissions is June 1, 2015. The applications are available on the VAST website:

<http://www.vast.org/grants.html>

We look forward to supporting your ideas for enhancing your students' science experience!

Timothy Couillard

Awards and Grants Committee Chair

Environmental Literacy Gets Boost from Virginia Governor

By Cindy Duncan



Sitting among Richmond Public School students beside the James River on Earth Day, Virginia Governor Terry McAuliffe signed an executive order creating the Virginia Environmental Literacy Challenge.

The voluntary program challenges classroom teachers, principals, and other school administrators to engage students in outdoor learning experiences and other projects aimed at improving student understanding of the environment.

“Environmental literacy is a key component of my administration’s conservation efforts,” the governor said in a statement. “We need to make sure that our students are graduating with the skills and knowledge they need to protect Virginia’s natural resources. Learning about our environment is a great way for children to understand important scientific concepts that will prepare them for the new Virginia economy.”

Then looking directly into TV cameras at the signing, Gov. McAuliffe said emphatically, “I expect to see teachers and school divisions taking this challenge seriously.”

According to the governor’s office, the new program will provide classroom teachers with lessons on topics like recycling and sustainability that will help them teach important scientific concepts in new, innovative ways. To complete the voluntary challenge, school divisions must

commit to providing significant numbers of students with outdoor experiences and train their teachers and administrators in best practices for using the environment as a classroom.

The governor’s executive order directs state education and natural resources agencies to work with school divisions that participate and also encourages them to partner with nonprofit groups, such as the Chesapeake Bay Foundation (CBF).

The Governor’s participation made the Earth Day event an apt occasion for promoting environmental literacy. Shortly before signing the executive order, Governor McAuliffe, First Lady Dorothy McAuliffe, and Virginia Secretary of Natural Resources Molly Ward had returned from an on-the-water discovery trip with the Richmond students aboard CBF’s James River education vessel, *Baywatcher*. The discovery experience aboard *Baywatcher* is one of many hands-on environmental education programs that CBF offers school students, teachers, and administrators across Virginia. Environmental literacy has long been a CBF core mission. This year, in fact, marks the 30th anniversary of CBF’s James River boat program in Richmond.

And CBF continues to advocate for environmental literacy

Environmental Literacy Gets Boost from Virginia Governor continued.

as a partner in the nationwide No Child Left Inside coalition and in the recently formed Virginia No Child Left Inside coalition, of which VAST is a charter member.

Why are conservationists and educators concerned about environmental literacy?

Growing numbers of children (and adults) today suffer from “nature deficit disorder,” a term coined by Richard Louv, author of the 2005 book *Last Child in the Woods*. It refers to a near-total unfamiliarity with the outdoors caused by a preoccupation with the indoors and electronic devices -- televisions, computers, cell phones, electronic games, and other virtual reality gadgets. On average, kids 8 to 18 years old spend more than 7.5 hours a day using entertainment media, says the Kaiser Family Foundation. That’s more than 53 hours a week.

CBF has sought to change that over the years by taking thousands of students, teachers, and principals outdoors for hands-on, get-wet-and-dirty experiences. They board one of our Coast Guard-inspected “floating classroom” vessels or paddle canoes and kayaks on creeks and rivers. They spend the day reading maps, identifying landmarks, noting shoreline land uses, taking water samples, fishing, crabbing, and oohing and aahing at the critters they find.

But the boat trips are more than just fun days on the water. CBF’s staff of professional environmental educators reinforce Virginia Standards of Learning and complement teachers’ own classroom studies. CBF’s summer professional development courses provide teachers and administrators with the knowledge and skills they need to establish their own environmental literacy programs. Takeaways include proven lessons, materials, projects, and field trip management tips.

For many students, the CBF field experiences represent the first time they’ve ever been on a boat. For still others, the trips are life-changing experiences that spark an enduring love of science and nature. Many teachers have confided

they were first inspired to become science educators by a CBF discovery trip they took as youngsters. For more about CBF’s outdoor education experiences, visit: cbf.org/education.

But environmental education does other important things as well. Studies demonstrate:

- It improves student achievement in science, likely because environmental studies connect classroom learning to the real world.
- It improves student interest and engagement in the classroom. Students just seem to like environmental studies, opting to focus science fair and service projects on environmental topics more than any other subject.
- It boosts reading, math, and social studies achievement when integrated into these subjects.
- When used as a common thread in all classes, environmental studies reduce student discipline problems, increase student enthusiasm, and generate greater pride and ownership in accomplishments.
- More importantly, environmental education teaches critical thinking and basic life skills necessary for a 21st century workforce.

Last year, Gov. McAuliffe and the other Bay state governors signed a new Chesapeake Bay Agreement that includes an important environmental literacy goal: *“Enable students in the region to graduate with the knowledge and skills to act responsibly to protect and restore their local watershed.”* Gov. McAuliffe’s Virginia Environmental Literacy Challenge should help advance that goal wherever students live in the Commonwealth. And CBF encourages the public and private sectors to work together to ensure all Virginia students have the opportunity to become environmentally literate. Armed with this knowledge, Virginia students can become tomorrow’s leaders, making sound decisions to restore the Chesapeake Bay and to protect Virginia’s precious natural resources.

Cindy Duncan is Virginia Teacher Professional Development Coordinator for the Chesapeake Bay Foundation.

**Virginia Project Learning Tree® presents a
Biology II/Ecology Institute
July 27 – 31, 2015
based at the
New Kent Forestry Center
11301 Pocahontas Trail, Providence Forge, VA**

Biology II /Ecology teachers are invited to join us for a rigorous outdoor exploration of Coastal Plain ecology with several local experts. This course will focus on content knowledge, investigations, and service-learning opportunities based on a Sample Ecology Curriculum Framework recently developed by Virginia teachers. We will conduct studies at False Cape State Park, York River State Park, and the Chickahominy River, and learn about many species issues, for a total of 40 hours of instruction.



Frog photo by Bill Portlock

REGISTRATION is online here.

https://docs.google.com/forms/d/1tvypA4twruFDTlZ4NI3-UAzYGHa1xFGUo40r_MMaX28/viewform
https://docs.google.com/forms/d/1tvypA4twruFDTlZ4NI3-UAzYGHa1xFGUo40r_MMaX28/viewform

You must be a Biology II/Ecology instructor to participate in this institute. After completing the online registration form, reserve your spot by sending a check for \$50 written payable to “VFA-PLT Fund” and mailing it to:

Lisa Deaton
 Virginia Department of Forestry
 11301 Pocahontas Trail
 Providence Forge, VA 23140

QUESTIONS? Contact Lisa Deaton at lisa.deaton@dof.virginia.gov or 804-512-2933.

Links on PDF:

<http://dof.virginia.gov/locations/nkcc.htm>

http://www.dcr.virginia.gov/state-parks/false-cape.shtml#general_information

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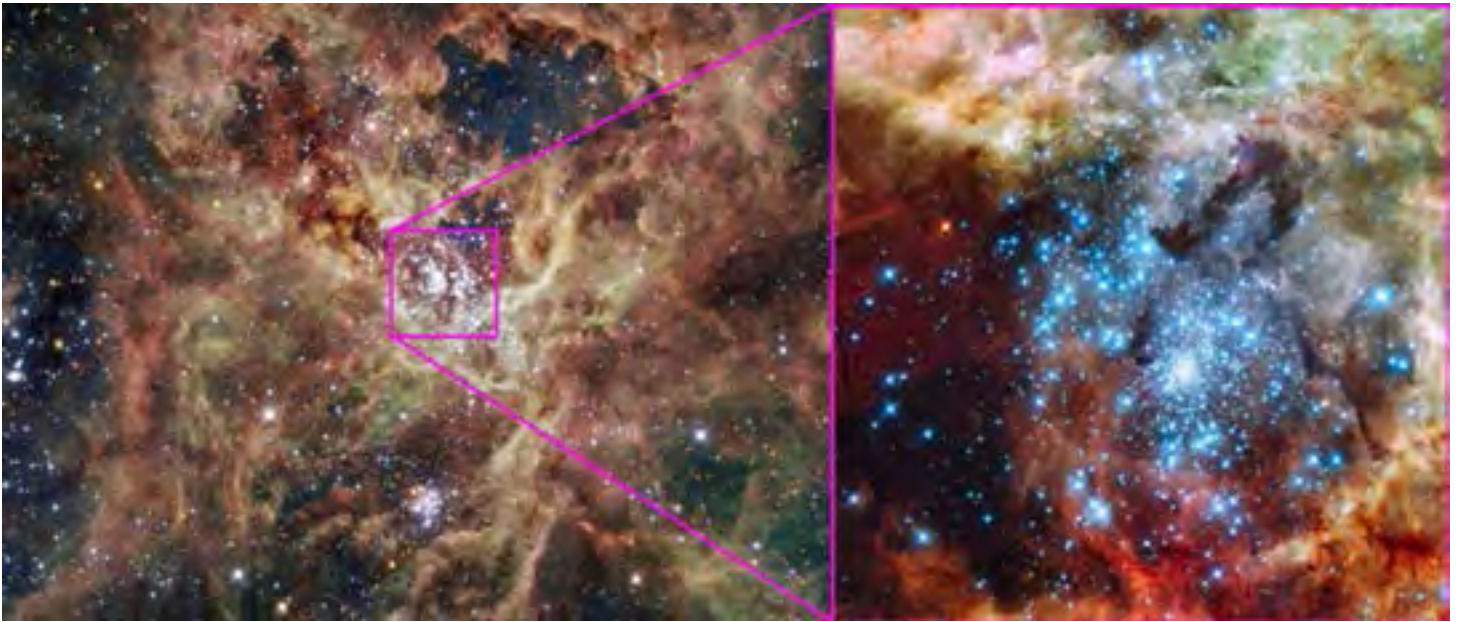
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Images credit: ESO/IDA/Danish 1.5 m/R. Gendler, C. C. Thöne, C. Féron, and J.-E. Ovaldsen (L), of the giant star-forming Tarantula Nebula in the Large Magellanic Cloud; NASA, ESA, and E. Sabbi (ESA/STScI), with acknowledgment to R. O'Connell (University of Virginia) and the Wide Field Camera 3 Science Oversight Committee (R), of the central merging star cluster NGC 2070, containing the enormous R136a1 at the center.

Is the Most Massive Star Still Alive?



By Ethan Siegel

The brilliant specks of light twinkling in the night sky, with more and more visible under darker skies and with larger telescope apertures, each have their own story to tell. In general, a star's color correlates very well with its mass and its total lifetime, with the bluest stars representing the hottest, most massive and shortest-lived stars in the universe. Even though they contain the most fuel overall, their cores achieve incredibly high temperatures, meaning they burn through their fuel the fastest, in only a few million years instead of roughly ten billion like our sun.

Because of this, it's only the youngest of all star clusters that contain the hottest, bluest stars, and so if we want to find the most massive stars in the universe, we have to look to the largest regions of space that are actively forming them right now. In our local group of galaxies, that region doesn't belong to the giants, the Milky Way or Andromeda, but to the Large Magellanic Cloud (LMC), a small, satellite galaxy (and fourth-largest in the local group) located 170,000 light years distant.

Despite containing only one percent of the mass of our galaxy, the LMC contains the Tarantula Nebula (30

Doradus), a star-forming nebula approximately 1,000 light years in size, or roughly seven percent of the galaxy itself. You'll have to be south of the Tropic of Cancer to observe it, but if you can locate it, its center contains the super star cluster NGC 2070, holding more than 500,000 unique stars, including many hundreds of spectacular, bright blue ones. With a maximum age of two million years, the stars in this cluster are some of the youngest and most massive ever found.

At the center of NGC 2070 is a very compact concentration of stars known as R136, which is responsible for most of the light illuminating the entire Tarantula Nebula. Consisting of no less than 72 O-class and Wolf-Rayet stars within just 20 arc seconds of one another, the most massive is R136a1, with 260 times the sun's mass and a luminosity that outshines us by a factor of seven million. Since the light has to travel 170,000 light years to reach us, it's quite possible that this star has already died in a spectacular supernova, and might not even exist any longer! The next time you get a good glimpse of the southern skies, look for the most massive star in the universe, and ponder that it might not even still be alive.



Schoolyard Botany Workshop

“Schoolyard Botany” is a professional development workshop for K–5 educators presented by the Flora of Virginia Project and the Virginia Living Museum

Inspire your students to love the outdoors, and meet your SOLs at the same time! Explore plants and their connections with culture, history, and art. You will use a selection of lesson plans inspired by the Flora of Virginia and the 2014 exhibition of the same name at the Library of Virginia. Sample lesson topics: journaling like a botanist; comparing types of botanical art; practical uses of plants; changes in habitats; and using dichotomous keys to identify plants. You’ll leave with a palette of hands-on, often outdoor activities that will interest your students in the botanical world around them. Lesson plans are keyed to combinations of K–5 SOLs in Science, Math, English, History, and Art. Each opens with an activity of sensory observation to encourage subjective learning, an approach inspired by Richard Louv’s *Last Child in the Woods*.

Free. Registration required. Supplies provided. Lunch is on your own.

9:00AM-4:00PM, held at your choice of four different venues!

Registration required. Contact the venue of your choice to register!

Monday, June 22, 2015 at the Virginia Living Museum in Newport News, Virginia

Tuesday, June 23, 2015 at Blandy Experimental Farm in Boyce, Virginia

Wednesday, June 24, 2015 at Lewis Ginter Botanical Gardens in Richmond, Virginia

Thursday, June 25, 2015 at the Virginia Museum of Natural History in Martinsville, Virginia

NEEF Announces Extreme Weather & Climate Change Free Online Course

Free Online Course Provides Information on Preparing for the Impacts of Extreme Weather & Climate Change
NEEF launched a free online course devoted to helping the American public understand and prepare for the impacts of extreme weather and climate change. Extreme Weather 101 is designed to equip Americans with the information they need to understand the links between climate change and extreme weather, anticipate the types of extreme weather events they may experience and prepare to protect life and property in the face of these events.

In 2014, the United States experienced eight weather and climate disasters with losses exceeding one billion dollars each, including drought in the West, five severe storm events, flooding in Michigan and the Northeast, and a winter storm that affected the Midwest, Northeast and Southeast. As some types of extreme weather increase in frequency and intensity in a changing climate, it is crucial that individuals and communities develop resilience by focusing on preparedness.

In the course, students learn “the basics” about extreme weather and climate change through videos, quizzes and toolkits with tips and links to preparedness resources. The course draws on the Third National Climate Assessment and other trusted federal agency and peer-reviewed sources to cover topics including how scientists know the climate is changing and how climate change impacts extreme weather, national and regional weather trends in the United States over various time scales, the health and environmental impacts of extreme weather and climate change, and weather preparedness.

The Extreme Weather 101 free online course can be found at <https://www.udemy.com/extreme-weather-101/>. The course is hosted on the Udemy online learning platform.

<https://www.udemy.com/extreme-weather-101/>

Time to Renew Your Membership!




Your VAST Membership


Don't let your membership expire! We would miss you and just think of what you would be missing:

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- Important information about current educational trends and news
- Points for recertification
- Networking opportunities

Did you know that you can print your VAST professional development certificates from the VAST website? Just login to Membership at VAST.org! You can also see future professional development opportunities, as well as your past and current training records!



VAST
Regions



Time to Renew your VAST membership

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Greetings State Leader in NSTA District VIII:

Allow me to introduce myself. As of June 1, I will be your new NSTA District VIII Director. I look forward to meeting you in person and finding out more about your organization and how NSTA can best support science education in your state.

My goals over the next three years are: to build a stronger relationship with your state; to provide more access to NSTA resources; and, to provide more support for what you are trying to accomplish in your state. As your representative, I would like to make myself available to you by whatever means that work best—email, phone, text, or social media.

In the meantime, please let me:

1. connect with you by your web and social media sites;
2. know when your state conference is as well as any other key meetings you would like NSTA representation or participation; and,
3. know if you have any comments, questions, or concerns.

All the best and I look forward to working with you for the good of science education and our profession!

Denny

Dennis A. Casey, Ph.D.
2014-2018 NSTA District VIII Director Elect
Director of Education and Public Programs
Virginia Museum of Natural History
21 Starling Avenue
Martinsville, VA 24112
Office 276-634-4184
Mobile 276-224-3906
<http://www.vmnh.net>

Editor's note: Congratulations Denny!

VAST members should know that Denny is a VAST Past-President and has served on the VAST Board and as the Web Administrator for the VAST website for many years. We are excited to have the NSTA District VIII Director Elect from Virginia. District VIII includes Kentucky, Virginia, West Virginia.



Conversations

Sometimes the mountain
is hidden from me in veils
of cloud, sometimes
I am hidden from the mountain
in veils of inattention, apathy, fatigue,
when I forget or refuse to go
down to the shore or a few yards
up the road, on a clear day,
to reconfirm
that witnessing presence.

– *Witness*

By Denise Levertov

“What do you want to do today while we drive to the restaurant?” she asked her grandson as she buckled him into his car seat. “Count all the blue cars you can see?”

“Um-m – no, I did that last time – let’s count all the red ones... Remember when we raced to see who could find the most B-words in the menu?”

Nana answered, “Ah, yes, and you won!”

After a pause, “I like red today, blue got so boring.” He began to giggle.

“What’s so funny?” Nana asked.

“Oh, I was just thinking ‘boring’ starts with ‘B,’ too!”

Beneath her training in early childhood education and her years as elementary school teacher, my sister has an instinctive gift for entering the world of children and stirring their thoughts and imaginations as a spring breeze might set leaves of a tree vibrating without disturbing a limb. Others might enter the room thundering truths and expectations, great gusts and flashing facts, blowing away all irrelevancies and leaving only the strongest branches intact. I recall a conversation in which she described her early encounter with the Head Start program and that many of those educationally needy children had rarely even heard a complete sentence during their earliest years at home.

Twenty years ago, a famous study¹. appeared [*Meaningful Differences in the Everyday Experiences of Young Children*, by Betty Hart and Todd Risley] which revealed the enormous differences in words exchanged between infants of professionals compared to those of working class families living in poverty. The researchers measured total word exposure in 8-36 month old children from 42 families spanning middle-class, professional, working class backgrounds including families living on public assistance. On average children of professionals had heard over 2000 words per hour, working class families just over 1200 words per hour, but



welfare children had heard only 600 words per hour. Extrapolated, this led to the conclusion there was a 30-million-word gap by age 3 between children of professionals and those living in poverty. With modern wearable digital technology, parent-child interactions indicate exposure of 20,000 words per day (22 million by age 3) vs. only half that many words for disadvantaged children. By age 3, a child’s IQ is more closely correlated with the number of spoken words heard than to any other factor, including parental education or economic level.

One might conclude that low socioeconomic-status families engage little with their kids. Yet further studies have revealed that the upper half of parents lacking a high school diploma had more daily verbal interactions than the lower half of college-educated parents. As Jill Gilkerson, director of child-language research for the LENA Research Foundation has put it: “Conversational turns are vastly more important than the number of words a child is exposed to.” Encouraging vs. directive conversations are key here: “What do you think of that?” vs. “Put it over there,” or “Don’t touch that.” The issue, it seems, is not urging parents to talk more, but to engage children in conversations. The top 10% preschool language test results compared to the bottom 80% showed 18 more conversational turns taken per hour for the upper percentiles. Perhaps Nana and her grandson were onto something!

In Denise Levertov’s words, the mountain is there, often veiled through mist or cloud, but also veiled through inattention, apathy, or fatigue. This time of year especially, we teachers often “forget or refuse to go...a few yards up the road to reconfirm that witnessing presence.” We ignore or postpone the conversations in our zeal to “cover the material.” Parker Palmer, author of *The Courage to Teach* and *Healing the Heart of Democracy*, has spoken of the analogy of “covering material” to dragging a huge tarpaulin over an athletic field: do we cover or allow our students to uncover? On a recent Saturday morning at our school 200 AP History students sat in a lecture hall for four hours of listening to a veritable hurricane of facts and information by their teacher prior to their examination.

And, so it was with interest mixed with a bit of apprehension that I read an April 24th blog by Grant Wiggins (author of

Science for All continued.

Understanding By Design), “*Why do so many high school history teachers lecture so much?*” Complete with charts from his student surveys in this 2014-15 school year, the top 3 subjects in which teachers lecture most were history, mathematics, and science, in that order. In classes identified as most heavy with lecturing, about half of high school teachers lecture 75 – 100% of the time. Students’ ideas of the “right amount of time for teachers to lecture so that you can learn best” showed 25% saying about ¼ of the period, 23% saying about ½ the period. Wiggins adds, “And please don’t tell me there is ‘so much to cover’ – that is silly. You are paid to cause understanding, not based on how many words you speak.” He cites AP history teachers who prepared students using simulations and performance challenges and a Portland teacher who had organized his entire course after the old Steve Allen show, Meeting of Minds. Wiggins also includes a link to research on lectures and offers two reasons to lecture at length (sometimes): the teacher has done original research, or has interesting knowledge based on research which can help overcome student misconceptions. He concludes with the caution that he is not saying not to lecture, just questioning why it is done so often. [Interestingly, our school’s student newspaper ran an April editorial in which one of our lecture-oriented special events was criticized, the student citing a 2014 study by Scott Freeman at University of Washington where students’ grades increased an average of 6% “when they were in an interactive learning environment compared to a lecture.”]

Predictably, many of Wiggins’ responses were defensive. Others: “it is easier and gives me more control;” “unlike math or science, history is a story;” [The old *Harvard Project Physics* program would argue that science is a story, too.] “overwhelming content compared to teachers’ backgrounds;” “the more I know about a topic, the easier it is to come up with an alternative to a lecture;” “...not a powerpoint that kids just copy, [but] plenty of stopping to ask questions and engage in discussion.” One respondent’s suggestion of a resource was *Why Won’t You Just Tell Us the Answer?* by Bruce Lesh. But Wiggins maintains “History teachers...are more fixated on inputs than outcomes.” Clearly Mark Williams (high school history teacher) is an exception. He was invited to write a guest post on this subject. Williams did a bit of research as an undergraduate on tracking how well teacher-talk and student-talk correlated with cognitive level: single facts, explanations, or higher level inferences, interpretations and syntheses. The higher level student responses came from questions asked which required students to speak longer and ask questions themselves; factual or recall questions, of course, elicited little conversation and personal engagement in the form of questioning or analytical thinking. No surprise there, but when teachers were shown the data, their behavior changed immediately. Mini-lectures of 3-5 minutes replaced lengthy monologues and more sophisticated prompts replaced fill-in-type questions.

The issue to me is not lecturing by history teachers. Does not this speak equally powerfully to science teachers? Is the “lecture” some sort of adult version of the Piagetian collective monologue so typical of young preoperational children? Like the bridge, are we engaging in “conversations” to nowhere? I wonder, as I sometimes

see the bowed heads and bored busy hands in my own classroom during pre- and post-test review.

Our propensity toward teacher-talk and less student conversation is not helped by our own “educationese” where we use language and terminology which too easily becomes obfuscating instead of clarifying. Levi Folly, a Virginia teacher, wrote about this problem in a recent piece in *Education Week*². We are trying to engage our children in meaningful conversation, hopefully conversation which enlightens and stimulates. In challenging readers to examine more closely their conversations with one another and with students, Folly offers these comments: “What is a ‘powerful conversation’? Is it different from a ‘rich conversation’? Does ‘have a conversation around’ mean to discuss? Recently, a friend told me he’d spent ‘all morning helping teachers unpack standards so they understood what students should know and be able to do.’ I wanted to ask whether or not the suitcase had wheels. To quote [a] colleague ‘Why don’t we just say what we mean?’” Check out Folly’s example of a conversation between an elementary student and his parent.

In science, at least in physics, the success of the modeling approach is almost entirely dependent upon student conversations and dialogue where lab work or problem-solving is shared on whiteboards with the class. Student groups explain their work to peers and teacher while students are encouraged to critique or comment in a non-judgmental atmosphere. When most students have been encouraged by parents and teachers to give short, factual, and “correct” answers to simplistic questions [“What did the alligator do?” “What is the acceleration of the elevator?”], it is hard to get more than mono-syllabic responses to more analytic questions [“What would you say if the alligator said that to you?” “How would you explain why the elevator accelerates that way?”]

Finally, Levertov suggests another obstacle to our ability to engage in meaningful conversations: “veils of inattention, apathy, fatigue...” Our school’s spring drama production, *Radium Girls* by D.W. Gregory is a piece of historical fiction which tells the story of young girls in Orange, NJ, who had worked in the U.S. Radium Corporation plant painting clock and watch dials and promoting a radium “cure-all” drink called Radithor. The girls, who routinely pointed their brushes in their mouths after dipping them in radium paint, were dying as necrosis of tissues in jaw, hands, and limbs occurred when radium began replacing calcium in their bones. The play is rife with corporate denials and worker mistreatment: “I’m just so tired of bein’ pushed around” as the main protagonist, dial painter Grace, explains. There are confrontations between scientists and lawyers: “We are the largest company in the world manufacturing radium; do you know what it takes to run a company like this?”...“A scientist is concerned with the truth...” “I’m looking out for my interest and you are looking out for yours.” Nearing the end of her own life, Grace comments tellingly to the company’s attorney, “At your factory, they told us what to do. When to do it. How to do it...I did what I was told. I never asked questions.”

As the play ends, Arthur Roeder, company president for four years, admits to the dial painters’ attorney that every day for four

Science for All continued.

years he had walked onto the floor and observed the girls at work, yet somehow “did not recall” ever seeing a girl put a brush to her lips. The final words in the drama are Roeder’s, to his daughter, with Grace at a distance commenting that he was afraid to look at her: “...try as I might – I cannot remember their faces. I never saw their faces.”

Can we “forget or refuse to go / down to the shore or a few yards / up the road, on a clear day, to reconfirm / that witnessing presence”?

In the end, is it about content and information, or is it about engaging in conversation?

“I never saw their faces.”

¹Sparks, Sarah D. *Education Week*. 22 April 2015.

²Folly, Levi. *Education Week*. 6 May 2015.

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.

- Chemistry Notes -

Jill Barker, VAST Chemistry Chair



- The American Association of Chemistry Teachers (AACT) is a new organization sponsored by the American Chemical Society by and for K-12 chemistry teachers. Their website, < <http://www.teachchemistry.org> >, contains classroom resources, professional development opportunities, and additional information that chemistry teachers may find of interest.
- ChemEd 2015: The biennial chemistry education conferences for K-12 chemistry teachers is being held from July 28-August 1 at Kennesaw State University in Kennesaw, GA. Information about registration, program, lodging, and travel is available at their website: < <http://ccpe.kennesaw.edu/chemed/> >.
- The 2015 POGIL Southeast Regional Workshop is being held 7/21-7/23 at UNC-Asheville. Introductory, intermediate, and advanced tracks are available for both high school teachers and college professors. More information about the workshop is available at: < <https://pogil.org/events/2015-pogil-southeast-regional-workshop> >.
- The Content Teaching Academy at James Madison University is again holding modeling workshops from June 22-26. Multiple tracks are being offered this year. Detailed information is available at: < <http://cta.jmu.edu/academy/2015-9-12-chemistry-modeling> >. If you are interested in modeling, but are unable to attend the academy, information about other modeling training opportunities is available here: < <http://modelinginstruction.org/workshops-2015/> >
- If you are unable to leave home this summer, **Flinn Scientific** has created chemistry teaching and chemical demonstration videos for virtual professional development. College credit is available through these series. Use the following link to learn more about the opportunities available through Flinn: < <http://www.flinnsci.com/teacher-resources/chemistry/> >.

The NSF 2015 Teaching & Learning Video Showcase (May 11-15) is now live.

View the videos and join the conversation!

<http://resourcecenters2015.videohall.com>

Take a peek into the world of STEM education research by checking out this showcase of more than 100 videos. The videos offer a 3-minute glance into the variety of innovative work being funded by the National Science Foundation in education.

We invite you to be an active participant during this five-day event. View videos of interest, post questions to the presenters, join the discussions that are taking place around each video, and vote for your favorite videos via facebook, twitter, or email ballot. And please spread the word about this event to friends, family and colleagues!

If you have any feedback or comments, please send them to: < contact@resourcecenters2015.videohall.com >.

The STEM Smart and CADRE Teams <http://cadrek12.org> <http://successfulstemeducation.org>

“The Science of Nuclear Energy & Radiation”**4-Day Science Teacher Workshop**

4 p.m. July 20 - 4 p.m. July 24, 2015

Registration Deadline June 19, 2015

The Virginia Section of the American Nuclear Society (VA-ANS), the Virginia Chapter of the Health Physics Society (HPS), the North American Young Generation in Nuclear (NA-YGN), and the Lynchburg Chapter of Women in Nuclear (WIN-LC) invite you to attend “The Science of Nuclear Energy & Radiation”, a four day annual workshop for science teachers.

The workshop will be hosted by Virginia Commonwealth University School of Engineering from July 20-24, 2015, and will feature tours of the Surry Nuclear Power Station and VCU’s Nuclear Medicine Facilities. There are also laboratories and hands-on activities.

Instructors and lecturers are experts in the fields they are to present, and will be discussing topics including nuclear energy and technology, nuclear power plant basics and safety, functionality and use of Geiger-Müller counters, and the basics, biological effects and beneficial uses of radiation.

The goal of this workshop is to provide educators with the opportunity to sharpen their knowledge and understanding of nuclear energy and radiation, enabling them to provide their students with factual and up-to-date information about nuclear science and technology. Ideas to use all the information provided in the classroom will be provided.

The \$75 registration fee includes:

- 4 Continuing Education Credits
- All Meals and On-Campus Accommodations
- Geiger-Müller Counters (for participants to keep)
- Teaching Materials
- Tours, Presentations and Laboratories
- Many applicable Virginia SOLs will be covered

REGISTRATION DEADLINE IS JUNE 19, 2015

For more information and to register, see the VA-ANS website

http://local.ans.org/virginia/3dSTW/2015/2015_4dSTW.html

QUESTIONS ? Contact Sama Bilbao y León, (804) 828-2570
virginia-3dstw@local.ans.org

Summer 2015 Program**Teachers of grades 3 - 8:**

Come explore electricity and magnetism, and teaching practices to support classroom integration of these topics!

Pick your favorite location and time

UVa Charlottesville Workshop**July 13-24, 2015****JLab Newport News Workshop****July 27-August 7, 2015**

- Academic year follow-up
- Receive: \$1500 stipend (\$1000 in the summer, \$500 near the end of the academic year)
- Free Electricity, and Magnetism Kit (more than \$100 value)
- Earn 3 graduate credits for UVa PHYS 6263
- Free Housing for non- commuters
- Free VAST PDI registration
- Network with fellow science teachers

For more detail go to the link

<http://people.virginia.edu/~ral5q/classes/UVa-JLab/summer/>

Apply Now!

UVa Professional Development:

July 13-24, 2015

<http://2015uvaapp.questionpro.com>

JLab Professional Development:

July 27-August 7, 2015

<http://2015jlabapp.questionpro.com>

Application due by 5:00 pm April 17, 2015

Job Opportunity:

Saint Patrick Catholic School, in Norfolk, is seeking Middle School Science teacher applications. Employment Applications are available on our school website, <http://www.stpcs.org>, under the tab entitled “People”.

Managing A Lab-Station Activity: You Can Do This!



Nick Swan May 2015
6th Grade Science Teacher,
H.B. Andrews PK-8 School

Picture this: a second year teacher is surrounded by bustling students moving very quickly around a crowded classroom. The alarm of a Geiger counter is going off, audible above the raucous din. The kids have iPads in their hands, and they are energetically attempting to scan every QR code they can. Thinking and learning is going on. Oh yeah, a few of that teacher's administrators are in the room, taking notes on his walkthrough form. Things are looking great for our new teacher!

Now imagine this: sheer bedlam is unfolding in another classroom. The students all have iPads, but only a few are trying QR codes. Most are playing with the devices, aloof, on games instead of on-task. A Geiger counter isn't registering any radiological signals because it's not even being used. Another alarm rings out though—a kid has dropped an iPad. Its screen is destroyed. By the way, that teacher's administrators are there, observing him. A subtle head shake from one indicates that all is not well. There is a fine between success and failure in the modern classroom, especially when 21st century technology is involved. The line becomes even thinner when teachers are trying station-rotations. You know all about these! Basically, a teacher manages a class full of students, broken into groups, moving about the classroom, taking turns at activity centers. Pulling one of these lessons off takes a lot of preparation, coordination, and attention to time management. And don't forget about the fundamentals. You've got a science classroom to run, after all! Things need to stay safe, or someone could lose an eye, inhale some poison, or burn the school down. You certainly don't want any of that being observed.

The lessons I described above come from personal experience. I was the teacher from the first lesson, but I narrowly avoided being the teacher from the second anecdote. Doing so required me to set expectations and ground rules early, keep an eye on the clock, and keep the other eye on all the students the whole time. I also let the technology do the hard work for me!

Set the Ground Rules and Expectations Early

The objective of the activity was for students to learn about radiation and the power contained inside of atoms. One station required students to download an app, NOVA elements, and use it to model atoms from the periodic table. Another station tasked students with



The yellow brick is the vintage Air Force issue Geiger Counter from 1973. The iPad is showing a display of acceptable radiation levels.

comparing a digital Geiger counter probe for the iPad to an analog Air Force Geiger counter from the 1970's, whilst reading an antique alarm clock locked behind a glass cabinet. Another station had students watching a YouTube video about the Radium Girls. A Radon detector was the star of another station, with an accompanying video clip. And I hosted the last station with a presentation on the history of atomic science and the Manhattan Project. This was all laid out for the kids early. If this isn't done, they won't take the activity seriously. Period.

Don't forget your fundamentals. Lab safety and appropriate equipment usage are tantamount. This activity didn't feature anything really dangerous. The older analog devices were fragile and the radium clock was a cherished antique on loan. If you wanted to try something like this, you would be remiss to not remind your kids to be careful with walking around with their eyes on their devices. Lab tables hurt when bumped into!

Keep One Eye on the Time, and the Other on the Students!

Let your kids know that they have a time limit at each station while they are rotating. If you do not, they will not use their time wisely. If they get bored while slacking off, they can start getting into mischief. Manage their groups. Don't let them break ranks and mingle with other groups unless you scaffold that into the lesson. Keep the kids moving to keep them engaged. If you don't move the kids on schedule, some stations won't be visited. You spent all that time prepping, so they might as well learn all they can!

Let the Technology do the Hard Work For You

When it comes to students using tablet devices to engage in stations, if you make a website that hosts your lesson objectives, you can refer your students to it instead of reiterating your instructions. For the 10 millionth time. Seriously, that gets kind of old, especially during your last class of the cycle. QR codes are great for leading kids to the websites and videos you want them to visit. If your kids are using I-devices, they can link directly to apps you want them to download. I'm including some of that media at the end of this article.

Wrapping it Up

It is really important that if you are going to go to all the effort and, let's be frank, stress; of a station lab activity, the students should be assessed for learning at the end of the day. And you should also assess the activity itself. What went well? What did not? What accidents did you successfully avoid? Ask your kids what they learned, and what they liked. And do ask your administrators if they liked what they saw. You invited them too, right?

Nick's website contains a lot of helpful iPad apps for both curriculum delivery and classroom management.

<http://handsontech.weebly.com/>

Twitter: @nswanHCS

Website: www.swansci.weebly.com

Suggested QR Code Maker Web Service: www.qrstuff.com
(plug the desired website in, and you can instantly generate a QR code.)

App: NOVA elements (free!)

Suggested QR code reader: Qrafter



This is a QR code for the NOVA elements App. Simply open up your QR reader and "scan" this image to be linked directly to the app. Enjoy!

iPad Geiger counter probeware: <https://itunes.apple.com/us/app/pocket-geiger-counter-lite/id448044891?mt=8> (not pictured)

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"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."

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