



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

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President Tom Fitzpatrick passes the gavel to newly elected President Michael Pratte. Tom will now serve as Past-President for 2020.

President Michael Pratte: served as president-elect in 2019.

Past-President Tom Fitzpatrick: will now serve as Past-President for 2020 having served as president in 2019 and president-elect in 2018.

Treasurer: Matt Scott has served as the VAST Treasurer for the past three years and is committed to serving another term.

Russell (Russ) Kohrs will serve as VAST's President-elect for 2020 and he will be president in 2021. He currently teaches Environmental Science and Geology at Massanutten Regional Governor's School and Lord Fairfax Community College. He holds a BA in Geology with minor in Archaeology from the College of Wooster (Wooster, OH) and an MS in Geology from the University of Cincinnati. He has served as the Earth Science Chair for the VAST board of directors, and as President of the Virginia Earth Science Teachers Association (VESTA).

Regional Director 1: Carolyn

Elliott has served as Regional Director for Region One for the past four years and has contributed to VAST through communications with the membership, helping with PDIs, and working with the legislative committee. Carolyn will continue to focus on improving a communications network among the Region One membership to provide a

VAST Enters the New Year with a New President and New Officers

forum for sharing teaching strategies and ideas for K-12 science.

Regional Director III: Margaret Greene has been active in VAST as the Earth Science/VESTA representative to the VAST Board. She has been active in VESTA since it was started. She served as Vice-President and then President of VESTA. Margaret is a member of VAST, NSTA, VIP, VESTA, and NAGT.

Regional Director V: Robbie Higdon, associate professor in the Middle, Secondary, and Mathematics Education department within the College of Education at James Madison University, holds a Ph.D. in Curriculum and Instruction from Clemson University, a master's degree in Secondary Education from James Madison University, and a bachelor's Degree in history from Furman University.

Congratulations to all new and returning VAST Board members who work together with their many talents and experiences to "inspire students, provide professional learning opportunities, build partnerships, and advocate for excellence at the school, local, state and national level". (VAST mission statement)



Donna Rowlett, Region VII Director; Margaret Green, Region III Director; Robbie Higdon, Region V Director; and Russ Kohrs, VAST President Elect for 2020. Carolyn Elliot, Region I Director, was unable to attend the PDI.



From the Executive Director

Keeping Millennials Engaged as well as others...We are generational

I'm asking the millennials of science education, what do we need to do to retain you not only as a member, but also as an educator? What are you interested in? What events do you want to see? How can we keep your attention?

Then again...we can ask that question to all of us...our demographics are definitely different whether by age, gender, race, location and employment. Think of all the studies we have read to understand our students...so what studies do we need to understand our membership?

Are you a member because someone suggested you join?
Did you find VAST on your own?
Did you come to a PDI and say this is for me?

Think of how many generations VAST has impacted. Much like Science has been generational from 8-track tape, to cassette to CD to the cloud. Where might you fall upon this spectrum? Or **Are we united by attitudes and beliefs and the effect we have on the future?**

VAST is where members can be heard and valued and its benefit serves by making a difference. Tell us your Wow moment and share it through social media.

Susan Booth, Ed.S.
Executive Director



National Science Teaching Association NSTA Elections are Happening!

**Time
Sensitive**

The National Science Teaching Association is holding elections for its Board of Directors and Council. If you are an NSTA member, you should have received your ballot by email. Visit NSTA's Website to find out more about the nominees.

You may also submit up to three names of members to consider for nomination on the 2021 ballot when you vote.
Voting Deadline: 11:59 pm Eastern Standard Time, February 10, 2020.

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Michael Pratte

From the Desk of your President

Greetings and Happy New Year!

**Michael Pratte
VAST President
2020**

Colleagues, it is a privilege to serve as your Virginia Association of Science Teachers President this year. I remember my first VAST Professional Development Institute (PDI) attendance as a pre-service teacher in the early 90s and how it nurtured my formation as a classroom science teacher. Attending the pre-conference and sessions connected me to a larger family of educators, resources, and expertise that keeps me returning each fall to continue to improve my knowledge and use of 21st century skills in my career.

With the newly adopted Virginia science standards and framework, we too can reflect on what knowledge and, more importantly, skills our students will need as they move closer to graduation and their career pathways beyond. Universal skills found in our standards over the multiple revisions continue to prove invaluable for our students. Our students will rise to more technologically equipped fields which require the ability for critical analysis of quantitative and qualitative data and lead to decision making in a collaborative problem-solving environment.

I invite each of you to reflect on how you integrate and allow your students to practice and master universal skills through the exploration of science content. I then ask you to consider sharing an investigation, method, and/or practice with others at the fall 2020 VAST PDI. This year's theme is *Our Contents, Our Courses, Leading to Many Career Pathways*. Please consider how you will share your talents and expertise next November 12 – 14. Be part of the VAST continuum of helping new and veteran colleagues connect to our family of pre-service, classroom, higher education, and non-profit partners.

Let's involve all colleagues and all students in meaningful science exploration,

-Mike



Call for Nominations for 2021 VAST Board of Directors!

Are you looking for a challenging leadership position that impacts local, state, and national science education? Would you like to serve the association that serves you? The VAST Nominating Committee is currently accepting nominations from the VAST Membership who are in good standing for the following positions on the 2021 VAST Board:

President-elect, Secretary, Regional II Director, Regional IV Director, Regional VI Director, and Regional VIII Director.

Just take a few moments to download and complete the [nomination form](#) and email to: tfitzpatrick@rcps.info

What is the VAST Mission?

The Virginia Association of Science Teachers (VAST) is a community of Science educators whose mission is to:

- inspire students,
- provide professional learning opportunities,
- build partnerships,
- advocate for excellence at the school, local, state and national level.

Who is Eligible?

All VAST Members, in good standing (current VAST member).

**Please note that all officers and directors serve on a volunteer basis. Please ascertain that the colleague(s) you nominate do not express serious concerns regarding volunteer service time or have conflicting priorities.*

Who May Nominate? Nominations are welcome from all VAST members. Self-nominations are always encouraged!

What Are the Position's Responsibilities? President-elect, President, Past-President

is a three-year commitment beginning in January 2021 through December 2023 as President-elect, Year 1; President, Year 2; and Immediate Past-President, Year 3.

The **President-elect**, shall have served on the VAST Board of Directors, will be elected for a one-year term, shall:

- Serve as the Co-Chairperson of the standing Conference (PDI) Committee (working closely with the PDI Chair) for the purpose of planning, scheduling, and execution of the conference scheduled for the year of his/her term in office.

The **Secretary** shall keep a permanent record of all business transacted by VAST; keep the minutes of meetings for the general membership, Executive Committee, and Board of Directors; distribute copies of the minutes to members of each group in a timely manner; and, perform such duties as are usually incidental to the office. The Secretary shall be elected for a term of three years.

A **Regional Director**, elected for two years, shall: (See the [Regional map](#). Find your county or the closest large city. Each Director represents one of eight geographic regions established by the Virginia Department of Education.)

- Be elected in even years if their region number is an even number and on odd years if their region number is an odd number;
- Promote membership in VAST in their region;
- Promote professional development activities in their region
- Participate actively in VAST functions, including Professional Development Institutes, publications, and awards.



Timothy Colin Bouchillon, an Environmental Science and Capstone Research teacher at Manassas Park High in Manassas Park, **Myron Blosser**, a Biology and Biotechnology teacher at Harrisonburg High in Harrisonburg, and **Dr. Anne Peterson**, Science Coordinator, Office of STEM an Innovation at the Virginia Department of Education.



Virginia Finalists Selected for Presidential Math and Science Teaching Awards

Two Virginia secondary science teachers were selected as state finalists for the 2019 Presidential Award for Excellence in Mathematics and Science Teaching. The award, regarded as the nation's top honor for mathematics and science teachers, recognizes teachers who develop and implement high-quality instructional programs that improve student learning in mathematics and science. The 2019 Virginia state finalists are **Timothy Colin Bouchillon**, an Environmental Science and Capstone Research teacher at Manassas Park High in Manassas Park and **Myron Blosser**, a Biology and Biotechnology teacher at Harrisonburg High in Harrisonburg.

The finalists were selected by review committees convened by the Virginia Department of Education. Dr. Anne Peterson presented plaques to the winners at the VAST PDI this November. The two Virginia finalists were recognized this fall by the state Board of Education on October 25, 2019.

The Presidential Award for Excellence in Mathematics and Science Teaching program is administered by the National Science Foundation on behalf of the White House. The award alternates annually between teachers in grades K-6 and teachers in grades 7-12.

A national review committee will review the applications of the 2019 finalists and the winners of the 2019 Presidential Award for Excellence in Mathematics and Science Teaching will be announced by the White House in 2020. Awardees each receive a \$10,000 unrestricted award from the National Science Foundation, a presidential certificate and a trip to the nation's capital for a series of recognition events and professional development activities.

For more information about the PAEMST program or to nominate a teacher, please visit www.paemst.org or contact Anne Petersen (anne.petersen@doe.virginia.gov).



Katherine Mangum Wins the Donna Sterling Exemplary Science Teaching Award (K-6)

Katherine Mangum on the left receives her award from Robin Curtis.

Katherine Mangum is the VAST 2019 winner of the Donna Sterling Exemplary Science Teaching Award for K-6. Katherine currently teaches fifth grade science at St. Catherine's School in Richmond, Virginia. She is also the FIRST LEGO League robotics coach and has taught first and second grades as well. In addition, Katherine serves on the Board of Directors with the Virginia Children's Engineering Council and is their Past President (2018-2019). She has participated with the NASA eClips Teacher Advisory Board and presented at conferences such as VMI STEM conference, VCEC Convention, and ITEEA Conference.

Katherine's inquiry-based project "Bee Friendly" and coaching the FIRST LEGO League robotics brings her tremendous joy as students excitedly take ownership of questions they want to solve. "Bee Friendly" originated from the girls researching about ways animals and humans interact. They discovered a podcast describing bees dying from pesticides used to prevent the spread of mosquitos thought to carry Zika Virus. Once the students read that seven types of bees were added to the endangered species

list, they decided to develop a solution to support bees.

Tonya Walker, Director of Middle School at St. Catherine's School said of Katherine;

"Because all teaching is relational (especially at a girls' school), Katherine creates a supportive classroom where her students recognize the importance of teamwork.

Her group projects stoke the imagination of her girls and set the bar high academically. Her young scientists understand that the process is more important than the product in her classroom and in the world of science."

Katherine plans to focus on Transforming Matter and Energy (SOL 5.9) and NGSS crosscutting concept, Energy and Matter (4-ESS3-1) for her professional development by traveling to Iceland on a National Geographic Family Journey in the summer of 2020 to deepen her understanding of geothermal energy. She then plans to create a student driven study of geothermal energy and its use around the world.

Future PDIs

2020	DoubleTree Hotel, Williamsburg, Nov. 12 - 14
2021	Hotel Madison and Shenandoah Valley Conference Center, Harrisonburg (JMU), Nov. 17 - 20
2022	DoubleTree Hotel, Williamsburg, Nov. 11 - 13

Secondary Teachers (6-12): Apply for the 2020 Donna Sterling Exemplary Science Teaching Award



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 2020, the award will be given to an exemplary secondary teacher. **For the secondary award the 6th grade teacher must be teaching in a secondary setting. The award alternates between elementary and middle/secondary.**

The awardee will receive a total of **\$4000**. In addition, travel costs will be reimbursed to attend the 2020 VAST PDI to receive the award and to the 2021 VAST PDI to present a session on the professional development experience and outcomes. The awardee will receive \$3000 at the VAST PDI in 2020. 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*.

Deadline for applications: July 15, 2020

To apply:

1. In your cover letter, include information on yourself, including your preferred name, your home and school addresses, and phone numbers and email address(es) where you can be reached. Tell us how many years you have taught, where, and what grade levels.
2. In no more than two pages, single-spaced, **describe an inquiry-based science unit** that you taught. Describe how your unit is student-centered and includes community engagement. 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.
3. In no more than two pages, single-spaced, **describe your plan for professional development**, using the funds received through the Sterling award. These plans may include summer courses, attendance at workshops, study abroad opportunities, instructional materials development under the guidance of experts on-site, etc. Feel free to be creative in your plan. Submit the professional development

description with anticipated outcomes, including plans for a

presentation at the 2021 VAST PDI. Tell how this award will help you become a better teacher of science and will support the development of leadership skills. Tell about your plans for writing an article about your experiences.

4. 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 pm on July 15, 2020.

Submit applications and letters of recommendation to Dr. Juanita Jo Matkins, jjmatk@wm.edu.

James Madison University Teacher Education Candidates Enjoy Their Time at VAST!

Robbie Higdon, Ph. D

Co-director for the Northern Ireland Study Abroad program, Co-advisor for the ROOP Residential Learning Community
Department of Middle, Secondary, and Mathematics Education, James Madison University
VAST Region V Director

Eleven James Madison University teacher education candidates and three professors attended the 2019 Virginia Association of Science Teachers Annual Conference. These students gave three presentations, attended keynote and concurrent sessions, and engaged with other pre-service teachers from around the Commonwealth.

Students in the MAT program presented “Academic Controversy to Enhance Conceptual Understanding”. This session focused on how to identify and introduce controversial topics within the secondary science classroom. Preservice teachers: Spencer Knox, Andrew Lough, Chris McKinney, Daniel Paunovic, Alex Shafer, Shannon Van Tol, modeled and shared ideas for introducing debate via constructive, cooperative, and academic controversy.

Officers for the JMU chapter of the National Science Teachers Association, Kayla Reibsome, Alesha Melendez, Nick Slater, and Zach Spencer, presented a session on “Actively Engaging All Learners”. They engaged their participants in ways to get every student in your classes actively involved within the learning process. Drawing from drama-based pedagogy, formative assessments, and learning cycle models, this presentation provided simple strategies

that can be implemented seamlessly into any lesson in any content area. Participants in this session should be prepared to actively engage with us and discover ways to “hook” all students in learning science concepts.

MAT students Amber Sanders and Alex Shafter collaborated with Dr. Robbie Higdon, JMU College of Education, and Russell Kohrs, Massanutten Regional Governors School, to give a presentation entitled “ReGifted: Differentiating for Your High-ability Students.” In this session, these students facilitated an interactive discussion on common issues in gifted education, and simple differentiation solutions that can be used in any class.

Our students also thoroughly enjoyed speaking with the various vendors and collecting those VAST bucks, which were eagerly redeemed at the Friday night auction. Our students “won” fossil specimens, books, posters, and Expo markers. We also became the proud owners of the life-sized, cutout posters of Captain Kirk Spock who join Sheldon Cooper in our growing collection.

See everyone in Williamsburg in November 2020!





VAST RISE Awards 2019 Awarded at the November PDI

VAST RISE Awards are presented to spotlight the excellent work done by science educators across the Commonwealth. They recognize service to science education in the individual's school, school system, and the VAST district in which they work. The number of awards to be given each year is determined by the Awards Selection Committee based on the qualifications of the nominees. The awardees are invited to attend the VAST PDI and will be recognized at the annual VAST PDI banquet.

Middle School Award for Outstanding Science Teaching and Contributions to Science Education in Virginia: **Sarah Arenas** - Thomas Harrison Middle School, Harrisonburg City Public Schools

Chemistry Award for Outstanding Science Teaching and Contributions to Science Education in Virginia: **Jen Sharp-Knott** - Floyd County High School, Floyd County Public Schools

Resource Teacher Award for Outstanding Science Teaching and Contributions to Science Education in Virginia: **Heather Leigh Briley Greer** - Smithfield High School, Isle of Wight County Public Schools

Informal Science Educator K-12 Award for Outstanding Science Teaching and Contributions to Science Education in Virginia: **Lowell Fowler** - Scott County Career & Technical Center, Scott County Public Schools

At-Risk Science Teacher K-12 Award for Outstanding Science Teaching and Contributions to Science Education in Virginia: **Craig Doolittle** - James Blair Middle School, Williamsburg-James City County Public Schools

Earth Science Award for Outstanding Science Teaching and Contributions to Science Education in Virginia: **Julie Back** - Phoebus High School, Hampton City Public Schools

Environmental Science Teacher Award for Outstanding Science Teaching and Contributions to Science Education in Virginia: **Sauna Russell** - Virginia High School, Bristol Virginia Public Schools

Community Partner Award for Outstanding Science Teaching and Contributions to Science Education in Virginia: **Natural Tunnel State Park** - Virginia Department of Conservation and Recreation

The Awards Nomination deadline is August 20, 2020. [Click here to go to the VAST webpage for more information and a Nominations Form.](#) Nominate yourself or a colleague who demonstrates excellence.

2019 Virginia Outstanding Biology Teacher Award is presented to **Elizabeth Romano** by VOBTA Director **Kathy Frame**



Elizabeth Romano receives her certificate from VOB-
TA Director Kathy Frame

Each year, the National Association of Biology Teachers (NABT) Outstanding Biology Teacher Award (OBTA) program recognizes an outstanding biology educator (grades 7-12 only) in each of the 50 states; Washington, DC; Canada; Puerto Rico; and overseas territories. Elizabeth Romano who teaches at The Governor's School at Innovation Park, Manassas, VA, received the 2019 VOBTA. Elizabeth is an instructor in the dual enrollment program between George Mason University and The Governor's School in which she teaches biology, microbiology, and anatomy and physiology classes. Among her numerous teaching responsibilities is to serve as the primary investigator for 15 to 20 wet lab research projects each year. She is known as an educator who goes above and beyond not only for her students, but also for her colleagues. She inspires her students to be passionate about biology and society.

As the VOBTA awardee, Elizabeth was a special guest of Carolina Biology Supply Company at the Honors Luncheon held in Chicago at the NABT Professional Development Conference. Each OBTA winner received gift certificates from Carolina Biological Supply Company, resources from other sponsors, and award certificates and a complimentary one-year membership from NABT. At the state level, Elizabeth received the VOBTA in absentia at the annual Virginia Association of Science Teachers (VAST) Award Ceremony held in Roanoke, VA.



VAST Regions Compete in The Revised 2018 Science Standards Break-OUT!!!

All eight VAST Regions region were given a multi-locked box that opened lock by lock as the group worked together to answer the challenge questions.

The winners above represented Region III by demonstrating outstanding command of the Revised Science Standards



2018. Congratulations to the region and newly elected Region III Director, Margaret Greene (2nd from the right in the front row) as well as VAST President Mike Pratte for 2020 on the far left.





VDOE Update

Anne Petersen (anne.petersen@doe.virginia.gov)

Thanks to all of those that attended the VAST conference this year; it was great to interact with many of you and learn strategies to support K-12 science instruction! At the Virginia Department of Education (VDOE), we are working with teachers and science leaders across the Commonwealth to provide all teachers with resources that can be used to support the implementation of the 2018 Science Standards of Learning and support the Curriculum Framework. We are at the beginning of the process and hope to have resources in place for the start of the 2020-2021 academic year. In addition, we have also released several new support videos which can be found on the VDOE Science Instruction page.

In addition to the resources, we also are planning for summer 2020 professional development. These professional development opportunities will be held June 22-24, 2020. Please mark your calendars! Announcements will be made through a Superintendent's email, Teacher Direct, Science Update, and directly to division science leaders. A three day professional learning opportunity will be available for third, fourth, and fifth grade elementary teachers. Discipline specific single day trainings will be available for secondary teachers. We also hope to continue our Deeper Learning Science Institutes in the fall in four locations in the Commonwealth. As information becomes available we will be certain to share it with VAST members as well as science teachers and leaders in Virginia.

A concern at VDOE is that of equity in education. How can we ensure that all students receive a quality science education? How do we support teachers in the implementation of instruction? We are trying to figure out how we can support equitable science instruction across the state. Part of the answer is to provide resources to teachers. The lesson plans and unit we are starting to develop will be low cost and embrace best practices in science instruction. We also need to consider the fact that students do not come to the classroom with the same content background or the same experiences (from school or home). In order to address this, teachers can use a common experience at the beginning of a lesson or unit so that students without the content or the experiences can have a platform to construct meaning of difficult or abstract science concepts. One goal in creating resources is to provide teachers with ideas on common experiences that can be put into practice within their classrooms.

If you have ideas on how we can better support equitable science education from our department, please feel free to contact Myra (Thayer) or me at any time.

Thanks for all that you do for students across the Commonwealth!

Anne Petersen



Virginia Junior Academy of Science Scholarships

There are two large scholarships offered by the Virginia Junior Academy of Science in the Environmental field. To check out other awards and more information please visit www.vjas.org. The information is found in the VJAS Handbook.

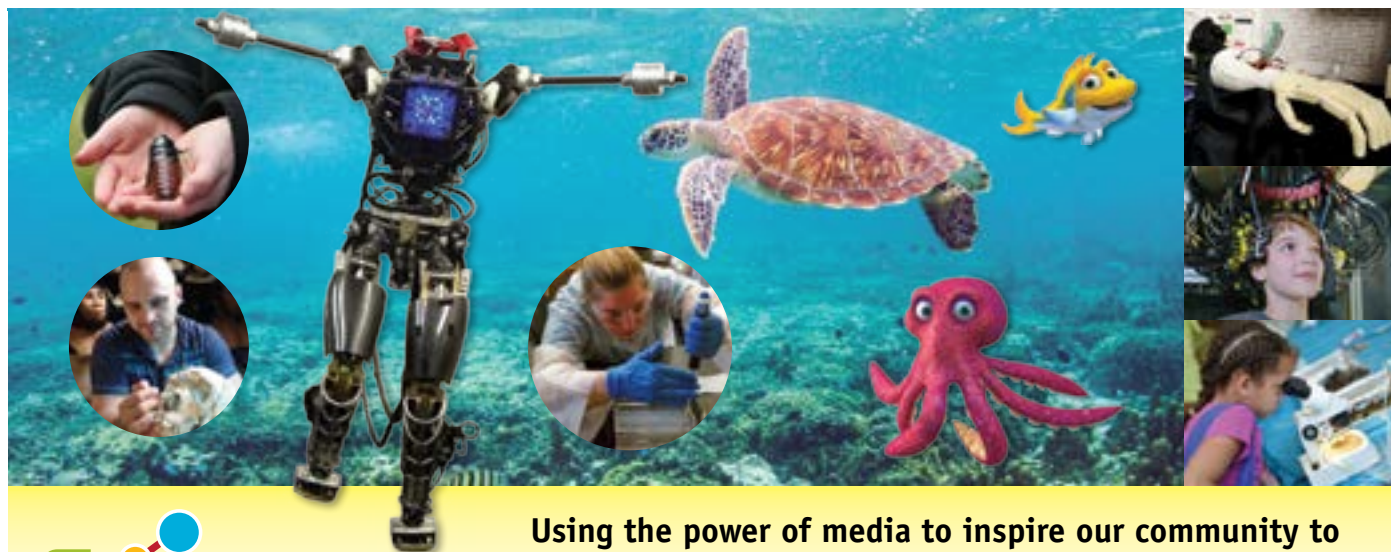
SCHOLARSHIPS PROVIDED BY THE VIRGINIA ENVIRONMENTAL ENDOWMENT

The Frances and Sydney Lewis Environmental Science Scholarship

This \$5,000 four-year college scholarship may be awarded to the student whose project presented at the VJAS Research Symposium evidences the most significant contribution in the field of Environmental Science. The purpose of the award is to stimulate interest in environmental sciences and to enable promising young students to pursue undergraduate studies in a related field. The Virginia Environmental Endowment (VEE) and the VJAS offer this scholarship in tribute to the outstanding and generous services of VEE Directors Emeriti, Frances A. Lewis and Sydney Lewis.

The Henry W. MacKenzie, Jr. Environmental Scholarship

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



Using the power of media to inspire our community to value science and understand its importance to our future

Educational Resources for Teachers and Parents

Hot Shots & Hot Jobs in STEM fields

Green Kids encouraging Environmental Stewardship

Community Events Calendar a hub for Science Events

**Science
MATTERS**



ideastations.org/sciencematters • [facebook sciencemattersva](https://www.facebook.com/sciencemattersva)

Developing Your Own Field Investigation Kits

Suzie Gilley, Wildlife Education Coordinator and State Coordinator Project WILD, VDGIF

Page Hutchinson, Forest Education Specialist and State Coordinator Project Learning Tree, VDOF



Why have students learn outside? There is no better location to learn about the biotic and abiotic factors of our environment than outside! Outdoor field experiences provide students with an authentic context for their learning. Getting students outside to study their environment also can increase engagement in learning and develop critical thinking, collaboration, and creative thinking skills.

Field investigation tips. The most valuable field investigations are those done over time (more than one class period); this provides students with ample time to collect their own data, to see how the data may change over time, and gives them an authentic context to help them interpret the data and discuss what it means. Data collected at the same location and same time over several years provides an opportunity to examine data trends or to observe changes. If you are using your schoolyard for investigations, consider collecting the same information each season, at different times of day, and under different weather conditions. For example, you can decide that the class will collect weather data on the second Tuesday of odd number months and every hour of that school day.

If any collecting is to be done, it should begin with a respect for the environment and the organisms you are collecting. Obviously, any collecting for instructional purposes should alter the environment as little as possible and should not significantly damage wildlife or their habitats. Where possible, anything collected should be returned to its original location at the conclusion of the activity. Check with your school system for any additional regulations.

Field investigation supplies. Many field investigations will only need a minimal amount of equipment that can be easily put together even on a tight budget. These Terrestrial and Aquatic Field investigation Kits are comprised of free or inexpensive items that can be easily gathered and are tailored to the schoolyard and the type of investigations students will be doing. There are some items that each small group needs and others that may be shared. Directions for making some of the equipment and resources for planning field investigations are included at the end of this handout.

We suggest you use a 5 gallon bucket to hold the materials; an alternative is a plastic bin. Consider making several kits so students can work in small groups. Buckets with lids or rectangular bins stack easily in a corner of the classroom.

Buckets and lids or plastic bins can be purchased at most hardware stores for just over \$5.00 or you can use recycled buckets that once held kitty litter, laundry detergent or other non-toxic materials.

The most important consideration in putting together any field investigation kit is not to forget a small **First Aid Kit** for the class. The teacher also should have a way of contacting help if needed.

Terrestrial Field Investigations

Schoolyards provide a wealth of opportunities for investigating without ever leaving the school site. Most schools have some landscaping from bushes and flower gardens to large trees. Even if a school currently doesn't have much more than lawn, students can find an abundance of different weeds mixed in with the grass and a variety of invertebrates that live there. If you can get to a park or other natural area there will be an even greater diversity of plants, animals and ecosystems. Developing the question you want to investigate is the first step, having equipment on hand and ready to go is the next.

Terrestrial Field Investigation Kit contents:

- Biodiversity research frames or quadrats (directions below)
- Field guides are available for a wide variety of organisms. Choice of guides depends on what you are planning to investigate. See Resources for suggestions for purchasing or downloading inexpensive field guides.
- Small net for capturing spiders, crickets and other small invertebrates in the grass, a 4-5 inch aquarium net works well
- Seed collecting wands (directions below)
- T-shirt sweep nets for collecting insects (directions below)
- Magnifiers (such as hand lenses or fold-out magnifiers) and bug boxes
- Large tweezers
- Small trowel and/or hand rake
- Small terrarium to temporarily hold a toad or other small animal for observation
- Tape measures - assorted lengths and types
- Ruler (flexible plastic 6 and/or 12 inch ones work well)
- Misting bottle with water to mist items for closer study with magnifiers

- Thermometers (air and soil)
- Soil probe – at least one for class use (Check for underground wires, pipes, etc.)
- Garden shears for cutting samples of different plants.
- Clip board to hold data sheets



Central Elementary School Gardens

Aquatic Field Investigations

There are many investigations that can be done in a stream, pond or other body of water. We all need water to thrive and the quality of our water affects all plant and animal life on our planet. Water quality test kits are available from multiple sources to do basic water chemistry.

Macro-invertebrates are good indicators of water quality. The type of species found will indicate the health of the water system.

Aquatic Field Investigation Kit contents:

- Leaf pack bags – use the bags that onions come in or purchase inexpensive lingerie bags
- Two way viewer - allows you to see top and bottom of insects www.nature-watch.com
- Bug boxes and other magnifiers (such as hand lenses or fold-out magnifiers)
- 2 -3 white ice cube trays for sorting insect types
- White dishpans to empty leaf packs into
- Minnow trap (need fishing license to use)
- 50 foot rope and tent stake to tie the leaf pack or minnow trap to shore
- Small aquarium net
- Laminated SOS cards or macro-invertebrate ID Cards
- Small paint brushes or tweezers to lift bugs from leaf debris
- White plastic table cloth, shower curtain or white flat sheet to work on when sorting insects; can be

divided into quarters

- Spray bottle – misting helps to release tiny macros from leaves
- 25 – 50 foot tape measure to determine water velocity (field measuring tape) OR make your own by taking heavy cord (orange is easily seen in the water) and marking distances on the cord
- Tennis ball, an orange or an apple to determine water velocity
- Stop watch to determine water velocity (a cell phone clock should have a stopwatch feature)
- Secchi disk or Turbidity tube to determine water clarity (See Resources for link to make)
- Yard or meter sticks to determine depth in streams
- Aquatic thermometer
- Water test kit available on-line (see Resources for suggestions)
- Clip board to hold data sheets (a piece of clear plastic cut to the size of the board will help protect data sheets from water)
- Macroinvertebrate identification cards; free to download: <http://www.edengelman.com/Macro-Cards/AllMacroCards2016.pdf>
- Macroinvertebrate identification dichotomous key, laminated; free to download at: watermonitoring.uwex.edu/pdf/level1/riverkey.pdf
- Disposable gloves & a heavy duty garbage bag (to pick up trash at the site)

Notes:

- A Virginia Fishing License is required to set a minnow trap www.dgif.virginia.gov
- A scientific collecting permit is required to sample aquatic macro-invertebrates. See www.dgif.virginia.gov/forms/ No permit needed if use Leaf Packs.
- Guidelines for wildlife in the classroom can be found at [DGIF Guidelines](http://www.dgif.virginia.gov/Guidelines)

DO IT YOURSELF DIRECTIONS

Directions to Make a Sweep Net for Capturing Terrestrial Insects

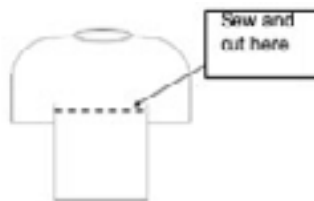
A sweep net can be used to collect insects in tall grass along a fence or in a field.

These instructions are for making a sweep net from a large white t- shirt and a coat hanger.

Supplies Needed (for each sweep net):

- 1 old, youth large white t-shirt (shirt should not have any holes)

- 1 wire coat hanger
- 1 pair of pliers to open and bend the coat hanger
- 1 large sewing needle
- Heavy duty thread for sewing
- Duct tape



Directions:

1. With needle and thread, sew tight, close running stitches across the shirt just below armpits (see picture). Cut off the arm and neck section just above your stitching and this will give you what looks like a bag. Make sure your sewing is tight enough that small insects cannot fall or crawl through.
2. Make a small cut in the hem on the bottom of the shirt.
3. Unbend the coat hanger.
4. Thread the coat hanger through the hem.
5. When the coat hanger is threaded through the entire hem of the shirt, re-twist the ends together. This will become the handle of your sweep net.
6. Cover the end of the wire coat hanger that is now the handle with duct tape to cover any sharp edges.
7. To use, sweep the net through tall grass or weeds to collect insects. Take a look inside and you will see what you caught easily against the white background of the shirt.

Directions for Making a Seed Wand for Collecting Seeds

A seed wand allows students to collect a variety of seeds that are found along edges of fields. Not all types of seeds can be collected this way, but for small seeds or seeds that are out of reach, it is the easiest method. You will need a pair of tweezers and a small container to put the seeds in once collected.

Supplies Needed (for each wand):

- Microfiber cleaning cloth
- Rubber bands
- Dowel or found stick about 2-3 feet long

Directions:

1. Wrap the microfiber cloth around one end of the dowel or stick.
2. Secure with rubber bands.
3. Wave the wand through tall weeds or grasses.
4. Remove seeds with a pair of tweezers and sort ac-

cording to type.

Directions for Making a Biodiversity Research Frame

Collecting data for every plant and animal that live around your entire schoolyard is virtually impossible and much too time consuming. Scientists collect data in smaller units (called samples) and then estimate the total number based on the possible number of units in the area being researched. There are many methods for collecting data in small units. One method is to use hula hoops which when rolled or thrown provide a semi- random sampling method.

You can also make a square frame using yard or meter sticks. Each small group of students can survey a different section of the school yard. If you are looking for insects and other animal life we suggest you conduct the survey several times, varying the season and time of day in order to get a clearer picture of animal life in the schoolyard.

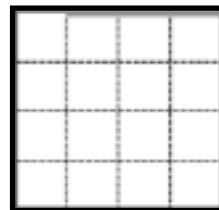
Directions can be found online for making a biodiversity research frame or sampling quadrat out of PVC pipe. This is a method for sampling vegetation cover types along a transect.

Supplies Needed (for one set or frame):

- 4 meter or yard sticks (for smaller frames use 30 cm rulers)
- Braided nylon string (melt ends using a candle)
- Pony beads, washers or paper clips to keep string from slipping back through the holes
- Drill

Directions:

1. Drill evenly spaced holes in each stick large enough to put the string through. For example: if you want a 10 x10 grid then drill a hole every 10 centimeters.
2. Cut the string slightly longer than the length of the stick. You will need enough string to go through the hole and be tied to the bead or washer and then through the hole of the opposite stick and be tied to another bead.
3. Repeat for the number of grids you want to have in the frame.



4. To use the frame lay down two of the sticks in the grass and stretch tight; lay the other two sticks across the first two to form a series of grids.

5. Survey the life in each grid or a random set of grids in the frame.

Other Resources:

North American Conservation Education Toolkit: Field Investigation and other guides developed to help educators explore the environment thru scientific investigations. The Toolkit can be downloaded free at [North American Conservation Education Strategy](#)

Wonders of Wetlands: Has a chapter on making sampling equipment as well as thorough background information and activities. Available from www.ProjectWET.org Click on **Store** at top of landing page.

Native Tree, Shrub and Vine guides from the VA Dept. of Forestry www.dof.virginia.gov may be purchased or downloaded for free.

Virginia Native Plant Society: <https://vnps.org/> has several regional native plant guides (click on *Growing Natives*) along with information for the *Flora of Virginia app*

Snake, Lizard, Turtle, and Frog and Toad identification guides can be purchased from Department of Game & Inland Fisheries www.shopdgif.com

Virginia Save Our Streams: <http://www.vasos.org/> The Virginia SOS website is packed with water quality monitoring information, especially for macroinvertebrates. The Stream Insects and Crustaceans ID Cards are located at <http://www.vasos.org/images/stories/docs/ModifiedBugIDCardoct2004.pdf>

Leaf Pack Project: <http://www.stroudcenter.org/lpn/re-sources/equipment.shtm> The Leaf Pack project offers a method of studying macroinvertebrates in the classroom. Data sheets and other activities are available.

Hoosier Riverwatch Volunteer Stream Monitoring Training Manual: <https://www.in.gov/idem/riverwatch/2332.htm>

Key to Life in the Pond: <http://watermonitoring.uwex.edu/pdf/level1/pondkey.pdf>

Key to Life in the River: <http://watermonitoring.uwex.edu/pdf/level1/riverkey.pdf>

Earth Force® Low-Cost Water Quality Monitoring Kit: available from many sources on the web.

Underwater Viewer: There are multiple sites with instructions to make inexpensive and simple viewers if you search the internet. This will allow you to clearly see the stream bottom. Key words “instructions for underwater viewer”.

Turbidity Tube: Directions for making a turbidity tube. [http://www.virginia.edu/blandy/blandy_web/education/Bay/TurbidityTubeConstruction&Use_Myr e Shaw.pdf](http://www.virginia.edu/blandy/blandy_web/education/Bay/TurbidityTubeConstruction&Use_Myr%20e%20Shaw.pdf)

Cloud identification chart: download for free at: https://science-edu.larc.nasa.gov/cloud_chart/

Topographic map of field site: download for free from: <https://store.usgs.gov/map-locator>

We would like to thank **Blandy Experimental Farm-UVA** for their proofing and suggestions.



Virginia Junior Academy of Science Needs Your Help...

Please consider judging and/or reading papers. We need your support. Feel free to share with others. Check out the following link for more details.

<http://vjas.org/judges.html>

Thanks,

Susan Booth

Our Journey from Old School Textbook to 3D

Ellen Peterson - Smithfield Middle School Technology Resource Teacher

Sterling Award Winner - 2018

Talk about outdated. Let's face it: the science textbook adopted by my district for use in my classroom was published about 15 years ago and there is little in the way of modern technology pictured on its pages. My students are digital natives, anxious to explore virtual worlds and create products that reflect their own interests and passions, in their own styles. At the crossroads of science and technology, is a fantastic tool called a 3D printer. Though I've entertained the idea of assigning projects in my science class that incorporate 3D printing technology, I decided to go "all in" and build a printer of my own, helping bring my science class into the 21st century. Along the way, my students and I learned a great deal about and from each other.

I began my journey by looking at a variety of 3D printers, gathering research from on-line sources as well as my local, professional makerspace. I discovered that there are a wide variety of 3D printers that print in a multitude of materials. There are some that have huge printbeds while others are almost toy-like in comparison. Some printers use plastic filament much like thread in a sewing machine (only fatter) while others use a pool of resin that solidifies thanks to the help of ultraviolet light, like fillings at a dentist's office. Additionally, there are printers that use additive manufacturing, depositing layer upon layer of material, until the object is complete while still others use laser sintering (where powder is fused by a laser to create the model). There are advantages and disadvantages to each type of printer and I needed to define my projects before I could decide which printer would work best for my classroom.

I decided to ask my students for help: they are the digital experts after all. When I talked to my students about potentially bringing a 3D printer to our classroom, they were thrilled by the prospect. One student, Alexander, summed it up perfectly, "So, we'll have a mini manufacturing plant right here in our classroom?" It was clear from the looks on their faces that the idea intrigued



Ellen Peterson constructs a Jelly Box, 3D printer.

and excited them in a way that the science textbook could never do. I knew that I had their attention; I needed to make sure I did something worthwhile with it to help them capture an enthusiasm for learning and Science.

Together we decided that our printer did not need to be particularly large. We knew it needed to be able to handle the wear and tear of classroom use; "Sometimes middle school students are hard on equipment," Sophia mentioned. "What if it breaks?" Jack said. "How are we going to make sure we have enough stuff so we can all print what we want?" Connor chimed in. I also reminded them that it had to be compatible with the technology we already had in place, if we wanted to be able to use it in class.

It took some digging before I came across a small Virginia company that manufactured 3D printers as kits, offering workshops to help the new owners build their printers. They catered to schools in particular because of the tendency to have limited budgets, especially when it came to repairs and maintenance. Though we often have money for new technology, we do not usually have it for upkeep and materials once the items are obtained. After much consideration, I purchased a Jelly Box by IMADE3D. I would build my new 3D printer, giving me the experience and expertise to be able to maintain and repair it should the need arise!

My students needed updates frequently as the building process began. I set aside dedicated time to build it, thinking it would take me a couple of weeks. In the meantime, we began to plan a project that would put

the printer to work. That's when I discovered another obstacle: I had to have access to kid-friendly software that would allow us to be able to create. It didn't take long before I realized one of the biggest obstacles was going to be time: I would have to invest a great deal of instructional time into learning and teaching students how to model in 3D. As a life



First printed object: an articulated, fossilized fish.

science teacher, that certainly wasn't in my curriculum!

I forged ahead and set aside approximately a week's worth of class time to teach my students how to navigate TinkerCad, a free, web-based application that allowed students to manipulate shapes in 3D. We created houses, cars, and characters of all sorts as we figured out how to use TinkerCad. My students discovered how their creations could be imported into one of their favorite on-line gaming platforms! Each day of that week, my students came to class hyper-focused on their creations, sharing ideas and helping each other create the things that were unable to do on their own. No sooner did one of them ask me how to do something when someone else responded, "Oh, I can show you how to..."

With the atmosphere of my classroom afire with that kind of enthusiasm, I introduced a challenge to bring their skills back into my life science classroom: re-design an animal with an adaptation to help it be removed from the endangered species list. This seemingly simple assignment sent my students racing to their groups to find a list of animals on the endangered list. Some students wanted to focus on their favorite animals while others examined local species that were endangered. Along the way, students discovered the biomes/environments from which the animals were disappearing. They had to learn about specific "short-comings" of these animals or other causes that may have been affecting their survival. This led to incredible discussions of man-made causes for habitat elimination and how we could also be the solution for stopping the animals from becoming extinct. This project was a goldmine of information that fit directly into my curriculum framework.

By now, my students wanted to know how the printer was coming along. Perhaps the part of this journey that scared me the most was having to become an expert at a piece of technology that I could not turn to someone else for support when something went wrong; it was an ungrounded fear. The technology that I thought would be "big and scary" turned out to take me about 12 hours



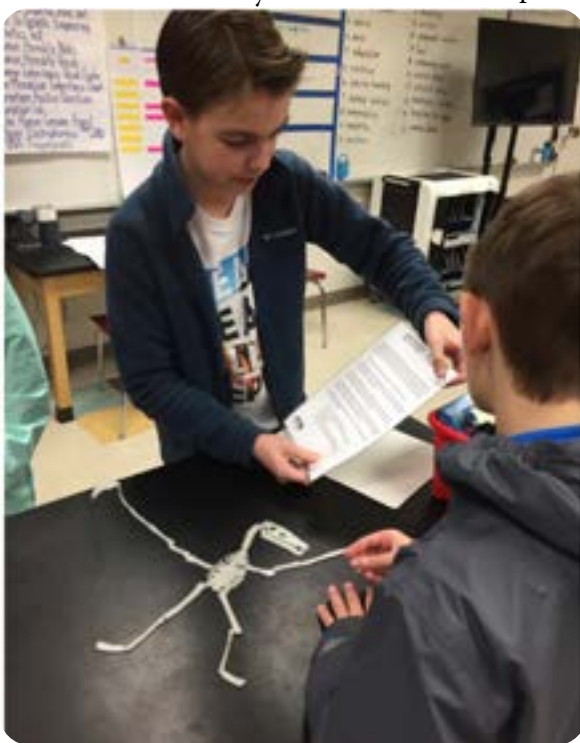
Manufacturing a 3D hydraulic claw.

pushed the button to start printing. I even realized I was holding my breath as the printer laid down its first layer of filament. We watched in amazed anticipation.

That first print did not turn out how we expected it to turn out, but we learned from that too. When the filament came out looking like a tumbleweed, the group raced to Google to figure out the reason why. We made adjustments, we tried again; again we got a tumbleweed. We made more adjustments, tried a few things, and sent our "burtle" (a turtle with wings, so it could cross the road without getting run over) to the printer one more time. Magic happened on that printer platform: out of a few strands of plastic, a new species was born in my class that day. And every single student in my classroom wanted to be the next person to discover a new species!

From this one project there arose a need to develop additional projects that fit into our curriculum. We also discovered a couple of tremendous drawbacks to using our 3D printer: it takes so much time, and everyone wants to print. My students and I continued to brainstorm projects and solutions together.

Since the printer came to class, we've made our own fossils; we've modeled DNA strands; and we've pieced together fossilized bones made from scans of actual fossils. More importantly, we've collaborated with each other, discovered new interests, and pursued passions we never would have known without our JellyBox. Students have persisted in multiple iterations of designs they've created, they've learned how to make precise measurements with tools like calipers, they've even justified their designs to their peers. I



3D printed fossilized bone scan of Archaeopteryx.

never imagined they'd learn so many scientific skills from a collection of wires, motors, and some processors. I took a lot of criticism from my colleagues about wasting instructional time on things that were not pertinent to our curriculum.

When I reflect on all of the other skills my students practiced and acquired throughout this process, I decided it only mattered that my students came to my class ready to see what else I had to offer and talking about science with a gleam in their eyes.



Troubleshooting a hydraulic claw for repairs



Marshall explains his Japanese River Rock Fish to our Assistant superintendent.



Watching your pieces come off the 3D printer is fascinating.



Learning how hydraulics work so our claws have movement.



Success with assembling 3D pen created pieces.



Donta the Dragonfly Explores the Dominion

Winter 2020

Cindy Duncan

Chesapeake Bay Foundation

Teacher Professional Learning Coordinator VA & DC

VAST Chair of Environmental Literacy

cduncan@cbf.org



There is no place like Virginia for enjoying the great outdoors, and winter time is no exception. Whether you are out for an invigorating walk along a trail or photographing the beautiful sites of the Dominion, winter time in Virginia has no limits for exploration.

Donta, as with most dragonflies, are very visible during the summer months. Dragonflies, with all their colorful attire can be found near water during the summer dancing and frolicking with each other. That's the adult stage of this amazing insect. But all dragonflies have an immature stage which inhabits freshwater. The females lay eggs, the eggs develop into nymphs or larvae and the larvae live over the fall, winter and spring in the water. While you are out exploring during the winter, you can still find dragonflies. You will just have to look for something very different. Usually the nymphs are kind of small and stubby. They have big jaws for catching tadpoles and minnows and other aquatic insects. Instead of the colorful attire of summer, they're usually dark brown in color.



Donta wanted to highlight several sites in Virginia that are at their best during the winter months. If you choose to explore any of these places, be sure to keep an eye open for dragonflies in their winter attire.

Caledon State Park - The beautiful Caledon State Park is considered a National Natural Landmark. Visitors often come to this part of the state to spot bald eagles. During the winter, this place becomes simply breathtaking. <https://www.dcr.virginia.gov/state-parks/caledon>

Wilderness Road State Park - A trip to southwest Virginia will bring you some of the most beautiful, uninterrupted landscapes in the entire state. These 400 acres once were part of Daniel Boone's great exploration, and the road

connected the coast to the western part of the country. During winter, incredible views of Cumberland Mountain create a dramatic and striking vision. <https://www.dcr.virginia.gov/state-parks/wilderness-road>

Great Falls Park - If you've never explored a national park during the winter, you'll want to give Great Falls Park a visit this season. Icicles and waterfalls alike adorn the landscape in a scene reminiscent of a fairytale. There are

plenty of nearby trails for an invigorating stroll through the woods. <https://www.nps.gov/grfa/index.htm>

Donta will be sharing more educational areas to explore in her next article in the *VAST Science Educator* coming in the Spring. A little hint, she will be in the Hampton Roads area sharing information about a unique place to explore and learn about.

Fun Fact: People often ask, "Were dragonflies really here when dinosaurs were on Earth?"

Yes! Dragonflies have existed for over 300 million years! In fact, they were here before the dinosaurs, and are among the most ancient creatures still populating our planet Earth.

CITATIONS

Heath, M. (2017, Nov 18). *Migrant Hawker Nymph* [Digital Image]. Retrieved from <http://marcheath.blogspot.com/2017/11/what-to-do-during-winter-months.html>.

<https://www.onlyinyourstate.com/virginia/winter-destinations-in-va/>



Dominion Energy's Project Plant It! Features STEM Lesson Plan Contest in 2020

By Suyapa Marquez, Senior Community Affairs Representative, Dominion Energy

Do you have a passion for creating hands-on and engaging lesson plans that make STEM subjects come to life? Do you enjoy helping students understand the important role of trees in the environment? Are you enrolled in Dominion Energy's Project Plant It! for the 2019-2020 academic year?

If you answered YES to all of the questions above, Dominion Energy invites you to enter the 2020 STEM Lesson Plan Contest. It's easy and free to enter; just send us an original, creative STEM-based lesson plan that promotes active learning about trees and the environment.

The winning lesson plan, along with information about the talented educator who created it, will be included in Project Plant It!'s Educator's Guide for the Classroom when the program launches for the 2020-2021 academic year. In addition, three lucky educators will receive a gift card that can be used to purchase teaching supplies for the classroom.

Share your love of STEM with Project Plant It!, and we could share it with other educators.

Eligibility Criteria:

- Educator must be enrolled in Project Plant It! for 2020
- Educator can teach students at any grade level in grades K-12.
- Educator can be a group leader of a scout troop, environment club, church group or any organization that serves youth.

Contest Rules:

- Only lesson plans that focus on science, technology, engineering or math will be considered.
- Lesson plans must be original and created by the educator entering the contest.
- Lesson plans must support the mission of Project Plant It!: To teach students about the important role of trees in the environment and to engage them in planting trees.
- Lesson plans should be designed so they can be worked on or completed in one or two class periods
- Each lesson plan must include: STEM Subject, Title, Grade Level [elementary, middle, high school],



Objective, Materials Required, Procedure, Desired Results/Outcomes

- For guidance on suggested format for lesson plans, view the current lesson plans in the Educator's Guide on the Project Plant It! website, projectplantit.com. [Note: Lesson plans that are too similar to the existing lesson plans will not be considered.]

Deadline and How To Enter:

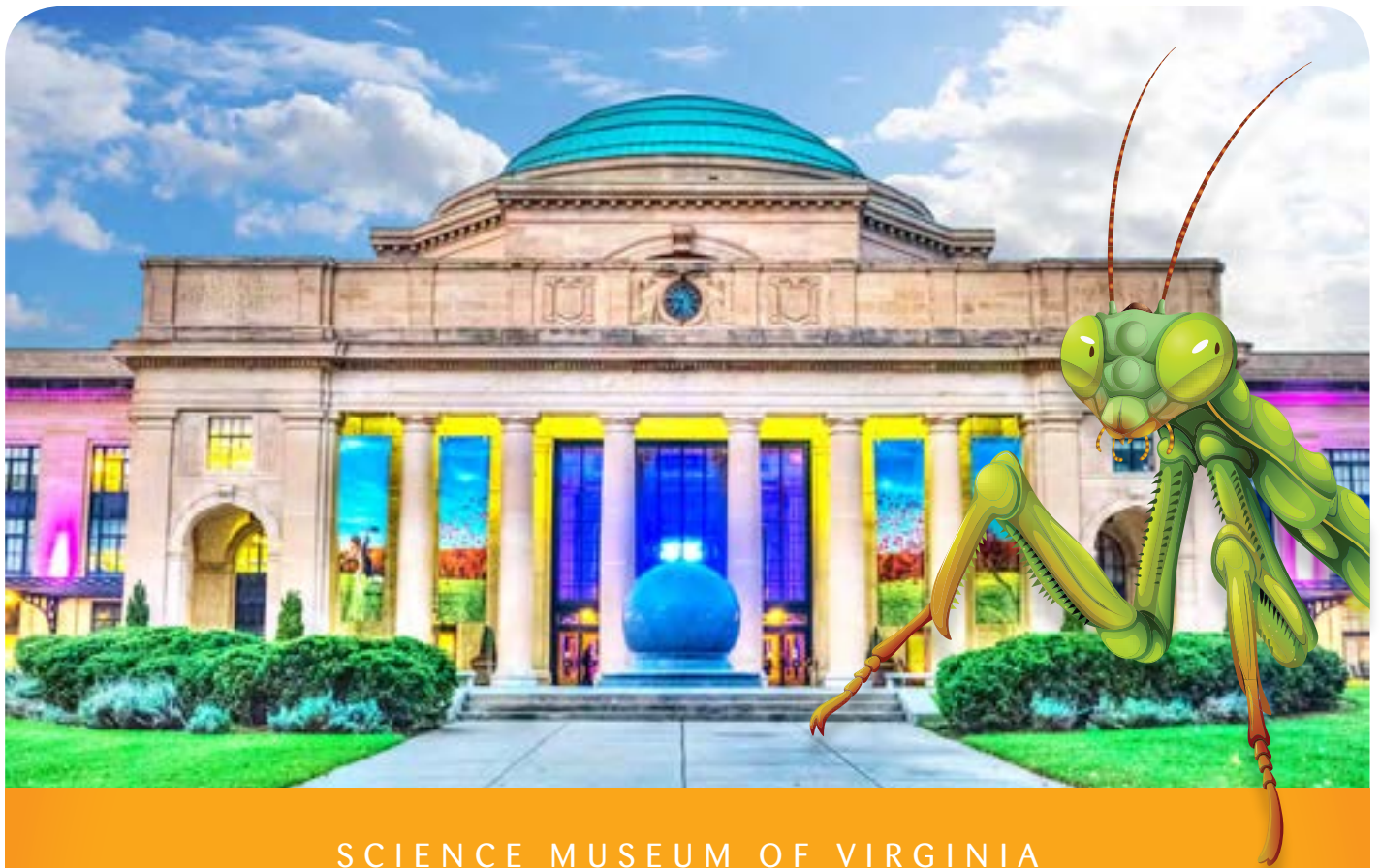
- Email lesson plan in Word document format to suyapa.d.marquez@dominionenergy.com by 11:59 p.m. on Friday, March 27, 2020
- Include your name, address, phone number, email address, name of school or group that you are affiliated with, grade level, and subject that you teach [if applicable]
- Winners will be notified by phone or email on or before Friday, April 17, 2020.

Prizes:

- First Place – Winner's lesson plan will be included, with citation of authorship, in the Educator's Guide; educator receives a \$200 gift card to Walmart
- Second Place – Educator receives a \$150 gift card to Walmart
- Third Place – Educator receives a \$100 gift card to Walmart

Fast Facts about Project Plant It!:

- Project Plant It! was established by Dominion Energy in 2007 to educate children, plant trees and improve the environment. Students enrolled in Project Plant It! receive a free redbud tree seedling to celebrate Arbor Day.
- The tree seedlings are grown and shipped to participants in April by the Arbor Day Foundation, a longtime partner with Dominion Energy.
- From 2007-2020 more than 650,000 tree seedlings will have been distributed to students in states where Dominion Energy operates.
- According to the Virginia Department of Forestry, this equates to about 1,625 acres of new forest if all of the seedlings are planted and grow to maturity.



SCIENCE MUSEUM OF VIRGINIA

Teacher Appreciation Day and Open House

Saturday, January 25 • 9:30 am – noon

Teacher Appreciation Day is back at the Science Museum of Virginia! Teachers, bring your immediate family, show your school ID and receive FREE general Museum admission for both you and your family! Don't miss a day of fun that includes our new touring exhibition, *Giant Insects*.

Make sure to RSVP on Facebook and you'll get a reminder before the open house.

For more information, contact us at 804.864.1400 or info@smv.org.

Presented by:



Special thanks to our
premier partner:





SciAll Is a Science Educational and Research Organization

Founded and Run By Dr. Gil



SciAll.org (incorporated in the United States as the 501(c)3 nonprofit 'SCIALL ORG INC', EIN: 82-0683398), is a science education and research organization.

Our mission is to expand and diversify public interest in science. Under this umbrella, we follow two core aims. **Aim 1:** Provide inspiration and guidance to students, particularly those from groups underrepresented in STEM, to help them understand the process of science and what it takes to succeed in STEM careers. **Aim 2:** Make the scientific process accessible to a broad public audience, particularly among groups traditionally underrepresented in STEM fields and groups that are traditionally skeptical of environmental science. To fulfill these aims, we connect the public directly to professional scientists, who volunteer as vloggers for our campaign. Our team of scientists, from various backgrounds, create and freely disseminate online videos that showcase personal reflections and stories that convey the relatable, intuitive, and, often exhilarating, human side of scientific research. We quantify the impact of our content through voluntary viewer surveys. For example, according to surveys from 530 voluntary respondents (60% female, 19% minorities): 94% (95% of females, 96% of minorities) became interested to learn more about scientific research because of our videos, which “made science more appealing” to 51% (54% of females, 56% of minorities) (full results published open access*). Though unconventional, our efforts to make science more accessible to the public are working. To date, our videos have been watched for >20,000 hours (on YouTube alone), and we’re just getting started.

More on Aim 1:

Many students, particularly those from underserved communities and from households that lack a tradition of higher education, are denied the opportunity to understand the process of science and what STEM careers offer, both in terms of benefits to society and fulfillment to individuals. Thus, SciAll.org seeks to openly share the otherwise esoteric processes of both conducting science and becoming a professional scientist. We complement traditional teaching approaches: our content first rouses interest in STEM, inspiring students to seek knowledge, and once sufficient knowledge is acquired (e.g., through traditional, classroom-based learning), our content then offers students mentoring and advice on how to effectively advance their careers in STEM.

More on Aim 2:

Environmental science answers the question: how do we reduce our impacts on the environment to grant our species a sustainable existence? However, the public is deeply divided about whether environmental science should guide human behavior. The fate of our species rests upon our ability to address these divisions. Thus, SciAll.org seeks to make the scientific process and the personal motivations of scientists accessible across political, economic, and cultural divisions. We do this by striving to make our content nonpartisan in political tone, while often discussing topics that have become unjustly politicized. It is only when science is inclusive and, consequently, embraced by people of all backgrounds, that it can guide our species to a sustainable and prosperous existence.

*Gil, M.A. [YouTube videos of 'research in action' foster diverse public interest in science](#). *Ideas in Ecology and Evolution* 10 (2017).

Memories from the 2019 PDI



Community Partner:
Natural Tunnel State Park



Teachers are
life-long learners



Art Contest
winners



President 2019
Tom Fitzpatrick



Working and
learning together



Board Volunteers



President 2020
Mike Pratte



Dr. Mike Gil with VAST
Board Members



Welcome Game



Exhibit Hall



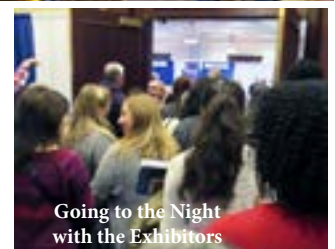
Networking



Region III
collaboration



Einstein @ PDI



Going to the Night
with the Exhibitors



Lottery winner Caitlin Unterman and Eileen Rogers of the Virginia Lottery.
Karen Brace is not in the photo because of a family emergency.

Virginia Lottery Winner 2019

Caitlin Unterman, a middle school teacher at the Virginia Episcopal School, Lynchburg, was a presenter this year and a winner of the VAST PDI Registration Lottery sponsored by the Virginia Lottery.

Karen Brace, an elementary teacher at Booker Elementary School, Hampton, Virginia was the second winner. The Virginia Lottery paid for the PDI registration plus meals including the Awards dinner. Watch your VAST email in August and consider having a chance to have a free registration to PDI 2020.



Professional Development for Educators
Engaging Secondary Students in Authentic Research – Year 3
Virginia Junior Academy of Science (VJAS)
James Madison University – May 28, 2020

Why Should I Attend?

Virginia's new graduation requirements, *Profile of a Graduate*, include demonstrated evidence of critical thinking, creative thinking, collaboration, communication and citizenship skills (the 5Cs). Beginning with the 2018-19 school term, students were eligible for *The Board of Education's Seal for Excellence in Science and the Environment*, which requires research and its presentation in a formal juried setting.

Annually, over eight hundred students participate in the VJAS Symposium. Other students participate in Intel-affiliated regional and state fairs. Participation in VJAS and/or Intel fairs varies by the region of the state. This program is designed to:

- Increase the number and diversity of schools and school divisions participating in VJAS.
- Develop awareness of VJAS and VAS and the important roles they play in developing future STEM professionals, as well as "life-ready individuals."
- Understand research barriers and how VAS can assist participants in over-coming.

What Is the Event Schedule?

Time	Event
7:30 – 8:30 am	Registration, Event Orientation and Breakfast with Leaders and Participants
9 am - 2:00 pm	Observation of Middle and/or Senior High School Student Presentations (15 minute presentations in over 30 concurrent sessions) Lunch will be available in the Judge's area between 11:30 am and 1:30 pm.
2:15 – 3:30 pm	Discussion with Participants and Leaders . . . Resources for Implementing Research and Joining VJAS . . . Program Evaluation

How Do I Register? Questions?

Registration will be available from March 1 to May 1, 2020. Go to <https://www.ittip.org/>. On the main page, look for information on program registration. Participants are required to attend all events and complete a program evaluation. After registration, you will receive information from Dr. Paula Leach, Director, ITTIP at Longwood University. For pre-registration information, contact Dr. Julia H. Cothron, VJAS Board Member, cothron9293@gmail.com

Sponsors

Virginia Academy of Science
Virginia Junior Academy of Science
Virginia Mathematics & Science Coalition
Institute for Teaching through Technology & Innovative Practices (ITTIP) at Longwood University

Let's Connect:

Step Out of Your Classroom!

Get the most from your membership by taking advantage of all VAST has to offer.



Website

The VAST website (vast.org) contains the most recent news and updates. Journal and Newsletter archives are available. On the site renew your membership and take advantage of other benefits of membership. Read about awards, grants, job announcements, professional development opportunities, and the latest PDI information.

Social Media and E-notes



Twitter: <https://twitter.com/VaSciTeachers>

Facebook:

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

LinkedIn: <https://www.linkedin.com>

VAST Group on LinkedIn:

<https://www.linkedin.com/groups/1836848>

You need social media accounts to log on to these these social media sites.

E-Notes - Delivered to your email mailbox with timely information for VAST members.

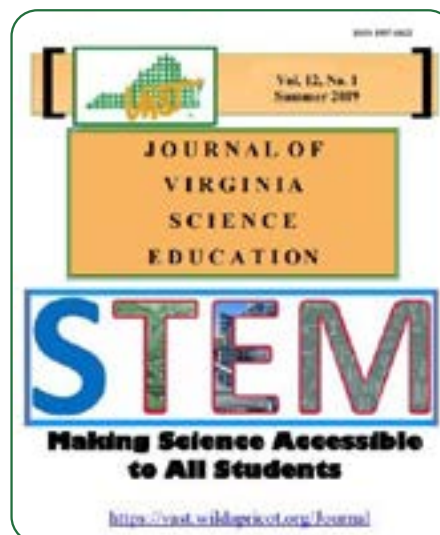
Newsletter

Published five times a year, *The Science Educator* includes science education news, resources, and current news.



Journal of Virginia Science Education

Published twice a year, the JVSE includes peer reviewed articles, research-based activities, and resources for all levels and both formal and informal educators.



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VAST Regional Directors:

Is Your Address Changing?

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Mission: The Virginia Association of Science Teachers (VAST) is a community of Science educators whose mission is to:



- *inspire students,*
- *provide professional learning opportunities,*
- *build partnerships,*
- *advocate for excellence at the school, local, state and national level.*

**Please send articles,
letters to the editor, or labs by the submission deadline, MARCH 1, 2020,
for inclusion in the next Newsletter.**

**Please consult the website for up to date information, VAST forms for awards and mini-grants,
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