



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

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Check the web for news, conference updates, registration, and forms.

# The Science Educator

Late Spring 2020

A Publication of VAST, The Virginia Association of Science Teachers

Vol. 68, No.5

## Virtual Professional Development Institute

**Registration Fee only \$25.00 • November 12-14, 2020**

### Content, Courses, and Career Pathways

#### Learning Together Virtually

**VAST has accepted the challenge.** We want to keep everyone safe, provide the best professional development and fulfill the VAST Mission: to “inspire students, provide professional learning opportunities, build partnerships, and advocate for excellence at the school, local, state and national level”.

**We are so excited about the possibilities** of trying new ways to develop and improve our PDI. General session speakers and presenters will be able to communicate by both live and recorded presentations. Although attendees may not be able to classically meet, greet, and share a break together in the hotel hallway, innovative ways are planned to continue networking within your division, across your region, and state. Vast continues to offer opportunities to build long lasting science relationships and connections to resources. Members will be able to access all presentations and content from every session after the PDI from the VAST web page.



#### It all starts now! Sign-up for \$25

**How about the registration fee?** Although we will miss the mileage, hotel lodging, meals, and exploring a new location, these features traditionally comprise most of the an attendee's cost. At \$25.00, your principal and/or supervisor can potentially sponsor your whole department rather than a single teacher. Touch base with these persons and explain this value early!

**The PDI committee is working on a schedule** for the virtual PDI. The general time frame will be:

Thursday and Friday, November 12-13 from 4:00 pm to 9:00 pm. Saturday, November 14 from 9:00 am to 3:00 pm.

**The PDI committee has extended the deadline** for submission of presenter proposals for the virtual PDI. Presentations can be live or pre-recorded. Detailed instructions and the online presenter proposal form can be found at: [Concurrent Session Presenter Information](#)

#### What will you gain by attending the VAST Virtual Conference?

- Teaching strategies, best practices, content support, and practical applications to support science instruction
- Professional development hours that can be used towards recertification
- An opportunity to learn and collaborate with peers and science experts using a virtual platform

#### Why send teachers to the VAST Virtual Conference?

- Cost Efficient: Divisions can register 20 teachers for less cost than sending one teacher to a face to face conference.
- Flexible times: a variety of sessions over a several day period allows teachers to pursue sessions that best meet their needs.

- Ease of Attendance: Teachers can attend sessions from the comfort of home or from school.

#### What does a VAST membership provide?

- Live and recorded presentations
- Virtual exhibit booths
- Opportunity to earn recertification points
- Access to a member's only section on the VAST webpage
- Opportunities to gain professional knowledge throughout the year
- Collaboration within an online community of teachers
- Publications throughout the year targeting Virginia Teachers
- Grant and scholarship opportunities

**Come one and bring one!**

**Make this the biggest attended event ever!!!**



During the unprecedented COVID-19 times our Education Field Programs are suspended through July 31, 2020. All summer courses through July 31st are being moved online. We have updated our Learn Outside, Learn at Home website to include new video learning, field investigation lessons and printed watershed curriculum as well as resources from our experts. For any questions or more online learning support please contact [chesapeakeclassrooms@cbf.org](mailto:chesapeakeclassrooms@cbf.org)

CBF provides high-quality professional learning that meets the evolving needs of teachers and schools across the watershed through the **Chesapeake Classrooms®** program. Our program enables teachers and school administrators to involve the entire school community in outdoor learning experiences that are aligned with local school system standards.

**Chesapeake Classrooms®** focuses on methods for incorporating environmental education into the core subject areas of reading, math, science, and social studies. The resources used in **Chesapeake Classrooms®** meet state educational standards in Maryland, Virginia, Pennsylvania, and the District of Columbia. **Chesapeake Classrooms®** increases students' achievement and engagement in learning while improving their environmental literacy and stewardship ethic. **Chesapeake Classrooms®** offers:

- Five-day online [summer immersion courses](#). More than 20 courses are available in June, July, and August 2020!
- We have designed courses to fit any schedule. All courses cost only \$50!
- An [online Resource Library](#) full of video lessons and student investigations for year-round support of course participants.
- The opportunity to design a [Meaningful Watershed Educational Experience](#) with collaboration and feedback provided by peer and mentor teachers.

## PRINCIPALS ENVIRONMENTAL LEADERSHIP PROGRAM

Through the [Principals Environmental Leadership Program](#), CBF provides high-quality professional learning that meets the evolving needs of administrators and schools. Through field experience, training, resources, and collegial discussion, these key leaders learn how to design a school program that utilizes and benefits the local environment and their schoolyard.

**ALL JUNE AND JULY PRINCIPAL COURSES ARE POSTPONED AND WILL RESUME SUMMER 2021.**

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## From the Desk of your President



**Michael Pratte**  
**VAST President 2020**

Dear Colleagues in Science,

I hope our newsletter finds you both well and looking forward to a well-earned summer rest from a very atypical end to our school year. This year will undoubtedly be remembered for the international health crisis, but hopefully also be remembered by how our educational system and teacher colleagues responded to our students during our school closure. As many school divisions raced to establish equity regarding student access to both online and print resources, establishing best practices for teachers to continue instruction of previously taught material, and maintaining effective communication with families and students, our public education methodology had forever changed. Our terminology now contains words like remote learning, synchronous, and asynchronous that helps to delineate the student experience when not in our traditional setting.

We acknowledge that remote learning in any content presents significant challenges with student access, choice of learning management systems, rigor, and engagement. The teaching of science remotely involves additional layers including access to phenomenon, investigations, and proper safety considered for any student work outside of our supervision. One factor that cannot be removed from the teaching of science is that connection to the teacher who provides the “why” behind the explorations and challenges the thinking of their classes beyond rote understanding of terms and definitions.

As you reflect over this summer and prepare for the next academic year please consider learning, sharing, and connecting with VAST for the fall Professional Development Institute. We are excited to host this year’s PDI virtually this year which will offer an affordable and customizable experience for science learning and collaboration. Attendees will choose from both synchronous and asynchronous presentations, dynamic keynote speaker presentations, exhibitor resources, and access to the **Whova conference app** which will enable an enhanced teacher networking experience.

I wish you a restful and recharging summer and look forward to joining you virtually this fall!

Take care,

*Mike Pratte*

VAST President, 2020



## VAST Wants You!

### Be a Presenter this November!

*Presenters share what they know with others and affect students and educators far beyond their classrooms.*

### CONCURRENT SESSION PRESENTER INFORMATION

Professional Development Institute

November 12-14, 2020

**VAST needs you! Share your good ideas! Submit a concurrent session proposal for the 2020 PDI.**

Presentations may be live or pre-recorded. Detailed instructions and the online presenter proposal form can be found at: [CLICK HERE](#)

The online proposal submission form is **due by June 15**. The PDI committee will review all proposals and presenters will be notified in early July regarding their submission. There is a limited number of live presentation slots available.

The registration fee is \$25.00 for presenter-attendees and presenters who represent a not-for-profit institution. Not-for profit institutions are also encouraged to purchase a virtual exhibit booth. A commercial presenter must also be registered as an exhibitor and pay the \$150.00 per presentation fee in addition to the standard commercial exhibit fee.

All presenters must pay the registration fee no later than October 1 to be included in the final program.

Complete registration information can be found at [CLICK HERE](#)

**Questions: Contact John Kowalski, [pdi@vast.org](mailto:pdi@vast.org)**



## VAST Awards and Grants



Considering the COVID 19 crisis and suspended 2019-2020 school year, the VAST Awards and Grants Committee has extended its submission deadline and created a new RISE Award category.

The deadline for submitting receipts and reports for 2019 Grant Awards has been extended to December 31, 2020.

The deadline to submit grant applications and award nominations is extended to September 30, 2020.

The new RISE category for 2020 is remote teaching which offers an elementary, middle, and high school level submissions. This category is designed for recognition of innovative approaches used during the crisis and school closures.

**Sandy Pace**

**VAST Awards and Grants Chairman**

# Congratulations!

## Dr. Eric Pyle - NSTA President-elect



“NSTA members recently elected Dr. Eric Pyle, professor in the Department of Geology and Environmental Science at James Madison University in Harrisonburg, Virginia, to serve as the association’s 2021–2022 president. Pyle will begin serving his three-year term in June as president-elect. As he prepares for his new role, Pyle says he will be making “opportunities to reflect on how NSTA can grow and expand membership reach, and particularly ways to collaborate with other science organizations. NSTA needs to help frame what meaningful collaboration for the best science education looks like at this time when science in general is under assault.” *NSTA Reports, April 2020*

Pyle has a background in K-12 and college-level STEM education. At James Madison University he works to support preservice and in-service teachers of science. He also supports student research that is consistent with the goals and objectives of the Bachelor of Arts in Earth Science program, namely communicating science to non-scientific audiences. He currently serves as Co-director for the James Madison University Center for STEM Education and Outreach and Coordinator for Science Teacher Preparation in the College of Science and Mathematics. Additionally, he serves on the Preservice Teacher Preparation Committee for NSTA.

Eric is a long-time VAST Board member from VAST Region V. Most VAST members know him as the auctioneer at several PDIs, a former Region V Director, and VAST President in 2009. VAST is proud of you!



## Outstanding Earth Science Teacher

Bonnie Keller been awarded the National Association of Geoscience Teachers Eastern Section “**Outstanding Earth Science Teacher**” for the Eastern Section for 2020. The Eastern Section covers NY, PA, NJ, MD, DE, DC, VA, WV, and eastern Ontario.

This award is given to precollege teachers who have made exceptional contributions to the stimulation of interest in the earth sciences and who are outstanding teachers. Each NAGT section selects a section winner. Sections may also have state winners.

Bonnie teaches earth science at Colgan High School in Manassas and is a VESTA and a VAST member.

You make VAST proud, Bonnie





# 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 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](mailto:tfitzpatrick@rcps.info)

## Who is Eligible?

Any VAST member 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, 2021; President, 2022; and Immediate Past-President, 2023.

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 **President**, for a one-year term following the year serving as President-Elect, shall: a.) Maintain general oversight of the interests and activities of VAST, representing VAST to the public; b.) Preside over all business meetings of the general membership of VAST, of the Executive Committee, and of the Board of Directors;

- Prior to the first Executive Committee meeting in January, nominate committee chairs, editors, web master, and VAST representatives to other groups, which require approval of the Executive Committee followed by Board approval;
- Prior to the first Board meeting in January, develop the annual budget in cooperation with the Treasurer

and Executive Director, and develop the calendar for VAST Board meetings;

- Represent VAST at conferences of other professional organizations such as NSTA (national and regional);
- Serve on the Standing Conference Committee; and
- Perform other duties incidental to the office.

The **Immediate Past-President**, for a one term following the year serving as President, shall:

- Be available for advice and counsel to see that programs and projects are continued under the new leadership;
- Chair the nominating committee for elected offices of VAST;
- Attend (or appoint a designee to attend) the National Congress on Science Education.

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.

# 2020 Donna Sterling Institute

## Virtual Professional Development for Secondary Educators

### October 10-17, 2020

We are pleased to announce the 2020 Donna Sterling Institute will be held virtually Oct 10-17, 2020. Donna Sterling was instrumental in her vision of problem-based learning (PBL) as a means of teaching and integrating science with math, engineering, technology, and language arts. PBL prepares students for academic, personal, and career success and readies young people to rise to the challenges of their lives and the world they will inherit.

Here is your chance to learn how to implement this powerful teaching strategy!

#### **The Path Forward-Finding Smart Solutions in Energy and Climate Science**

K-12 students need a fundamental understanding of energy to develop a thorough, comprehensive understanding of climate science and the path forward to climate and energy resiliency. However, decisions about climate and energy policy are seldom made from a foundation of science. Toolkit for teaching Energy and Climate; <https://www.climate.gov/teaching/toolbox-teaching-climate-energy>

The 2020 Sterling Institute in collaboration with NEED Energy will engage participants in a PBL unit using topic of climate and alternative energy, which is adaptable for elementary through high school students. Participants will learn about climate and alternative energy from Dr. Don Haas in a virtual presentation and engage in NEED lead activities to help understanding of climate and alternative energy. Teachers learn the key components of a PBL unit including designing an authentic scenario and essential question, question map development, and creating culminating activities. Teachers will consider how to modify what they learn to meet the Standards they teach and the needs of students in their own classroom context.

#### **Sterling Institute Part 1 (Fall, 2020; 10 hours Professional Development)**

The goal of Part 1 of the Sterling Institute is to provide support for teachers to develop and enact problem-based learning units in their classroom. In the fall of 2020, the Institute will take place over 3 weeks and use a combination of asynchronous and synchronous instruction.

#### **Week 1 - Oct. 5 -10**

Asynchronous, combination of videos, readings, and reflections): ~3 hours

- Introduction to Sterling Institute

- *Introduction to PBL* - Read Navy et al., (2019) and Edmondson et al. (2019)
- Introducing the Scenario, Overarching Question, Culminating Activity
- *Climate Science* (Don Haas)
- Possible Reflection/Discussion board questions: How could you integrate what you've learned so far into your instruction? What barriers do you perceive to this type of science instruction? What questions do you have about PBL at this point?

#### **Synchronous: ~2 hours - Saturday October 10**

- Introduction to question mapping
- "Hands on" inquiry activity
- Introduce PBL planning template

#### **Week 2 - Oct. 11 - 17**

##### **Asynchronous: ~ 3 hours**

- Post several example PBL unit plans for participants to use as templates/guides
- PBL Planning: Develop a unit plan, question map, and culminating activity
- Reflection: What questions do you have about PBL at this point? What supports do you need to enact this in your classroom?

##### **Synchronous: ~ 2 hours - Saturday October 17**

Small breakout groups (4-6 people) by content area/grade level with a Sterling facilitator, each participant prepares a 2-3 slide overview of their unit (plan, question map, culminating activity) to share and get feedback on. (Provide participants with questions to discuss about each unit.)

**Instructors include:** Dr. Jennifer Maeng, Dr. Anne Mannarino, Dr. Juanita Jo Matkins, Elizabeth Edmunson, Elizabeth Kirk, Sue Kirk, LoriAnn Pawlik, and Jaclyn Claytor.

#### **Registration fee: \$25 for Donna Sterling Institute**

Register online at:

<https://vast.wildapricot.org/Registration-Information>

2020 Online Registration Form and Fees for PDI attendees, exhibitors, and Donna Sterling Institute.

**Online registration is open until October 3.**

## 2020 VAST Professional Development Institute Keynote Speaker



Dr. Cindy Moss

Vice President, Global STEM Initiatives, Discovery Education

### “Preparing Your Students for the Careers of Tomorrow”

This keynote will explore how we can prepare our student’s today for tomorrow’s careers in STEM-related fields, including those that may only require one semester of community college. Attendees will learn how to position science as a way to provide students with real-world problems and grow their student’s confidence in their own problem-solving abilities. Additionally, attendees will hear how STEM teaching and learning can help decrease the achievement gap in districts of all sizes.

#### Bio:

Dr. Cindy Moss is currently the Vice President of Global STEM Initiatives for Discovery Education and travels the world helping companies, nonprofits, Ministries of Education and school districts understand the importance of STEM education and how to implement it successfully.

Previously Dr. Moss served 10 years as the PreK-12 Director of STEM for the 145,000 students and 10,000 teachers in the Charlotte Mecklenburg School system. While there her work to decrease the achievement gap helped earn the district the Broad Award, often considered the super bowl of urban education.

As a teacher, Dr. Moss taught Biology, Chemistry, Anatomy and Earth Science for 20 years, and earned numerous awards, including the Milken National Educator Award. She earned a BS in Zoology from the University of North Carolina, where she was a Morehead Scholar; her master's in Science Teaching from Syracuse University and her Ph.D. from Curtin Institute of Technology in Perth, Western Australia. Her recent awards include Top 100 Women in STEM Award from STEM Connector, the top 100 women in Diversity in STEM from Diversity Matters and 1 of the top 25 Businesswomen in Charlotte from the Charlotte Business Journal.



## 2020 VAST Professional Development Institute Keynote Speaker



**Zipporah Miller, EdD**

Director of Learning with Anne Arundel County Public Schools  
Author, Pearson Education

### ***“Using Phenomena to engage Students in 3-Dimensional Learning Experiences”***

#### **Overview**

This address will focus on how the use of phenomena establishes a purpose for learning. This shifts the learning from focusing on a single topic to focusing on trying to figure out why something is happening. This makes learning meaningful for students as they are actively engaged in the learning process.

#### **Biography:**

Zipporah Miller serves as the Director of Learning with Anne Arundel County Public School System. Previously, she was the K-12 Coordinator for Science in Anne Arundel County. She conducts national training to science stakeholders on the Next Generation Science. Dr. Miller is a past Associate Executive Director for Professional Development Programs and conferences at the National Teachers Association (NSTA) and was a reviewer during the development of Next Generation Science Standards. Dr. Zipporah Miller holds a doctoral degree from University of Maryland College Park, a master's degree in school administration and supervision from Bowie State University, and a bachelor's degree from Chadron State College.



“  
You don’t need a lab coat, degree, or laboratory to be a  
scientist. What you need is an inquiring mind, the  
patience to look at nature carefully, and the willingness  
to figure things out.

”

- Ken Miller

Kenneth R. Miller grew up in Rahway, New Jersey, attended the local public schools, and graduated from Rahway High School in 1966. Miller attended Brown University on a scholarship and graduated with honors. He was awarded a National Defense Education Act fellowship for graduate study and earned his Ph.D. in Biology at the University of Colorado. Miller is professor of Biology at Brown University in Providence, Rhode Island, where he teaches courses in general biology and cell biology. Miller’s research specialty is the structure of biological membranes. He has published more than 70 research papers in journals such as “Cell”, “Nature”, and “Scientific American”. He has also written the popular trade books ***Finding Darwin’s God*** and ***Only a Theory***. His honors include the Public Service Award from the American Society for Cell Biology, the Distinguished Service Award from the National Association of Biology Teachers, the AAAS Award for Public Engagement with Science, the Stephen Jay Gould Prize from the Society for the Study of Evolution, and the Laetare Medal from Notre Dame University. Miller lives with his wife, Jody, on a small farm in Rehoboth, Massachusetts. He is the father of two daughters, one a wildlife biologist and the other a high-school history teacher. He swims competitively in the masters’ swimming program and umpires high school and NCAA softball.

# EXHIBITORS and VENDORS

Breaking News!

## Virtual Professional Development Institute

November 12-14, 2020



Exhibitors and vendors: now is the time to plan to exhibit your companies and institutions. We thank you for your past participation and need your support. We are reaching out to the region as other states and NSTA are canceling events, as well as, reducing attendee registration to \$25 cost to encourage participation. Our goal is 2000+ registrants!

### Resources for Exhibitors:

- [Exhibitor information \(PDF\)](#) All Booths will be listed in the Exhibitor/Vendor List.  
[Whova Exhibitors.pdf](#)
- [Registration information](#)
- [Concurrent sessions and presenter information](#) – The PDI is supporting both live and pre-recorded presentations. The deadline to submit online presentation proposals form is June 15<sup>th</sup>. Commercial presenters must have purchased a booth.
- Session times Thursday and Friday 4:00 pm - 9:00 pm, Saturday 9:00 am - 3:00 pm.
- For updates of PDI information please check the VAST website, [PDI page at VAST.org](#).

**Sponsorships are available** - with no food/beverage/hotel or mileage expenses, this is a great opportunity. Sponsor at whatever level fits your budget:

#### \$1000 Level Sponsor

- one rotating banner ad on the PDI app and website
- digital program listing (name, logo, link)
- 1/4 page ad in newsletter - 280 characters
- 10% discount on VAST 2021 PDI Exhibitor booth

#### \$2500 Level Sponsor

- two rotating banner ads on the PDI app and website
- digital program listing (name, logo, link)
- 1/2 page ad in newsletter - 300 characters
- 15% discount on VAST 2021 PDI Exhibitor booth

#### \$5000 Level Sponsor

- five rotating banner ads on the PDI app and website
- digital program listing (name, logo, link)
- Full page ad in newsletter
- 25% discount on VAST 2021 PDI Exhibitor booth

### Thinking of Advertising?

- Advertise in the PDI program - [PDF Form](#)
- Advertise in the May or October digital issues of the VAST newsletter - [PDF Form](#)
- Advertise in the August VAST Newsletter that reaches 4000 Virginia science educators and schools - [PDF Form](#)
- Newsletter ad space diagram - [PDF](#)

# Journal of Virginia Science Education Update

Amanda L. Gonczi, Ph.D. & Jennifer L. Maeng, Ph.D., co-editors

<https://vast.wildapricot.org/Journal>

Check out the abstracts for articles published in the December 2019 issue of Journal of Virginia Science Education. As a reminder, initial submissions for the December 2020 JVSE issue are due July 31, 2020. The theme is Science: An Opportunity to Improve Students' Literacy Skills, though manuscripts that do not address this theme are also welcome. The next issue of JVSE will be published July, 2020.

## **Do You See What I See? Plant and Animals and Habitats, Oh My!**

Jennifer L. Maeng, Ph.D.<sup>1</sup> & Deannine Lahham<sup>2</sup>; <sup>1</sup>University of Virginia, Curriculum, Instruction, and Special Education; <sup>2</sup>Albemarle County Public Schools; Corresponding author email: [jlc7d@virginia.edu](mailto:jlc7d@virginia.edu)

For young children, the distinction between an observation and an inference can be difficult to grasp, yet we use these skills in our daily lives and in many content areas. For example, we observe and infer both as we explore the natural world around us and as we read. Even more difficult for young students to understand is the idea that scientific knowledge, while durable, can change with new evidence. In this article, we describe an activity that introduces elementary-aged students to plant and animal diversity while providing opportunities for them to practice making observations and inferences and distinguishing between different types of empirical evidence.

## **Lights, Camera, and a Call to Action: Women in Media Help Promote Science Identity in Female Students**

Uchenna Emenaha & Anne A. Perry, University of Houston; Corresponding author email: [emenaha08@gmail.com](mailto:emenaha08@gmail.com)

Research shows that female students show lower interest in STEM (science, technology, engineering, and math) subjects due to misconceptions that these courses are better suited for their male counterparts. This article explores the current representation of women in STEM and illustrates how media can be used to support female students' STEM identity development. STEM identity development is a theoretical framework that describes the ability for an individual to identify or see themselves being able to do and/or be successful in STEM subjects (Brickhouse & Potter, 1999; Marcia & Kroger, 2011). The context of STEM identity development is created and recreated as students negotiate between the relevance, meaning and abilities between themselves and STEM subjects (Furnham, Chamorro-Premuzic, & McDougall, 2002). Academics wanting to understand factors that can support positive STEM identities would benefit greatly from understanding the ways in which a student develops their academic identities within subjects like science and math. This article will discuss how media can be incorporated into instruction to work towards developing positive STEM identity in young female students. By investigating how to cultivate young girls' interest in STEM in the early grades with media, educators can support students' future STEM career aspirations.

## **An Examination of the Oral Argumentation Abilities of Secondary Students with Disabilities Using Socioscientific Issues**

Mindy Gumpert, M.S.Ed.<sup>1</sup> & Bill McConnell, Ph.D.<sup>2</sup>; <sup>1</sup>Old Dominion University; <sup>2</sup>Virginia Wesleyan University  
<sup>1</sup>Corresponding author email: [mgump001@odu.edu](mailto:mgump001@odu.edu)

More than six in ten students with disabilities (SWD) spend the majority of their day in the general education classroom (U.S. Department of Education, 2019). The expectation is SWD will participate in all content area activities alongside their nondisabled peers. Improving science literacy is an intrinsic goal of science education, yet current science practices may not support all students, particularly SWD. We believe argument using socioscientific issues is an effective way to support SWD in science by enabling them to engage in dialogue, discussion, and debate in scientific topics. SSIs are not only personally meaningful and engaging to the student, but the use of evidence-based reasoning provides a forum for understanding scientific topics (Zeidler, 2003). In this article we present an overview of an argument session and identify several scaffolds used in a classroom of diverse learners. We discuss how the modified Assessing Scientific Argumentation in the Classroom Observation Protocol (Sampson, Enderle, & Walker, 2012) was used as a summative assessment. Finally, we discuss differences and similarities between SWD and their nondisabled peers when engaging in argument using socioscientific issues.

## **Cross-disciplinary and Cross-cultural Impacts of Math Identity**

Joanna G. Jauchen, M.S.<sup>1</sup> and Talisa J. Jackson, M.Ed.<sup>2</sup>; <sup>1</sup>Department of Mathematics, George Mason University; <sup>2</sup>College of Education and Human Development, George Mason University; Corresponding author email: [jjauchen@gmu.edu](mailto:jjauchen@gmu.edu)

While the number of careers in science, technology, engineering and mathematics (STEM) fields is growing, the STEM community continues to have difficulty attracting and retaining female, Black and Latino/a students. Because a historical emphasis on achievement has failed to address this issue, researchers and practitioners are turning to other possible avenues to address the underrepresentation of women and minorities. In this study, we explore two factors that may impact the underrepresentation of women and minorities in STEM: mathematical identity and science self-efficacy. This paper compiles findings from the literature and results from our regression analyses to shine light on the connection high school students' mathematical identity has on students' science self-efficacy. We further reflect on how teachers can cultivate their students' mathematical identities, and work together to create equitable STEM spaces.





## 2020 Virtual VJAS Annual Meeting & Special Awards

Dr. Julia H. Cothron

### VJAS Representative to VAST Board and Chair of Special Judges

Incredible efforts precede the submission of a research project to the Virginia Junior Academy of Science (VJAS), and in fact require a commitment from the student, parent, teacher, school sponsor and the school and school division. Despite COVID-19, the Virginia Academy of Science and its Junior Academy wanted to recognize these commitments, although in a different manner than in prior years. Fortunately, students' research papers had been received prior to school closure and the existing procedure was modified to use the research paper as the basis for recognizing students' research projects.

- Student research papers in 31 different sections – 12 middle school sections and 19 senior high school sections – were reviewed by a team of VJAS Readers. Each reader scored the quality of the abstract, introduction, methods/materials, results, discussion/conclusion and overall quality of the written paper. Previously, the scoring criteria were published in the VJAS Handbook. Based upon scores and readers' recommendations, students were "accepted" for the 2020 Virtual VJAS Annual Meeting. On April 15, Accepted Papers were published on the VJAS Website ([www.vjas.org](http://www.vjas.org)).
- In the 31 sections, each accepted paper was reviewed by a team of VJAS Judges. In addition to the written paper, these judges considered the quality of the problem and its importance for the STEM discipline. Judges looked for evidence that the student did the work, understood the project, and was interested and invested in the project. Overall, judges looked for high quality

projects for the age, educational background and work environment available to the student. On Thursday, May 28, at 7:30 pm, a Virtual VJAS Awards Ceremony was held. For each of the sections, awards were made for first, second, third and honorable mention. The ceremony was live-streamed via YouTube, with the link available on the VJAS home page ([www.vjas.org](http://www.vjas.org)). After the ceremony, winners for each section will be posted on the VJAS website.

- In June, all first place papers will be reviewed by designated teams of special judges. These judges will determine winners of various special awards and scholarships. The VJAS leadership expects to announce these awards in late June, again by a Virtual VJAS Special Awards Ceremony. Look on the VJAS website ([www.vjas.org](http://www.vjas.org)) for the announcement of the date, and if you miss it, check out the listing of top award winners.

The 2020 Virtual VJAS Annual Meeting and Special Awards Ceremony reflect the leadership, ingenuity and hard work of the VJAS Leadership Team, as well as the readers, judges and special judges who adapted and used different strategies to make these events possible. The VJAS Leadership Team includes Susan Booth, Director; Robin Curtis, Associate Director; Se Jeong, VJAS Committee Chair; and, Mike Lovrencic, VJAS Committee Vice-Chair. These leaders created a workable solution by consulting with the Virginia Academy of Science, VJAS Student Officers, participating teachers and schools, and sponsors of various scholarships and awards.



# Review of CK-12 Foundation

Stephanie Harry

Chemistry Teacher, Tabb High School, NBCT AYA: Chemistry  
VAST Chemistry Content Chair

So, on March 23<sup>rd</sup>, Governor Ralph Northam announced that Virginia Schools would be closed for the remainder of the 2019 -2020 school year. As a result, my school district informed us that we would be teaching online for the 4th quarter and students would not receive a grade for this work. We also had to determine the essential topics we would be covering. I was concerned with how I was going to effectively cover my selected topics and provide appropriate feedback to my 100+ students. Then another chemistry teacher started a discussion on National Science Teaching Association (NSTA) chemistry listserv looking for recommendations for good online resources. This is when I first heard about CK-12 Foundation. Before committing to this resource, I attended an informal Zoom meeting and the teacher explained how she was using and had been using CK-12 to teach her students.

CK-12 is and has always been totally free, including all their training. The webinars are archived and live, are very helpful. Their books and chapters can be added to your library, then renamed as your own. Once it is your book, you can download and print all or part of a pdf. The pdf won't have the interactive pieces that the online book does, but it is still a powerful comprehensive resource when you are relying on printed documents only. CK-12 is very responsive to questions and you can email them at: [jumpstart@ck12.org](mailto:jumpstart@ck12.org). They have a variety of courses ranging from kindergarten to 12th grade. You can assign the chapters as outlined by CK-12 or select specific topics from the chapter.

Each concept lesson is a combination of reading assignment, review questions, videos, Plix (Play, Learn, Interact, and eXplore—offer learners an interactive and immersive experience exploring concepts), and/or real-world articles.

Once students complete the concept, they will complete adaptive practice questions ranging from easy to hard. The range of the questions assigned is predetermined. The system will continue to ask students questions until they answer 10 questions correctly. The system may ask a student to review a reading sample based on their response to review questions.

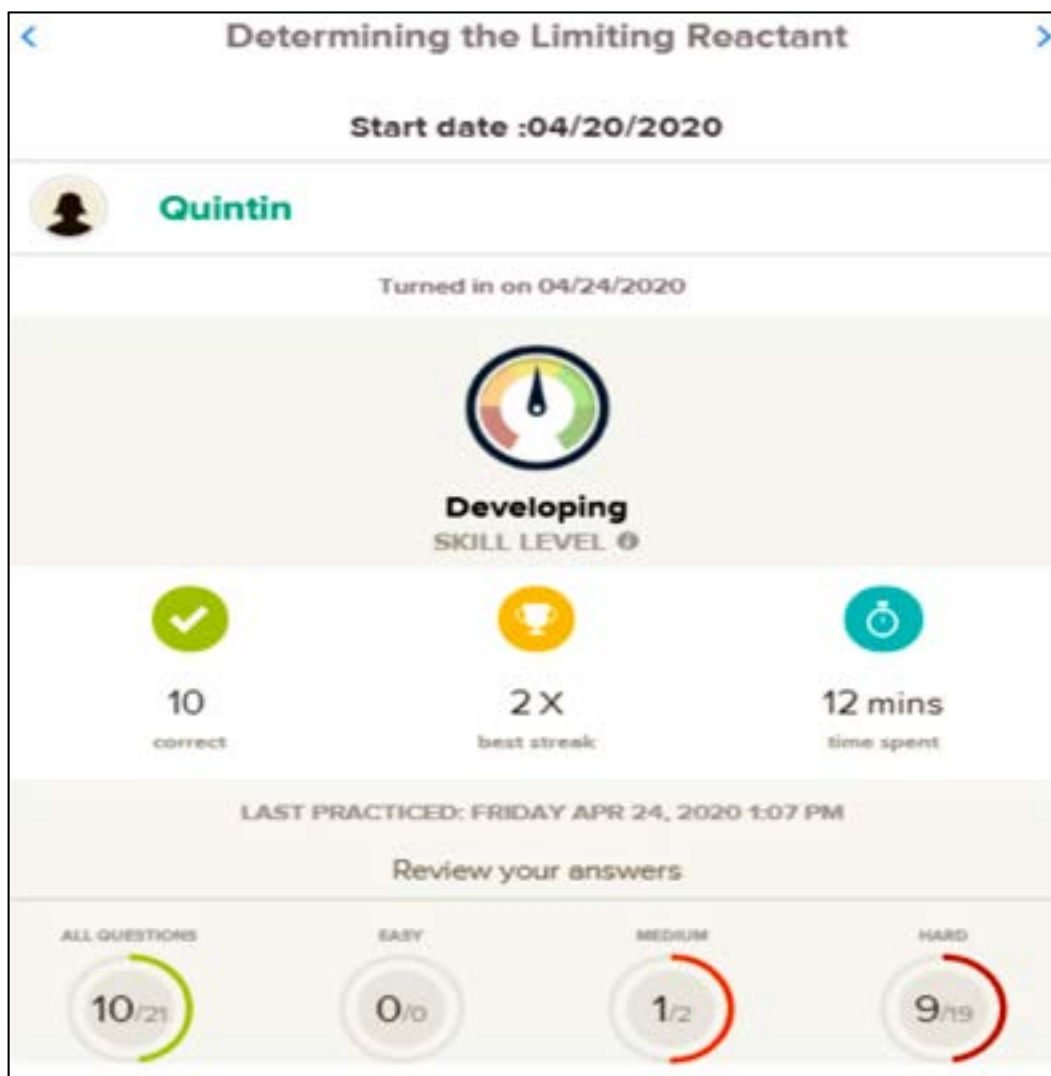
**Image 1.** – Report of learning concepts completed for the entire class.

Module 1: Stoichiometry and Percent Yield				
PRACTICE	PRACTICE	PRACTICE	PRACTICE	PRACTICE
Volume-Volume...	Mass-Volume Stoichiometry	Limiting Reactant	Determining the Limiting...	Theoretical Yield and...
100%	100%	100%	100%	100%
—	—	—	—	—
100%	100%	100%	100%	100%
100%	100%	100%	100%	100%
100%	90%	100%	100%	100%
80%	20%	20%	20%	30%
90%	80%	—	—	—
100%	100%	100%	100%	100%
80%	80%	100%	100%	100%
100%	100%	100%	100%	100%

Once students complete a concept the website gives a detailed report on the students' progress. It provides information like how long they spent on the practice review, and how many questions did students answer

before they got 10 correct (Example: 10 questions correct/18 questions total). If you need to, you can use this information to convert to a numerical score for the student.

**Image 2** – This report shows an individual report. Although this student completed 10 questions his skill level is developing. This student spent 12 minutes on this practice, and they had to answer 21 questions before they answered 10 questions correctly. This student was given 2 medium questions and 19 hard questions.



Here are the five different skill levels.

**Beginning** (red)- new to concept

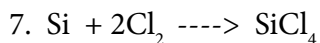
**Exploring** (orange)- starting to understand

**Developing** (yellow)- demonstrating familiarity

**Proficient** (Light green)- understands core concept

**Mastery** (dark green)- deep and demonstrated understanding

**Image 3** – When a student submits an incorrect response, they are shown the correct answer. In order for students to see the correct answer the teacher must select this function when setting up the assignment.



What mass of  $\text{SiCl}_4$  is formed when 10.0 grams of Si and 60.0 grams of  $\text{Cl}_2$  react?

Molar mass of  $\text{SiCl}_4$  = 169.8 g/mol

Molar mass of  $\text{Cl}_2$  = 70.9 g/mol

Molar mass of Si = 28.0 g/mol

\_\_\_\_\_ g

Your answer should be rounded to three significant figures. Do not include units in your answer.

49.45

X

(Wrong)

60.6

✓

(Correct)

**Image 4** - This is an example of the spreadsheet I am using to keep track of students' progress as they complete each concept within a module. My school will be asking for a summary of each students' progress for the quarter and this system will help me to make an informed decision for each student.

V = created CK12 account  
\* = didn't answer questions before submitting

P = Proficient  
H = Mastery

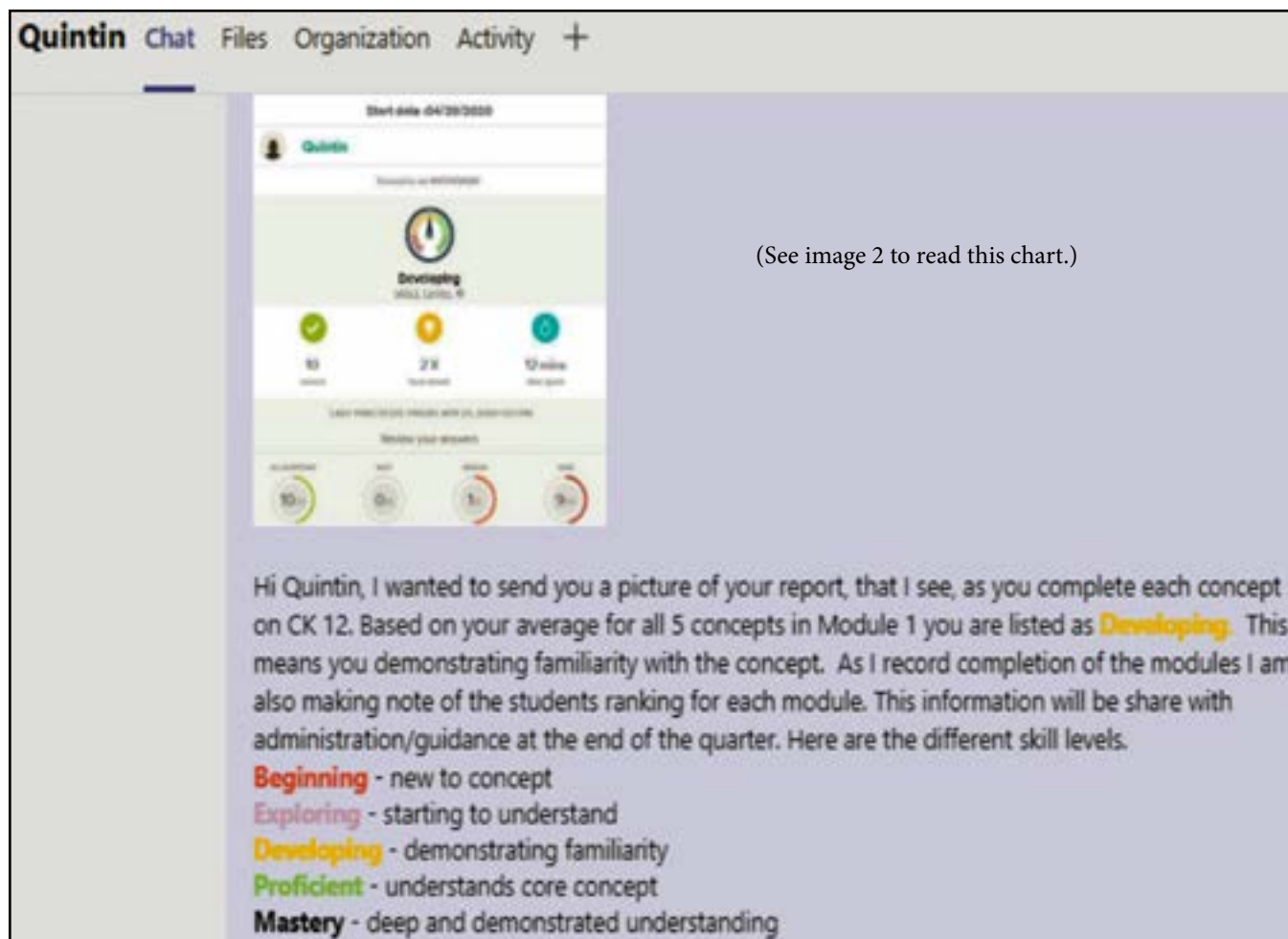
B = Beginning  
E = Exploring  
D = Developing

Days Met: Monday, Tuesday, Wednesday, Thursday, Friday

	Module 1 4/24					Module 2 - 5/1	Module 3
Nicholas A ✓	E	H	M	M			
Paola M ✓	P	H	M	M	M		
✓	P	H	M	M	M		
✓	P	H	M	M	M		
Ami A ✓	E						
✓	P	B	E	D	P		
✓	H	B	E	E	E		
✓	H	B	E	E	E		
Tryna L ✓	P	H	P	P	P		
✓	H	B	E	E	E		
A ✓	P	B	E	E	E		
E ✓	P	B	E	E	E		
✓	P	B	E	E	E		
M ✓	P	B	E	E	E		
IL ✓	P	B	E	E	E		
M ✓	P	B	E	E	E		
A ✓	P	B	E	E	E		
Jacques E ✓	P	B	E	E	E		
D ✓	P	B	E	E	E		
✓	P	B	E	E	E		
✓	P	B	E	E	E		
D ✓	P	B	E	E	E		

Vol-tel/math  
Lanning  
Bart L.L.  
Determining  
L.B.  
yield  
Summary  
Comprehibility  
Gas Pressure  
Ideal Gas Law  
Dalton's Law  
Summary  
Boyle's Law  
Charles Law  
Gay-Lussac Law  
Combined Gas  
Summary

**Image 5** – In an effort to keep my students informed of their progress I sent this message to them using Microsoft Teams chat. The skill level for each module was based on their average skill level for the entire module. I have over 100 students so to reduce the amount of time typing I prewrote comments for each skill level. So, I would copy, paste, and make necessary adjustments to the comment before sending it to the student.



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# Science in Action: An Open Inquiry into the Spread of Covid-19 for High School Students

Gregory MacDougall – Virginia Department of Education Science Specialist

We live in uncertain times. Uncertainty breeds fear, and fear leads to changes in our brains and bodies that help us to fight or flight. As we gain understanding, we reduce uncertainty as well as fear. The Covid-19 pandemic provides an opportunity for us to learn about viruses, how they spread, and, more importantly, reduce uncertainty and fear through understanding.

News reports on Covid-19 give us information that reporters think we need to know. They are producers and we are consumers of this information. Similarly, science teachers produce organized lesson packets that they think student-consumers need to know. Yet, this consumption is far from the work of scientists. Scientists are producers. The work of scientists is a process of learning that produces better understandings of our world. The purpose of this article is to consider open-ended and student-centered ways in which our students can be more like scientists working within a process of learning and producing knowledge.

Instead of giving you a lesson on the spread of Covid-19 for you to consume, this article is using a structure based on the scientific and engineering practices found in the Virginia Science Standards of Learning (2018). This structure can be used to support and guide the work of student-scientists to produce knowledge. In this process, raw data on the spread of Covid-19 will be used as a vehicle for the student-scientist to conduct an open inquiry based on their interests and curiosity.

## Asking Questions

The Framework for Science Education states that “(a)sking questions is essential to developing scientific habits of mind” and that students can be inspired by curiosity (2012, p. 54). Using data sets is one way to spark curiosity and questions.

The first step in this open inquiry into raw data is to ensure that the data is coming from a reputable source. The learning one gains from analyzing data is highly dependent upon the quality and integrity of the raw data. In this case, the data I am using came from Harvard University. In this age of data manipulation, Harvard maintains a world-wide reputation for its quality of medical research

and information.

The following spreadsheet includes data of Covid-19 confirmed cases by country. The data sets can be downloaded from:

<https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/L20LOT>

Creating a question starts with careful observation. The data set above is quite large and includes cumulative numbers of confirmed Covid-19 cases from 251 countries, from Afghanistan to Zimbabwe! Real science is messy. The work of the student-scientist is to observe and ask questions, to *produce* questions.

As I review the data, curiosity leads me to wonder about the rate of increase of the virus in the United States. In doing so, I begin to focus my attention on what I believe is important. I decide to focus my attention on the cumulative total of confirmed Covid-19 cases in the United States by date.

1	CNTRY_NAME	122	0123	0124	0125	0126
235	United Arab Em	0	0	0	0	0
236	United Kingdom	0	0	0	0	0
237	United States	1	1	2	2	5
238	Uruguay	0	0	0	0	0
239	Uzbekistan	0	0	0	0	0

In making careful observations of the data, I notice a pattern. The number of confirmed cases starts with one, then increases slowly. As I observe the later dates, I see that the rate of confirmed cases increases dramatically.

Notice that at this point, my curiosity is based upon what “I” am observing. Undoubtedly, you will confirm my observation, but it is important to note “I” am doing the work. You might also point out that the words I am using are qualitative: increases slowly, increases dramatically. I am merely making general observations at this stage.

As I explore the data, I begin to wonder about the number of confirmed virus cases *each* day. Additionally, I would like to predict number of future infections in the U.S. The following two questions come from my exploration the data:



1. How does the daily rate of confirmed Covid-19 cases change over time?
2. Using a rate of change over time, what predictions might be made about the number of confirmed Covid-19 cases for the future?

Based on my first question, I am looking at the number of confirmed cases changing by day. Therefore, I identify the date as the independent variable and the number of new cases each day as the dependent variable.

As you look at the data, what is driving your curiosity? What observations might you make? Are you interested in a particular date range? Are you interested in a country, or region? Are you interested in obtaining a different data set from another reputable organization?

Students will have a variety of different questions they will ask. As teachers, what might you do to help student scientists get access to raw data from a reputable source, make careful observations of the data, and create a question aligned to their interests?

## Planning and Carrying Out Investigations

Planning and carrying out investigations is different when using existing data sets. Students are not actually conducting an experiment and collecting data. However, they must plan how they will analyze the raw data. Based on my questions, my plan is to use a program that came with my computer as a tool to manipulate and analyze the data. A critical part of my plan involves manipulating the raw data in order to calculate the number of confirmed cases each day.

Based on your question, what tool/computer program would you use to analyze the data? What is your plan to manipulate the raw data in order for you to answer your question?

How do we as teachers support our student-scientists in selecting and using appropriate tools and technology needed in answering their questions? What help might students need in planning to manipulate the raw data to answer their questions?

## Interpreting, Analyzing, and Evaluating Data

I once had an interesting conversation with a leader in mathematics education. She said: “the problem with science is that your numbers are never neat.” This is usually true. In general, doing real science is rarely ever neat. During

this phase of work, the student scientist may travel down several dead ends. In order to streamline the learning process, we often give students a neat and orderly plan for carrying out an investigation and analyzing data. In an open-inquiry, however, the student-scientist is doing the work and more often discovers what *does not* work more than what *does* work. It is not neat.

Based on my questions and my data, I need to organize the data set to reveal patterns to answer my questions. I start with making a copy of the original data set. On the copied spreadsheet, I delete extraneous information so that I have a simple set of data needed to answer my questions. I organize the data so that the computer program recognizes that the independent variable, date, is on the x-axis, and the dependent variable, number of daily cases, is on the y-axis.

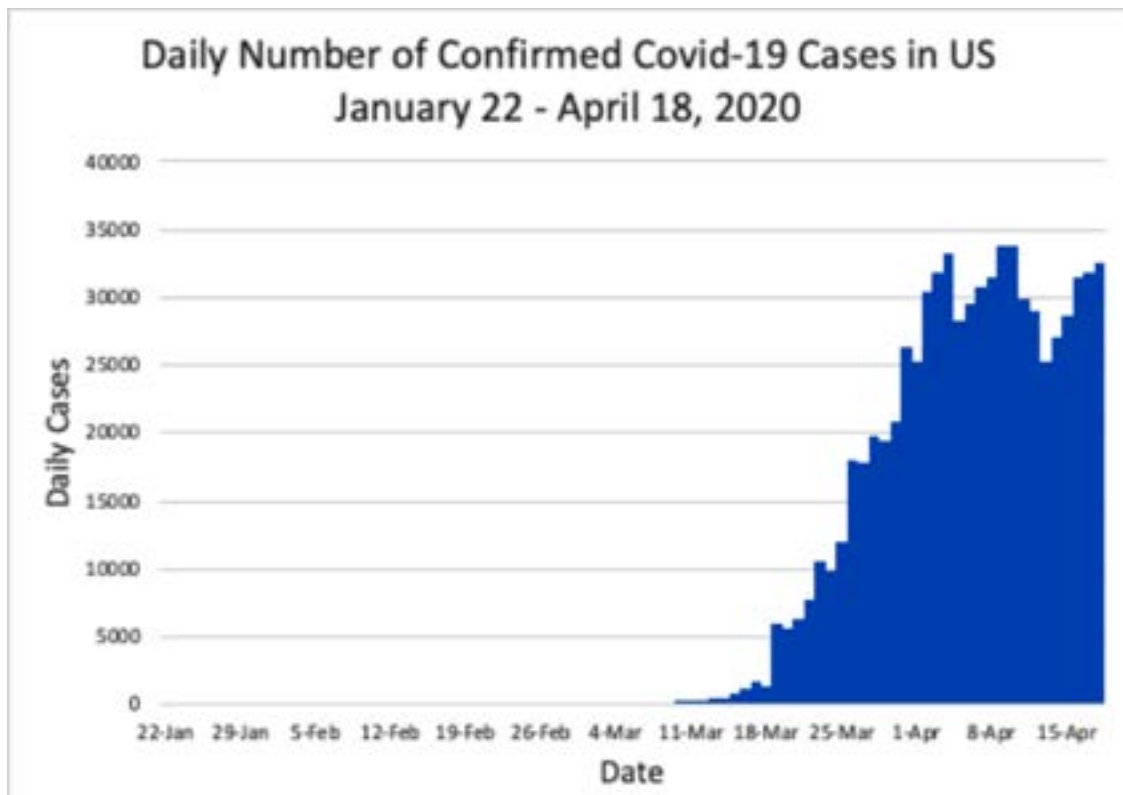
The data set includes the date and cumulative number of Covid-19 cases in the U.S. However, I am looking for the number of daily cases. To find that, I use the formula builder in the program to calculate this number by subtracting the number of cases from each previous day. In the example provided, you can see that the number of confirmed cases for April 15 was 28680, which is found by subtracting the number of cases on April 14 from the number of cases on April 15.

CH2		$\times$	$\checkmark$	$f_x$	=CH3-CG3
	A	CG	CH		
1		14-Apr	15-Apr		
2	Daily Cases	27051	28680		
3	United States	607670	636350		

As with my initial observations of the raw data, I confirm that the number of daily cases increases slowly in January and increases dramatically in April. I begin to wonder how a graph might reveal additional information that would cause me to revise my current understanding of how the daily rate of cases changes over time.

I have decided that a column chart would be best suited for my analysis and for communicating my conclusions to others. Note that if I was interested in creating a graph of the cumulative total confirmed cases, as in the raw data set, I would simply create a scatter plot of the data. However, I am looking at cases per day.

I have often said: If a picture is worth a thousand words,



then a graph is worth at least a hundred! Indeed, my graph reveals more information. My initial observation led me to conclude that there were two patterns: a slow beginning and a rapid increase in cases. In reviewing the graph, I discover that I need to revise my model of how the daily rate of cases change over time.

Based on your question, how are you organizing the data? What do you have to do to the raw data to analyze the data and answer your question? What graph might help you in the process of answering your question?

How do we as teachers support our student-scientists in organizing raw data? How can we help students to construct, analyze, and interpret data in the process of answering their questions?

### Constructing and Critiquing Conclusions and Explanations

In answering my first question about the daily rate of change, the graph reveals a pattern that I did not see in my initial observations. It can be observed that there are three patterns that are very much dependent on the date. However, I have also found predicting future cases to be a more difficult task. Therefore, I have decided to limit my prediction to one month. It can be observed that there was very little spread of the virus during January and February. Indeed, given this data

alone, I would predict future cases to diminish. This part of the data does not help me in predicting cases for the month of May.

The graph reveals a different pattern during the month of March. Based on this data, I would predict between 40,000 to 80,000 confirmed cases per day during the month of May.

During the month of April, I notice that the number of daily cases fluctuates. Based on this data, I would predict between 25,000 to 33,000 confirmed cases per day during the month of May.

In my quest to answer the second question regarding the number of future cases, I have found that I might not be able to accurately predict the future number of cases even for just one month. I also know that there are many intervening variables that would impact the spread of the Covid-19 virus. However, I have concluded that the Covid-19 virus is not going away soon.

Based on your question, what conclusions have you made? What prediction can you make? What is the range of dates that are of interest to you?

How do we as teachers support our student-scientists in graphing their data and constructing arguments or counterarguments based on data and evidence?

## Conclusion

The purpose of this article is to model the thinking and processes of student-scientists in an open inquiry with raw data on a timely subject. This open inquiry is student-centered and closely mirrors the work of scientists. It is messy. It is not neat. It is science in action.

The scientific and engineering practices found in the Virginia Science Standards of Learning (2018) provide a framework for open inquiry. Teachers should imbed these practices within science content throughout the year in ways that promote student-centered learning, and support them when they need more information. This inquiry with raw data on Covid-19 could provide the foundation for further exploration of Biology standards 4d and 4e.

We live in a data rich world. Teachers in every subject can find raw data for use in their science classrooms. The science teacher needs to determine what raw data is useful and when to use it in a student centered classroom. More importantly, teachers need to consider supports to help students through this inquiry process, to help students take control of their learning. The National Research Council states that “(s)chools and classrooms must be learner

centered” (p. 23) and

New developments in the science of learning also emphasize the importance of helping people take control of their own learning. Since understanding is viewed as important, people must learn to recognize when they understand and when they need more information. (p.12)

Giving students voice and choice in learning the Virginia Science Standards is one way to help our students “take control of their own learning” and therefore, their understanding of an uncertain world.

## References

*National Research Council 2000. How People Learn: Brain, Mind, Experience, and School: Expanded Edition.* Washington, DC: The National Academies Press.

*Virginia Science Standards of Learning (2018)*



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## Virtual Lifelong Learning Connections to the VAST PDI Experience

Susan Bardenhagen, Region IV Director

As a teacher who has immersed herself in learning new things about every subject for as long as I can remember, I thrive on being a student. My family nurtured an eclectic background- immersed in the visual and performing arts of all genres, doing research, while gaining an appreciation for nature.

Since my first full-time teaching job in a rural district in upstate New York, I have modeled experiential and hands-on instruction. We took over the school kitchen to make cookie snacks for our nature studies fieldtrip with my students teaching their parent chaperones about types of trees, flowers, birds, and soil (in 1976 we called it dirt). Our electricity unit included building a doorbell for visitors to our classroom; our civics lesson included nomination speeches and campaigning for class elections; and reading class presented a play they created from one of their folk tales - rehearsing, making costumes, invitations, and programs. I took the "T" in PTA seriously and was elected the VP of my school's council, establishing the importance of parents and community stakeholders in education. I maintained connections with my college and community outreach- presenting for some of my professors, playing violin in the community orchestra, attending outdoor education conferences and subject area workshops, and writing curriculum for the state's "Young Highway User Program".

New York teachers' permanent certification required a Master's degree- however, that was not why I earned both a Bachelor's in Music and an MS in Education in four years. My high school coursework was heavy on the humanities; my college transcripts reveal a more diverse palette with a variety of sciences, math and statistics, foreign languages, history and social sciences, and visual and performing arts. This established a foundation in STEAM-infused education before the acronym was coined; just like my mom was an ecologist way before that title was publicly championed.

When I began teaching in Virginia in 1981 and was told I needed six graduate hours to receive certification, I started taking courses at the NOVA UVA and VA Tech center and never stopped. By the time I received my Education Specialist's degree in Administration & Supervision in 1991, I had nearly 200 hours and seven endorsements for NK-8 classroom, K-8 principal, and K-12 supervisor. I continued taking classes and completed all of the coursework for an Ed.D. program, majoring



in Curriculum & Instruction with minors in Special Education/Gifted/ESL by 1998.

Career education programs, ecology clubs, science fairs, school plays and musicals, and community outreach formulated an advocacy for a strong workforce, environmental science, gender equity, multicultural awareness, and arts-infused instruction. Add the collegiality benefits of an active *Phi Delta Kappa* chapter, training as a teacher coach and advisory council facilitator, being part of the founding of a regional *NCTM* affiliate, and attending an *NVAST* conference where I met Astronaut John Young which led to a VAST PDI attendance for over 30 years. The empowerment gained by successfully securing a diverse group of grants, coaching and mentoring colleagues and school stakeholders, presenting at many subject area conferences, and coordinating local and regional science fairs, career conferences, and teacher professional development conferences, has also nourished my thirst for learning.

My job as the county's high school summer school coordinator from 1982-1990 and joining *Phi Delta Kappa* expanded my horizon to working with secondary educators and other organizations- community service at homeless shelters, women's shelters, and the *American Association of University Women*- which teaching at a Title I/culturally diverse school and taking Special Education courses had only provided a small window into inequity and discrimination. In 1991, I helped secure female presenters in non-traditional careers- being miffed that this category didn't include me as a teacher or my

neighbor who is a nurse, but that my chemical engineer sister, my biochemist symphony stand partner, and physician sister-in-law were eligible for “Girls + Math + Science = SUCCESS!”. I accepted the role of coordinator the next year since I had connections to the schools- this year will be the 30th annual conference (when it’s safe to have over 300 people together). It has expanded from IBM engineers sharing courses needed for engineering degrees, to technology, design, and the arts for careers with workshops for teachers and parents in STEM, equity, and advocacy.

The regional *NCTM* affiliate included several districts in region IV, so I enhanced my curricular strategies for teaching with different methods and approaches. I presented and upped my audience to *VCTM*. I also took a course from my Math Supervisor on how to teach with manipulatives- a momentous experience as I was finally able to understand mathematical concepts in fractions, algebra, and more! This is not to say I hadn’t been a good teacher for Math, but OMG I could be more effective and understanding what students needed to have. Add the ecology ingredient and my “Trash to Treasures” workshops began.



The VAST PDIs have provided the greatest power of connections, collegial relationships, new knowledge and paradigm shifts, and fuel for lifelong learning. I have presented on the Math & Science connection, STEAM-infused instruction, ecology clubs activities, and 4<sup>th</sup> grade geology and geography connections. I also joined NSTA after meeting their rep and taking advantage of the books, journals, webinars, and outreach- specifically the biannual *USA Science & Engineering Festival* in DC- I was pleasantly exhausted in 2012 after spending two days sharing science with parents and children, dressed in my VAST labcoat- with pre-service students and science teachers from other states doing slime chemistry and physics aerodynamics activities.

From contacts with PDI vendors and educators, I became part of the *American Institute of Aeronautics & Astronautics* as an educator associate and organizational judge for regional science fairs; through *AIAA* a judge with *The Real World Design Challenge* which includes student teams from all of the states and US territories, and also the *Society of Women Engineers* as a volunteer for TechTrek outreach, activities at the Air & Space Museum, and Girl Scout STEM

events. PDI Keynote and special speakers have included astronauts, international icons, Nobel prize winners, and an exciting diversity of STEM fields.

Through the Kennedy Center’s diverse programs, I’ve met *NIH* Director Dr. Francis Collins- featured in VAST’s theme for “Faces of Science in Virginia” student artwork - he was a leader with the Human Genome Project. Not only is he a musician, but he has promoted the Kennedy Center’s “Sound Health” summits – on STEAM connections. From their listserve, I was invited to the *National Academies of Science, Engineering, & Medicine* “Cultural Arts Programs”. The symposia, report releases, and programs that I have attended in the last five years range from STEM + the Humanities, Women & Under-represented Populations in STEM Career Fields, Sexual Harassment in Higher Education, environmental science “The Plastic Problem”, and authors.

My involvement in my schools’ PTAs introduced me to the Federation of Galaxy Explorers in 2002- re-igniting my fascination with space (kindled with John Glenn’s mission broadcast over the PA in third grade). I became a mission team leader for four groups from grades 3-8, Moon and Mars Base summer camps instructor, astronaut interviews, and museum tours. Another connection- *Explore Mars’ Humans to Mars Summits* – has had programs with NASA leadership, engineers, scientists, and their global connections.

Though now I’m retired, yet substitute teaching, my quest for learning has not been hampered by the COVID 19 pandemic’s effect- closing schools and performance venues, cancelling or postponing conferences. Since I’m not out and about late, I’ve been able to watch PBS programs and CBS morning news programs. Virtually attending courses/webinars, meetings, summits, performances, and programs has filled daily schedule with diverse opportunities. More intriguing is how SCIENCE and being “citizen scientist” connects the many topics and presenters.



WETA’s “American Experience” documentary on Nobel prize winner Norman Borlaug who developed wheat seeds and a planting process which generated abundant harvests saving millions of people ~~ *Explore Mars’* teleconference “How Mars Can Help Us Solve Climate Change” premise that an innovative farming technique used in Earth’s



## Region V News

**Robbie Higdon, Region V Director, James Madison University**  
**Andy Jackson, VAST Parliamentarian and Director of**  
**Harrisonburg High School Governor's STEM Academy**



Congratulations to Andy Jackson and students from the Harrisonburg High School (HHS) Governor's STEM Academy! In February, Jackson submitted fourteen student papers to the Virginia Junior Academy of Sciences. These papers are the result of very formal science and Engineering studies based on many hours of experimentation or design/build, and the standards to have your paper accepted are high. Twelve of the fourteen papers submitted by HHS students were accepted. These twelve papers moved on to be judged for state level awards. This same research was also submitted and presented at the Shenandoah Valley Regional Science & Engineering Fair held at James Madison University on March 10. Multiple awards were won by the students including two 1st place awards. In addition, HHS students received 6 special awards and in the two Engineering sections, HHS Governor's STEM Academy students took 5 of the 6 medals! Three of the papers moved forward to the Virginia State Science and Engineering Fair scheduled to take place in Roanoke, Virginia. However, due to COVID-19 restrictions, students submitted presentations online for the judges.

At the state level, Harrisonburg High School juniors Stella Alexiou and Thomas Shulgan received an honorable mention at the state level for their project on renewable fuels for cooking and heating in Africa, titled: "Engineering a Sustainable Source of Fuel for the Nasaruni Academy." Harrisonburg High School senior Jadelin McLeod earned

1st place in Material Science for her work entitled, "The Comparative Stab Resistance of Two Chainmail Weaves." McLeod decided to take her passion for chain mail — she has made jewelry and armor from different kinds over the years — and develop a science project around that. "I was curious as the material properties of them and which one was stronger," she said. After finding little research on the matter, including a more serious literature review years prior, McLeod decided to do her own experimentation on the topic. What she did know was chain mail is more likely to be damaged by stabbing rather than stretching. She decided to do puncture strength tests on two different types of chain mail. Jackson asked Jadelin how things were going at the regional final competition and she replied, "Great, people come up and I get to talk them about chainmail and they HAVE to stay and listen!"

Some article content previously published:  
Williams, M. (2020, April 30). HHS student places first in state science, engineering fair. Daily News-Record, Retrieved from [https://www.dnronline.com/news/harrisonburg/hhs-student-places-first-in-state-science-engineering-fair/article\\_4c738690-1b28-5fa5-a926-2925aa41a94a.html](https://www.dnronline.com/news/harrisonburg/hhs-student-places-first-in-state-science-engineering-fair/article_4c738690-1b28-5fa5-a926-2925aa41a94a.html)

### **Robbie L. Higdon, PhD**

Region V Director for the Virginia Association of Science Teachers  
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## **Virtual Lifelong Learning Connections continued:**

deserts/arid soils could be used in Mars' dusty regolith. CBS's piece on the plight of Long Island's oyster farmers and NASEM's Science & Entertainment Exchange's "The Science of Where – GIS, Mapping the Spread of Global Pandemic" ~~ NOAA's webinar on "Large Scale Sanctuary Oyster Restoration in the Chesapeake Bay". PBS documentary "The Gene: An Intimate History" ~~ vendor Carnegie Science's webinar, William Ludington's "Learning about the Microbiome Living Inside of All of Us!" ~~ National Academy of Medicine's many webinars on the COVID 19 pandemic. Addressing the pandemic on a global scale was discussed in depth by the special panel at the NAS's 157th annual symposium including Dr. Anthony Fauci, China's CDC Director George Gao, and Dr. Sanjay Gupta ~~ lessons learned presented by NASEM's Gulf

Research Program's panel, "Remembering the Deepwater Horizon Oil Spill" ~~ Geologist Dr. Tanya Harrison suggesting the US facing the pandemic could be our next Apollo moment. Both the NSF's new grant guidelines and the NAS's Grand Challenges emphasize interdisciplinary projects = STEAM! I hope you can vicariously enjoy how I felt as all of the aforementioned connections inspired me to write my thoughts. There are also several speakers who would be awesome presenters for this year's PDI! I'll keep you posted.

**Susan Bardenhagen, VAST Region IV Director**

# Why We Learn and Teach

Shirley Sypolt, 2020 VAST Vice-President

I moved from Nebraska to Virginia in 1992 when my husband was assigned to Langley AFB. I taught as a public school elementary teacher, in Hampton, for 26 years (in grades 5, 3, and 2) and I was the Science Instructional Leader for my Elementary School for 16 of those years. In the evenings I took all the required night courses for my MAT (Master of Arts in Teaching – Environmental Education k-12). I was offered a teaching job at CNU the same night that I defended my science thesis study with my review board; my published thesis study was called: ***The Relationship of Teachers' Attitudes and Behaviors Toward the Environment*** and a copy is in the CNU library. For 8 of those years teaching Elementary students, I also taught as an adjunct professor, in the evenings at Christopher Newport University.

I retired from teaching less than two years ago, but the good thing about this, is that it's given me more time to reflect on my teaching career and to be out in the public, during regular school day hours during the week; except more recently (with the COVID-19 outbreak). While we are actively teaching, I don't think we (as teachers) actually realize how much our interactions impact our students. Our interactions with our students (at every level) should be "life changing" for them, or should I say "life engaging for them."

Looking back to when I first started teaching in Hampton, my second year of teaching 5<sup>th</sup> grade, was probably my most challenging year as an elementary teacher. That year I had a young girl (T) in my classroom, who was dealing with a very difficult home situation (taken away from her mother and being raised by her grandparents). This girl's grandparents were trying very hard to help their granddaughter, but they were really struggling. This is the only student that I ever had, that could set the tone, all day, for all the other students. (T) would just stop in the classroom doorway and scan the whole classroom, and I could easily tell from her facial expression, whether or not she and all the other students were going to cooperate with me that day, or not. To say the least, I had numerous talks with (T) and her grandparents (after school) and we all discussed the importance of (T) wanting to present herself as a "positive leader" and not as a "bully." I constantly reminded (T) how smart she was and that she could grow up to be anything that she wanted to be, if she just set positive goals and worked hard to achieve them. At that time, at the end of each 5<sup>th</sup> grade year, the nearby middle school would still hold an

assembly for our graduating 5<sup>th</sup> graders, and the middle school would send about five of their top ranked (in both academic and behavior) 6<sup>th</sup> graders to come talk to our elementary students. The day of this visit, (T) was one of the first students to walk down the hallway. She came up to me and gave me a great big hug) and said "I did listen to what you said last year. Thank you, Mrs. Sypolt, for not giving up on me!" About thirteen years later, I saw (T) in a grocery store, in my neighborhood, with her two young children. I asked her what she was now doing and her reply was, "I'm happily married and I'm working as an engineer." **Wow!**

One morning before school, I stopped at the Hampton Walmart to pick up a few things for my students. As I walked through the electronic door, a tall young man standing just inside the door said "Hi, Mrs. Sypolt, are you still teaching at Cooper Elementary?" I said yes, and we talked for several minutes. (D) reminded me that he had been in my 5<sup>th</sup> grade **4-H Environmental Club**; and he had entered and won the statewide **Arbor Day** poster contest for 5<sup>th</sup> graders. This young man and his mother invited me to go with them to the luncheon and the awards ceremony at the Natural History Museum in Martinsville. The luncheon and awards ceremony went very well, but as we were leaving (D's) mom stopped at the first Walmart and bought some allergy medicine. It turned out that (D's) mom was having an allergy attack due to some of the musty/moldy smells at the museum (especially when she was close to the tall upright stuffed black bear). (D's) mom asked me to drive us back to Hampton, and promptly fell asleep. About halfway home, I decided to take (D) and his mom to visit my parents place, a mile out of Keysville, in Charlotte County. (D's) mom was feeling better by the time we got to my childhood home and by then we all needed a restroom break & some fresh air. My mom treated (D) and his mom, like best friends, and served them homemade cookies and drinks and took them on a tour of the large garden and yard. They both returned home with lots of fresh vegetables & fruits to enjoy. I asked (D) what he was doing now, and he told me that he was finishing up his last year at Hampton University and he wanted to become a scientist. **Wow!**

When I had my first total knee replacement surgery at the Portsmouth Naval Hospital, I stayed for two nights. The second night around midnight, my roommate's nurse came in to check on her. She glanced

over at me and did a double take and asked me if I was “Mrs. Sypolt from Cooper Elementary”. After I said yes, (G) told me that she loved being in my fifth grade science classes and thanked me for being such a great science teacher. (G) also told me that she had decided that she wanted to be a nurse, even before she went to middle school. **Wow!**

Last summer, after recovering from my second total knee replacement surgery, I was going to the York County YMCA on a regular basis to exercise. During one of my Y visits a tall young man (P) came up to me to ask if “I was Mrs. Sypolt from Cooper Elementary School?” When I said yes, (P) then told me that he loved being in my Fifth Grade “**Young Astronauts Club**” and he told me that he still remembered the two flocks of geese honking loudly at each other out on the soccer field behind our school, during one of our before school Fifth Grade “**Bird Watching Club**” walks. He then asked me if I remembered the science question that he had asked me in fifth grade, and being old, and forgetful, I asked him what the question had been. He then said: I asked you “if I’m riding in my car with my parents, and my window is down, and I drop a tennis ball out of the window, will the ball fall straight down to the ground or will it fly backwards because the car is moving forward?” **Obviously, we had been studying our 5th grade Physics science unit at that time.** I asked him if he had tried it, and he said “yes, I tried it with my Mom on the way home from school that same day.” He then went on to tell me that he was now working at the shipyard as an engineer. **Wow!**

Last November, after returning home for the 2019 VAST PDI with the Executive Director, Susan Booth; she was told that she was being moved from one classroom location at her middle school to another location (along with changing the grade levels that she would be teaching science to). For several weeks, I went in for a few hours at a time to help her get the science classroom and science lab set up. While there, I frequently ran into a lot of my prior elementary students that I had taught, that were now in middle school. It was great to get all the hugs. I also helped Susan, when she had an astronaut (Roger Crouch) come and do assemblies for all of the grade levels at her middle school and she held a “meet and greet” with parents after school. At this parent meeting, a dad came up to me and said that he had been a student of mine at CNU when I was teaching the “**Science Methods course for Elementary Teachers**”. He told me that he is now teaching science in a Hampton school and that “he loves it.” **Wow!**

One Saturday recently, my husband and I went to a local restaurant, in Hampton for lunch; and a young woman (with an older woman) came up to our table. The younger woman asked if I was Mrs. Sypolt from Cooper

Elementary and when I said yes, she looked at the older woman and said “I told you so MOM!” We talked for a while and the Mom told us that she was the restaurant manager, and that her daughter (C) was working as a chef’s aid until she got accepted for a computer job that she had recently applied for. (C)’s Mom also told me that her daughter still talked about how much she loved being in my science class and in the science clubs I did for the fifth graders, both before & after school. The next time we visited the same restaurant, the Mom came over to tell me that her daughter had just gotten hired as a computer programmer, and that it was the science job that her daughter had wanted. **Wow!**

**These are just a few of my stories from 26 years of learning and teaching!**

Now with COVID-19, close contact is discouraged, but I’ve still found ways to keep science learning fun for our grandkids. I’ve been putting “science things to do at home” packs together and delivering them to the grandkids porch steps for them to do, or emailing them ideas. 1) I emailed the parents of all of our grandkids information about the Super pink moon 2020, that was in April - and information about why it is called a pink moon - even though it wasn’t actually pink, and 2) while my husband was hauling about 11 tons of river gravel into a cleared out space in our front yard for our new rock garden, I was raking it out as smooth as possible, and looked down and found an unusual looking rock, on one side it looks like the face of a California condor; I gave our grandson Grayson the rock and pictures of this type of bird to look at, and he agreed that it did look like a condor’s face. While cleaning little sticks & leaves that blew down off the trees yesterday, I found another rock, and this one, on one side looks like the face of a box turtle: I’ll also give this rock to a grandchild, with a picture for comparison. 3) Another summer science idea; I’m giving each of my grandkids a copy of the book: “**Turn This Book Into a Beehive! And 19 Other Experiments and Activities that Explore the Amazing World of Bees**”, by Lynn Brunelle. I am keeping my autographed copy of this book that Lynn gave to me at last year’s VAST PDI; she was one of our exhibitors. **WOW!**

**Once a teacher, always a teacher!**







**Question your world.**



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### Mission of the Virginia Association of Science Teachers (VAST)

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



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