

The Open Universe

A periodic investigation into Vermont Science...

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NEWS

Phenomena-driven Instruction

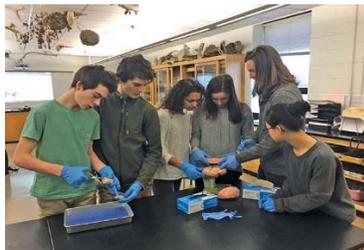
Inquiry vs. Practice:
Is there a difference?

The Fourth National Climate Assessment

Science Phenomena

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

Events and Announcements



Welcome to The Open Universe, a periodic investigation into Vermont Science. In this issue, we'll investigate using phenomena in science instruction and discuss the science and engineering practices (SEPs) of the Next Generation Science Standards (NGSS). We'll then check out the new climate report that came out of Washington this past November 23rd, 2018. Finally, let us do some science learning together about the InSight lander.

Next issue, we will be going into the cross-cutting concepts and discussing equity in science.

Phenomena-driven Instruction

Phenomena. Many of us have heard this term and believe we know what it is. For some, phenomena is synonymous with "hook" - something to quickly engage a student in learning and a way to make sure a student is mentally present in class.

However, a phenomenon used to anchor your science unit or lesson does not have to be "phenomenal." Ideally, a phenomenon should move students from "learning about" to "figuring out." Phenomena drive units and student learning across all three of the Next Generation Science dimensions.

Here are three great resources you can check out to find out more about why and how you might try to incorporate phenomena into your lessons. Make sure to read the events and announcements at the end of our newsletter to learn how to register for two upcoming workshops in December regarding phenomena.

- [Using Phenomena in NGSS-Designed Lessons and Units](#)
- [NGSS EOUP Rubric: Using Phenomena \(Video\)](#)
- [Practice Brief 42: Using Phenomena in Lessons and Units](#)

Inquiry vs. Practice: Is there a difference?

By now, you are hopefully familiar with the three dimensions of the NGSS. Many districts have chosen the eight SEPs as their districts proficiency-based graduation requirements (PBGRs). But why do we call them practices and not science inquiry?

Generally speaking, science inquiry tends to be pretty rigid in instruction. How many lessons have been taught that teaches a very structured definition of the "scientific method?" This mode of thinking (and structuring science investigations) doesn't accurately reflect what scientists actually do- deep thinking, repeating multiple steps, reflecting, etc.

The SEPs are not a method of investigation, but instead are designed to be more holistic and complete. While there will seem to be crossover between elements of scientific inquiry and practices, students use the practices as building blocks for their investigations.

Inquiry vs. Practice (cont.)

Therefore, practices are not meant to be learned in isolation. We want our students to construct explanations and arguments, use evidence and communicate their findings—and generally be actively engaged in science.

A great way to start encouraging students to own the SEPs is to be more mindful of them and think about way to build lessons that have students authentically engage in the practices.

Here are some resources that may be of help to you as you begin to mindfully investigate the science and engineering practices.

- [Practice Brief 32: Why focus on science and engineering practices—and not “inquiry?” Why is “the scientific method” mistaken?](#)
- [EiE Video Snippets: Focus on NGSS Practices \(Videos\)](#)
- [Scientific and Engineering Practices in K-12 Classrooms: Understanding A Framework for K-12 Science Education](#)
- [NGSS: Science and Engineering Practices \(Video\)](#)

The Fourth National Climate Assessment

The National Climate Assessment is a mandated report that is required every four years and provides the most relevant information available regarding climate change and its impacts on the US. Its goal is to inform response decisions to its findings about the impact of climate change on human health, community well-being, business and economies, as well as ecosystems and natural resources.

On November 23rd, 2018, the United States Global Change Research Program (USGCRP) released Volume II of the Fourth National Climate Assessment (NCA4). Here are some key findings of the NCA4 (from [National Oceanic and Atmospheric Administration website](#)):

- Societal efforts to respond to climate change have expanded in the last five years, but not at the scale needed to avoid substantial damages to the economy, environment and human health over the coming decades.
- Climate change is expected to cause growing losses to American infrastructure and property and impede the rate of economic growth over this century.
- Rising temperatures, extreme heat, drought, wildfire on rangelands and heavy downpours are expected to increasingly challenge the quality and quantity of U.S. crop yields, livestock, health, price stability and rural livelihoods.
- Continued changes to Earth’s climate will cause major disruptions in some ecosystems. Some coral reef and sea ice ecosystems are already experiencing transformational changes, affecting communities and economies that rely upon them.
- Changes in the quality and quantity of fresh water available for people and the environment are increasing risks and costs to agriculture, energy production, industry and recreation.
- Climate change threatens the health and well-being of the American people by causing increasing extreme weather, changes to air quality, the spread of new diseases by insects and pests, and changes to the availability of food and water.

For a more comprehensive dive into the full NCA4, please visit [the Fourth National Climate Assessment website](#).

Science Phenomena

On November 26th, 2018, NASA launched and successfully landed their InSight lander on Mars. The lander will be taking thermal and seismic measurements of the red planet over the course of the year to learn about its interior and its geologic history. Check out these resources regarding the InSight mission and the 7 minutes of terror.

- [InSight landing explanation](#) (Video)
- [What is the 7 minutes of Terror? \(Curiosity Rover\)](#) (Video)
- [Mars InSight Mission Overview](#)
- [NASA Control Room](#) (Video)

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

The Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST) is the highest recognition that a K-12 mathematics or science (including engineering and computer science) teacher may receive for outstanding teaching in the United States.

This year's award will be going to outstanding 7-12 teachers.

The award recognizes excellence in teachers who develop and implement high-quality instructional programs that are informed by content knowledge and enhances student learning. The National Science Foundation (NSF) administers PAEMST on behalf of the White House Office of Science and Technology Policy.

Some of the awards recipients receive:

- A paid trip to Washington, D.C., to attend recognition events
- A \$10,000 award from the NSF; and
- An opportunity to build partnerships with colleagues across the nation

Consider applying or nominating an outstanding Vermont educator today. For more information, please visit [the PAEMST website](#).

Events and Announcements

Understanding the NGSS and Building K-12 Science Systems

On December 6th, 2018 at North Country Career Center in Newport, VT, The Agency of Education will be offering Understanding the NGSS and Building Systems and Sequences will dive into how to read the Next Generation Science Standards, what resources are available to help unpack the standards and offer models of scopes and sequences, K-12, K-5, MS, and HS. [Register for this opportunity](#).

NGSS Phenomena Workshop

The Agency of Education will be offering an NGSS Phenomena Workshop that introduces Phenomena and their use in 3D classroom performances and assessment. Participants will jump into using the phenomenon concept in their classrooms as well as drafting and evaluating phenomena that match the PEs of the NGSS. For dates and locations, please visit our registration page. [Space is limited to 18 participants- register today](#).

Events and Announcements, (cont.)

Science Olympiad

The 2019 Vermont Science Olympiad will be held at the University of Vermont on March 9th, 2019. The event will be co-sponsored by the College of Education and Social Services, the College of Engineering and Mathematical Sciences, and the College of Arts and Sciences.

While UVM is still working on the details, they plan to have the registration form out soon. If you, or anyone you know, are interested in attending this year's Vermont Science Olympiad, please contact Michele Guyette at Michele.Guyette@uvm.edu.

Item Development for NGSS-aligned Science Assessment

Vermont and Rhode Island field tested its new NGSS-aligned Science Assessment. With help from educators like you, our assessment is one of the strongest and best. If you did not have the opportunity to review items for both content and bias, please consider doing it this coming January 14-16, 2018 in Nashua, NH.

We are looking for educators strong in their understanding of the NGSS from all levels, Elementary, Middle and High School.

Your travel will be reimbursed by our vendor and districts will receive a stipend for substitute teacher hiring. Participants need to consider traveling on January 13th, 2019 and be present all three days.

To apply for this opportunity, please take a moment to [fill out this google form](#). Participants will be notified mid-December. Please also note, that we are looking for both content and bias folk. If we have too many content applicants, we may bring you on board but ask that your help with bias!

Envirothon 2019

Would you like to help your students explore environmental issues and gain practical knowledge and experience in natural resource management? The Vermont Envirothon helps students focus on Vermont's environmental issues related to aquatics, forestry, soils, and wildlife resources through real-world learning in a teamwork environment. Vermont Envirothon is co-sponsored by a variety of agencies and organizations working in natural resource conservation. The program provides an opportunity for hands-on field experiences guided by resource professionals. [Learn more or register online.](#)

Margaret Carrera-Bly

Science Specialist

Proficiency-Based Learning Team

Telephone: 802-479-1097

Email: Margaret.carrera-bly@vermont.gov