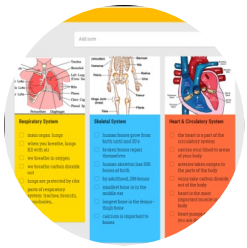

Science Phenomena for Virtual Learning

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Time Frame 60 minutes

Essential Question(s)

How do we center instruction around observable phenomena in a virtual setting?

Summary

Participants will develop a broader understanding of what makes real-world phenomena engaging, student-centered, relevant, and grade-appropriate. During this session, participants will explore the role of phenomena in lessons that may be delivered virtually or in blended learning environments. By centering instruction around observable events that students can access outside of the classroom and with digital tools, participants will gain an appreciation for using phenomena effectively in a virtual setting. To enhance authentic teaching, a practice of effective schools, teachers can expect time to collaboratively explore standards-based phenomena for immediate practical application.

Learning Goals

- Participants will recognize the role of phenomena during virtual learning.
- Participants will identify grade-appropriate phenomena aligned to state standards.

Attachments

- MS-HS-Phenomena-Slides.pptx
- Presenter-Slides-Science-Phenomena-for-Virtual-Learning.pptx
- Resource-List-Science-Phenomena-for-Virtual-Learning.docx
- Resource-List-Science-Phenomena-for-Virtual-Learning.pdf

Materials

- Presenter Slides
- Resource List handout (attached; one per participant)
- Internet access

5 minutes

Engage

Presenter's Note

Make sure that participants have a digital copy of the **Resources List** so that they have access to the links that will be used throughout this session.

Begin on **slide 3** to briefly go over session goals. Explain to participants that by the end of the session, they will be able to:

- Recognize the role of phenomena during virtual learning
- Identify grade-appropriate phenomena aligned to state standards.

Move to **slide 4** and instruct participants to use the link or QR code to go to the Mentimeter (menti.com). On the Mentimeter website, participants will see six statements about what makes a phenomenon effective in a virtual setting. Participants should distribute 100 points across all six statements, distributing more points to the statements that they think are most important. This activity is similar to the Spend a Buck strategy. Start a discussion by saying something like, "Before we get into using phenomena for virtual learning, let's think about what characteristics of good phenomena might be."

Mentimeter results link:
https://www.mentimeter.com/s/30630e542e899269aaa606ed7650988a/45a3b5e03a59

Mentimeter Statements:

Effective virtual phenome:

1. Create a productive struggle for students to develop conceptual understanding.
2. Are accessible and interactive through multiple media formats.
3. Utilize students' everyday interests and experiences.
4. Require students to do independent research to understand and explain.
5. Should be used as a fun attention-grabber.
6. Have to be something everyone will find interesting.

10 minutes

Explore

Move to **slide 5** and explain to your participants that they will be reviewing two K20 lessons using links they can find on their Resource List. Mention that the Resource List also contains links to additional resources.

Presenter's Note

You may choose to screen share while leading participants through the two lessons.

Share the lesson link for Feelin' the Phenomena with participants and instruct them to review the lesson. Give a lesson overview and describe the phenomenon: the lesson explores the weather variables that contribute to the formation of a tornado using a simulation and video from an expert. In the lesson, students view an image of a tornado forming on Doppler radar and do a photo-deconstruction activity; it is a specific example of how we use sims and models to predict weather.

Participants should evaluate how the phenomenon is used within and throughout the lesson. Participants should also explain what about the phenomenon would make it effective in a virtual setting. Once participants have had about 5-7 minutes, ask them to share what they found.

Ask participants, "How is the phenomena used throughout the lesson? What makes this lesson effective in a virtual setting?" Discuss participants' opinions.

Possible Answers

How is the phenomena used throughout the lesson?

- Students engage with simulations throughout the lesson to predict tornado activity.
- The expert discusses models and simulations throughout the video.

What makes this lesson effective in a virtual setting?

- The lesson is easily accessible online
- The video could be replaced with another photo, an animation, video clip, etc.
- All student interaction is via digital tools or could easily be converted to an entirely online context

Go to **slide 6** and share the lesson link to Venom: From Lethal to Lifesaving. Briefly go over the key parts of the lesson that make it effective in a virtual setting. Be sure to go through each of the five Es of the lesson (Engage, Explore, Explain, Extend, Evaluate). Describe the features that both lessons have that make them easily adaptable to a virtual learning environment. Point out features in this lesson that the participants identified in the previous lesson.

Participants should notice that both lessons:

- Can be used in a virtual, face-to-face, or blended classroom.
- Refer to phenomena that are accessible and familiar to students.
- Rely on students' prior knowledge and experience.

10 minutes

Explain

Move to **slide 7** to go over the possible uses for online tools Padlet, Google Keep, and Desmos or Quizlet that make virtual phenomena effective. Here, participants see examples of how to use online tools in multiple ways in a science setting. Explain how the various online tools help us use strategies Connect & Collaborate, Collect Evidence, and Card Sort.

Connect & Collaborate

- This specific Padlet format allows students to visually connect ideas
- It is useful for the How I Know It strategy and small-group discussion activities

Collect Evidence

- Google Keep is like a bulletin board
- You can add notes, lists, drawings, images, etc.
- Chrome extension lets you automatically add a note or pin directly to your Keep from any website

Card Sort

- Desmos and Quizlet are two possible approaches that allow students to draw and drop cards with or without an answer key
- They can be visually engaging (it's hard to capture in a screenshot but check it out!)

Highlight that these tools can be used in multiple ways. For example, Google Keep can also be used as a tool for students to collaborate.

10 minutes

Extend

Go to **slide 8** to discuss some strategies for effective use of phenomena in general, for in-person, virtual, and blended learning.

You can explain that in any lesson, effective phenomena:

- Relate to student interests, experience, locale, etc.
- Allow students to make observations, develop models, ask questions, etc.
- Are too complex for students to just Google an answer for.
- Push students just beyond what they already know.
- Should be explainable using the DCI(s) that students are learning.
- Engage students in all three dimensions as they discover.

Move to **slide 9** to discuss specific strategies for effectively using phenomena in a virtual setting.

You can explain that in virtual and blended lessons, effective phenomena:

- Are accessible to students through a variety of media formats.
- Can be experienced at home or in the classroom.
- Emphasize the use of science and engineering practices.
- Have the potential to actively engage the entire family, not just the student.
    - Examples include: observations of weather, daytime or nighttime sky
    - Images, videos, simulations

Continue to explain that because virtual phenomena are so versatile, they also lend themselves to student choice, especially in how students demonstrate their understanding. In virtual and blended settings, there are many opportunities for students to explore science through projects and activities that connect personal and community interests. Family members can help with projects, which reduces the cognitive load and initial intimidation of science content, allows students the mental space to get comfortable with the context before diving into any concepts. Highlight the modeling and explanations from the two lessons when discussing versatility of virtual phenomena.

More Information

The Council of State Science Supervisors published a document with more information about equitable home-based science teaching and learning during the COVID-19 pandemic. It explains how to maintain science-learning goals in a virtual setting. You can read the document for more information and to help you orient a discussion during this session.

The following two slides are used to help provide participants with tips and strategies on getting started.

Move to **slide 10** to discuss how to access and implement phenomena. Explain to participants that they can start by asking simple questions that stimulate students' curiosity. Strategies like I Notice, I Wonder can prompt students to make observations and ask questions.Tell participants they can also use graphic organizers to scaffold student inquiry in a way that promotes collaboration and discussion among groups.

Go to **slide 11** to show participants some examples of discussion starters and sentence stems they can offer their students to help them interact with phenomena in a virtual setting.

Additional Resources

Feel free to share additional resources with participants about innovation beyond classroom-based learning, how students and their families can interact virtually with science phenomena, and a family worksheet about how exactly to define and explore a phenomenon.

25 minutes

Evaluate

Go to **slide 12** to give participants instructions for the closing activities.

Share the **MS-HS Phenomena Slides** with participants and explain to them that on the slides, they will see three middle school-level phenomena and three high school-level phenomena. Each phenomenon slide is followed by a virtual engagement slide. Ask participants to choose one of the phenomena from the slides for a discussion about how they would engage students with that phenomenon virtually.

Detailed instructions are included on slide 1 of the phenomena presentation. Examples have already been added and should be cleared before sharing with participants.

After giving participants 10 to 15 minutes to add their ideas, bring the participants back together as a whole group, and discuss the ideas that were added to the group document. Go to **slide 13** to wrap up the session with a 3-2-1 Reflection. If time permits, have participants share their 3-2-1 responses and answer their questions.

Resources

Council of State Science Supervisors. (n.d.). Learning at Home: Reimagining the Possibilities. https://drive.google.com/file/d/1iay2v8R2YVtuPZbOsml-QscwIQ2HpCHy/view

Council of State Science Supervisors. (n.d.). Supporting Equitable Home-Based Science Teaching and Learning During Extended COVID-19 School Closures. https://drive.google.com/file/d/1XVTwNr_z5DpWBrl-OSu-k_232dy7CoOA/view

K20 Center. 2020, Sept. 15. 3-2-1. Strategies. https://learn.k20center.ou.edu/strategy/117

K20 Center. 2020, Sept. 16. Feelin' The Phenomena. 5E Lesson. https://learn.k20center.ou.edu/lesson/415

K20 Center. 2020, Sept. 15. How I Know It. Strategies. https://learn.k20center.ou.edu/strategy/144

K20 Center. 2020, Sept 16. I Notice, I Wonder. Strategies. https://learn.k20center.ou.edu/strategy/180

K20 Center. 2020, Sept. 16. Spend A Buck. Strategies. https://learn.k20center.ou.edu/strategy/154

K20 Center. 2021, Jul. 21. Venom: From Lethal To Lifesaving. 5E Lesson. https://learn.k20center.ou.edu/lesson/453

Phenomena Template for Families. https://docs.google.com/document/d/1rYKykwRFEDxwYDg7Pwr9uH5b4-4apC5X5pkvH1VUfwA/copy

Zieminski, C. and McKenna, TJ. Virtual Science Education Resources #VirtualScienceEd. NGSS Phenomena. https://www.ngssphenomena.com/virtual-science-education