



PROFESSIONAL LEARNING RESOURCE

HOW TO SET UP A WONDERLAB

Introduction

This professional learning module introduces considerations for designing a WonderLab to inspire a sense of wonder and awe in science. It encourages deeper focus on slow observation to develop the attitudes, skills, and knowledge that make up the Explorer Mindset using the Wonder Learning Strategies. It is part of the [WonderLab Learning Resources](#): a collection of resources inspired by the work of renowned National Geographic Explorer and photographer Anand Varma. It consists of three parts:

- **Part 1: Engage and Explore**

Watch how National Geographic Explorer Anand Varma and his team interact with each other and the tools in the WonderLab, a space that sparks curiosity and wonder.

- **Part 2: Learn by Doing**

Learn how to use the Wonder Learning Strategies and Scientific Practices to create learning environments that inspire and sustain wonder. There are two Wonder Learning strategies that are explored and analyzed in this section: creating enriched learning environments to make space and provide time for learners to explore and experiment.

- **Part 3: Reflect and Apply**

Reflect on your experience and how to set up a “WonderLab” in your learning environment.

Guiding Question

How can you set up a learning environment where your learners can develop a sense of wonder and develop the Explorer Mindset attitudes and skills using the Wonder Learning Strategies¹ to engage in scientific practices and communication?

¹ Conijn, J., Rietdijk, W., Broekhof, E., Andre, L., & Schinkel, A. (2021). A theoretical framework and questionnaire for wonder-full education. *Journal of Curriculum Studies*, 54(3), 423-444.



Part 1: Engage and Explore

National Geographic Explorers are naturally curious about the world, but it is more than curiosity that drives their joy and excitement in the work. It is the ability to slow down their interactions with phenomena in the world to inspire wonder. Following their sense of wonder allows Explorers to view something with a different perspective, make connections in new ways, stimulate their imaginations, or notice something new and unfamiliar about something that is seemingly familiar. Even with new understandings, this sense of wonder persists and motivates Explorers to stay curious. So how can educators inspire wonder in their learners?

Anything a learner can use their senses to interact with could be something that inspires **wonder**. It could be a picture, a video, a story, a toy, a song, or observations out in the world. It should be something interesting enough that learners want to explore, puzzling enough that it will inspire questions, but not so confusing that it results in frustration. National Geographic Explorer, [Anand Varma](#), has been inspired to explore cephalopods. “Cephalopods are a really fascinating group of marine creatures that include

Vocabulary

Familiar (adjective) easy to recognize because of being heard, seen, or met before

Wonder (noun) the mental state of openness, questioning, curiosity, and embracing mystery that arises out of experiences of awe

Viewpoint (noun) the position from which something is observed

Empathy (noun) to care about other people, cultural resources, and the environment. Be respectful and committed to making the world a better place. Value and understand their own and others' points of view, acknowledging differences.

Contemplate (verb) to look at thoughtfully for a long time

Awe² (noun) the feeling of being in the presence of something vast that transcends your current understanding of the world

² [Awe: The New Science of Everyday Wonder and How It Can Transform Your Life](#)

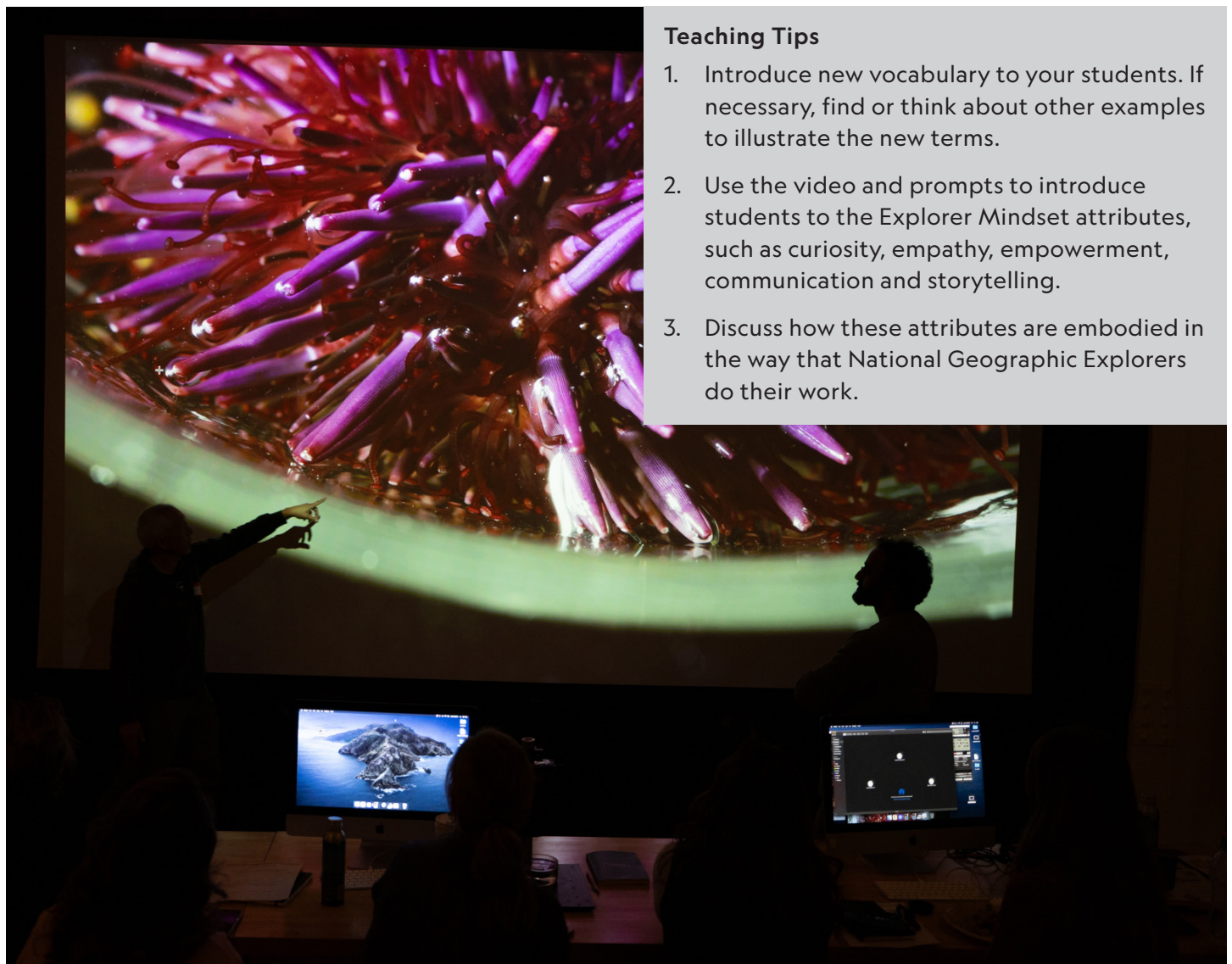




octopus, squid, cuttlefish, and nautilus...They're really interesting, because they have some of the most complex behavior on our planet. And they've evolved this complex intelligence completely independently from us." But to really learn more about cephalopods, Anand wanted to find ways to slow down his observations. In order to do that, he created a WonderLab that would allow him to photograph and video record cephalopod behavior.

Watch the video, [I Wonder: Create Space for Wonder](#). Pay attention to how Anand and his team interact with each other and the tools and phenomena in the WonderLab to spark curiosity and pose questions about what to explore. Use the following prompts to reflect on the video.

1. What are Anand's goals for the WonderLab?
2. What kinds of things did he have to consider in designing the WonderLab?
3. Who is Anand working with in designing the WonderLab? Why are these collaborations important?
4. What are other ways Anand could explore cephalopods if he did not have the WonderLab? Would he be able to "slow down" his observations in the same way? Why or why not?
5. What would you be interested in having your learners "slow down" to explore? What would you need to make that happen?



Teaching Tips

1. Introduce new vocabulary to your students. If necessary, find or think about other examples to illustrate the new terms.
2. Use the video and prompts to introduce students to the Explorer Mindset attributes, such as curiosity, empathy, empowerment, communication and storytelling.
3. Discuss how these attributes are embodied in the way that National Geographic Explorers do their work.



Part 2: Learn by Doing

Anand Varma has a goal to inspire young learners **“to slow down, observe, find the mystery of things that hide in plain sight and take the time to explore the wonder of our world.”** When we take the time to deeply explore a phenomenon, we start to raise questions that elicit curiosity so it becomes a puzzle we want to figure out, or it creates a demand to learn something new so we can provide a more complete explanation for what we are observing. Either way, when learners are inspired by wonder, they are motivated to seek out more—more exploring, more reading, more investigating, more conversations. This provides an opportunity for learners to develop the [skills and attitudes of an Explorer](#), such as curiosity, empathy, empowerment, problem-solving, and storytelling.

There are two areas that educators should think about in creating learning environments that inspire and sustain wonder:

1. Teaching strategies (**Wonder Learning Strategies** and **the Scientific Practices to Inspire Wonder**) that can be used to make space for learners to have that initial spark of an idea.
2. How to **cultivate learners’ sense of wonder** by providing a physical space with tools and resources to encourage them to **explore and experiment** in ways that follow their questions.

The next few pages will address these areas.





Wonder Learning Strategies

Educators play an important role in designing learning environments that stimulate wonder. Before any strategies are implemented, educators should be positioned to be sensitive to learners' own wondering experiences, to listen and respond with empathy and curiosity to show that wondering is valued in the learning space. Teachers can be role models by sharing their wondering experiences. Whether these happen outside the classroom or during instruction, when wondering experiences are shared, it cultivates a community of wonderers! Explore the Wonder Learning Strategies. Think about how you could start cultivating a community of wonderers by incorporating these simple strategies in your teaching.



Adapted from: Conijn, J., Rietdijk, W., Broekhof, E., Andre, L., & Schinkel, A. (2021). A theoretical framework and questionnaire for wonder-full education. *Journal of Curriculum Studies*, 54(3), 423-444.



Scientific Practices to Inspire Wonder

When students are encouraged to actively engage in the process of science, it can foster critical thinking and problem-solving skills. By participating in practices like asking questions, developing models, and conducting investigations, students learn how science works in real-world contexts. The eight scientific practices work together to help students build a deeper understanding of scientific concepts through hands-on, inquiry-based learning that lead to authentic questions, inspiring them to wonder about the world they live in. The following resource will help your students develop their wondering questions related to each one of the practices as they engage in the process of science.

Scientific Practice	Examples of Related Wondering Questions
Asking Questions	<i>What do I notice? What happens when...? I wonder what would happen if...? What is one thing I can change?</i>
Analyzing and Interpreting Data	<i>What data should I collect? How should I look at the data? What data display makes sense for my results?</i>
Obtaining, Evaluating, and Communicating Information	<i>Who do I want to share my work with? How should I share it?</i>
Planning and Carrying Out Investigations	<i>What do we want to explore? How could we investigate? What materials do we need? What are we going to measure?</i>
Constructing Explanations	<i>What do I think is happening? Why do I think so based on evidence? What scientific reasoning supports this?</i>
Engaging in Argument from Evidence	
Developing and Using Models	<i>How can I represent what I think is going on?</i>
Mathematics and Computational Thinking	<i>How can math or computational thinking help me answer my questions?</i>

Adapted from: Science and Engineering Practices. <https://my.nsta.org/ngss/PracticesFull.aspx>



Explore and Experiment

Next watch the video called [I Wonder: Explore and Experiment](#). Look for ways that Anand and his team work within the enriched environment of the WonderLab to improvise the construction of different incubators that would allow them to explore and experiment the wonders they have around the cephalopods. Pay attention to the variety of tools and resources, as well as how they collaborate with each other.



Your Turn

Return to your responses to the first three questions after you watched the video I Wonder: Create Space for Wonder in the Engage section and your viewing of this second video. Consider how you would respond to these questions for a WonderLab in your own learning space.

- What are your goals for a WonderLab in your learning space? What would you want your learners' goals to be when they enter your WonderLab?
- What resources would you need to consider including in the physical space of your WonderLab to allow learners to explore, experiment, and generate their own questions?
- Who would you want learners working with in their WonderLab?



Cultivating Learners' Sense of Wonder

After learners engage with a phenomenon, their wonders will result in many questions. Because you value their wondering experiences, you want to support your students in exploring answers to their wonders. Scientific and engineering practices (see Scientific Practices to Inspire Wonder resource) are great ways for students to work like scientists to pursue lines of inquiry related to their wonders. Even in setting up the WonderLab before they can study the cephalopod eggs, Anand and his team engage in several of these scientific and engineering practices to design an incubator at the very last minute. What did you notice in the video?

One final and important message that surfaces in this clip and is paramount to the success of a WonderLab is that failure is expected and accepted. Failure leads to learning, but you have to make a first attempt. In Anand's words, "This is our first pass. It's not pretty, but I'm just trying to see if it works once. Once we know it works, we can make this a little bit less embarrassing. Early stages, I feel like it's more important to move quickly and test out ideas than it is to have everything look perfect because we're going to have to do this a bunch more times before we get it right."

Your Turn

- How might you cultivate wonder in your learners?
- Once you have a physical space, how can you engage your learners in scientific practices to explore their wonderings more deeply?
- How can you encourage your learners to take risks with their ideas? With their tinkering? With their explorations?

Teaching Tips

1. Choose a strategy that aligns with your teaching philosophy. Consider your learning environment and the content to be learned.
2. If you are already aligning to the NGSS science and engineering practices in your teaching, think about how the Wonder Learning Strategies could be incorporated to create "moments" of awe and wonder to increase student engagement. Allow students to formulate their own questions.
3. Create a safe environment for learning where learners are not afraid of failure and see it as an opportunity to learn.
4. Share the I Wonder: Explore and Experiment video with your learners. In this video, National Geographic Explorer Anand Varma demonstrates how scientific inquiry is approachable to all. Use the opportunity to explore how they can see themselves as scientists.





Step 3: Reflect and Apply

Identifying resources and phenomena that your learners might find interesting is a great way to get started with a WonderLab in your classroom. Even something familiar to your learners can inspire awe and wonder when explored in different ways. See the activity titled [“Making the Familiar Unfamiliar”](#) for finding something new and interesting in something familiar. This is a great way to support learners in the scientific practice of asking questions around something familiar. Finding ways to spark learners’ sense of wonder will inspire them to engage in the scientific practices to pursue answers. But true wonder leads to more wondering, which is when you know you have been successful at designing a WonderLab in your learning space!

Think about

Take some time to reflect on these questions and consider what you are already doing with respect to supporting learners around creating space for wonder in your classroom.

- Why is creating space for learners to wonder important?
- How can you create a culture of wonder in your classroom?

Identify other areas of improvement based on your experience.

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