Remote Learning Resource
Leading an Anchoring Phenomenon Routine

The Anchoring Phenomenon Routine is used to kick off a unit of study and drive student motivation throughout the unit. The purpose of the Anchoring Phenomenon Routine is to build a shared mission for a learning community to motivate students in figuring out phenomena or solving design problems. The Anchoring Phenomenon Routine is an essential part of the OpenSciEd instructional model, the inquiryHub instructional model, and the NextGen Storylines instructional model.

In an Anchoring Phenomenon Routine, students:

- Are presented with a phenomenon or design problem
- Write and discuss what they notice and wonder about from the initial presentation
- Create and compare initial models of the phenomenon or problem
- Identify related experiences and knowledge that they could draw upon to explain the phenomenon or solve the problem
- Construct a Driving Question Board
- Identify potential investigations to answer the questions on the Driving Question Board

In this document, we offer some initial suggestions for how to adapt an Anchoring Phenomenon Routine to a remote learning environment. In a regular classroom, the routine might last one or two days; as outlined here, it might span multiple days, so that students have time both to generate ideas and build on each others' ideas.

Many schools use Google Classroom, and there are a number of tools that can support the Anchoring Phenomenon Routine. The Google Doc version of the curriculum units will be an essential resource for making adaptations of materials themselves. In addition, Google Drawings, and Google Jamboard are tools that students can use to construct initial models and build a class Driving Question Board.

In general, it is best to use technology tools with which students are already familiar. However, there are a number of tools that are well suited for virtual collaboration in the Anchoring Phenomenon Routine. If using a new tool, you will need to take time to show students how to use the platform. This will take time and patience. In planning, you can devise and use a systematic step-by-step approach in helping students learn how to use the platform.

Also, if you want to create a slide presentation (e.g., to show students how to use a new technology tool), you can make a screencast that records you speaking over slides. There are a number of free screencasting tools available for educators.

When technology is not available, the phases of the Anchoring Phenomenon Routine may need to be spread out. The document includes some suggestions, too, for providing students with samples of past students' work with which to compare their own thinking, if it is necessary to group different phases of the routine together.

An important crosscutting equity consideration is to enable multiple ways for students to contribute, and when students do not participate, to use it as an opportunity to reach out by phone, text, or social media. Ensuring equity will require use of a wide range of tools for connecting to students. For example, you might encourage students who do not have a laptop to join online meetings via phone and use texting to gather and make use of questions from students who may not have access to online platforms.

Presenting a Phenomenon

Many phenomena included in OpenSciEd are presented already as a video that could be made available to students. Others, however, involve in-class demonstrations or investigations.

If you have materials at home for a demonstration, you can make a video of yourself doing the demonstration. Video-conferencing tools like Zoom allow you to record yourself as well, simply by starting a Zoom meeting with just yourself, and recording the meeting.

If presenting the phenomenon involves a student investigation, consider engaging other members of your family in the investigation, and recording a video.

If you need to replace a demonstration or an investigation with a video presentation of some kind, it's important to take care to choose videos that present the phenomenon without giving away the science ideas that students are expected to figure out ahead of time. This presentation provides some guidance on how to select a video for an anchor. Some phenomena can also be presented as simulations. OpenSciEd makes extensive use of simulations already in its units, many of which are accessible directly from the creators' websites.

For paper packets, investigations may be presented in the form of a narrative description or as a set of data, along with some questions for making sense of data.

What To Attend To In Using Technology Tools to Support This Phase:

As this is the first step in any unit, it is important to check to make sure students have basic access to video.

In a synchronous environment, it is often difficult to live stream video over a tool like Zoom, so this step might best be introduced asynchronously. Give students space to share what's going on for them before expecting them to jump into learning around a curricular phenomenon. Many students want to share what is going on at home (introduce their pet, their sibling etc.). Not all students will feel comfortable with this, but know that students might need to do this before they engage in new learning. While they may have built an in-person community this is a new context and taking a little time to build this new community will help. Students may take on different identities in the virtual setting, create space for this. Also, be forgiving of yourself, your students, and the technology. It's not going to go well all the time!

In an asynchronous environment, you can use Flipgrid to record a phenomenon and ask probing questions and/or have students generate questions. Students can then videotape their replies/questions. Then students and teachers can comment on the replies. Teachers would need to establish norms for student interactions.

Regardless of the technology being used, give students a chance to practice sharing their ideas in the technology they are using. Are they posting ideas in chat? On a virtual sticky board? Ask them to share ideas and thoughts that are "lower stakes."

Equity Considerations:

Prior to engaging students in the first activity, it is critical to establish that all students have access to the tools that you will use, and to try out using them. Testing is also a good opportunity to engage with students in a virtual ice breaker, to help build community.

In choice of videos, attend to the *experience* of the phenomenon over an *explanation* of a phenomenon.

Make sure you provide a hard copy of a similar phenomena for students that can not view videos or join the conversations remotely.

Getting Students to Notice and Wonder

In an asynchronous environment, this step might unfold in three steps. First, students email or submit their own noticings and wonderings to you. Second, you present the summary of noticings and wonderings to them. Third, you ask the students to reflect on or comment on what stands out to them about their noticings and wonderings.

Beginning with this phase of the Anchoring Phenomenon Routine, you may wish to experiment with a tool like this one where students can post virtual stickies to a virtual cork board. Students can write their noticings and wonderings in a private space, push them to a common space, and then compare theirs to others. Padlet is another tool where students can present their ideas; in Padlet, each student has a different color that can help track individual students' ideas.

You can also try one of a variety of free video annotation tools like Vialogues or VideoAnt that allow students to annotate videos with their noticings and wonderings.

In a low technology environment, students can complete a T-chart like they might in class, or if observing phenomena at home, take and submit photos of them.

What To Attend To In Using Technology Tools to Support This Phase:

The tools that can be used to support students sharing ideas here require some practice to learn to use. Be sure to take time to familiarize students with the tool in a low-stakes way, by getting them to post something unrelated to the core content. You may wish to use the first time when students use the tool to share something fun they did.

Equity Considerations:

As in the classroom, it is important to accept all students' ideas as to their noticings and wonderings. In the digital environment where all students have access to a common document, norms should be set that we respect and encourage peers to share their ideas.

Creating Initial Models and Comparing Them

When students first make sense of a particular phenomenon, creating and sharing initial models can help students see where there are gaps in their understanding that unit investigations can help them understand. At this point, it may be most useful to use simple drawing tools, such as Google Drawing or even Google Slides that rely on students' own ingenuity. Or, students can simply take a photo of a drawing and upload it, if using a technology system.

In Google Slides, each student or group of students could work on a different slide in a common slide deck, or on their own slide deck that you can integrate into a common slide deck to facilitate a virtual model gallery walk.

When comparing models, if using Google slides, you can invite students to use notes or comments to identify shared and unique elements of models.

Texting is yet another way students could compare models or be asked to, either in a synchronous or asynchronous environment.

When technology is not available, students can simply draw their models and submit them. And, if you have past student work, you can provide students with packets that include other students' initial models to compare to their own. In addition, you could ask students to have a family member share their initial models of a phenomenon with them. Just as we hope students will focus on figuring out initial models without consulting other resources, family members can be encouraged to do the same. Family members in this way can be partners in students' learning.

What To Attend To In Using Technology Tools to Support This Phase:

> Later in the units, students may engage with more complex modeling tools and simulations. The Anchoring Phenomenon Routine is intended to support students in using their own ideas, rather than using more sophisticated simulations where key model components are already embedded within them, before students have had a chance to propose that they need to be there. We use the students' own ideas rather than online models and simulations you or students might find.

In contrast to hand-written drawings in class, where you can limit time on drawing and redrawing models (making the perfect the enemy of the good), be aware of students who spend time creating and re-creating drawings. Encourage students to share their first draft thinking.

Students may be tempted to use the web simply to look up answers at this point, because they have access to a wide variety of technology tools. You can either discourage them from doing so, or you can take advantage of their access to tools and ask students to put explanations they find in their own words (using few if any science terms), something that can reveal gaps in their understanding. If they do find useful web resources, you can invite them to pose questions about terms and ideas that they find confusing.

Equity Considerations:

When engaging students in student group modeling activities, take care to ensure that each member of the group can make a meaningful contribution, using whatever communicative resources are available to them, including their home language. As all models include components, interactions, mechanisms, and boundaries of the systems being modeled, one possibility is to assign each person a role to attend to one of these elements of models, when reviewing and comparing models. Another potential role for students is to assign someone to check that each piece of a proposed model (component, interaction, mechanism) reflects items from a Gotta Have It checklist. This person can also make sure the Gotta Have It checklist includes the ideas from the Initial Ideas and Related Phenomena posters/moments.

You can also create an expectation that each group or person will comment on something that another group's model helped them see or that led to a new question for them.

Identifying Related Experiences and Phenomena

In this phase, students generate multiple ideas about knowledge they've developed, related experiences, or related phenomena that they think could be useful in explaining the anchoring phenomenon. If on a videoconference, this could be done in one of the tools named above, such as Padlet, or by using a Google doc to support idea generation. If using a videoconference tool like Zoom, students can use the chat feature to post their relevant knowledge, related experiences, and phenomena. You may want to create a board in the pinup tool for recording and returning to students' related experiences and phenomena.

With students at home, there is a unique opportunity to invite students to engage their caregivers and siblings in identifying related experiences. In addition to eliciting related experiences and phenomena, students could be invited to investigate the science behind related phenomena their family members generate.

What To Attend To In Using Technology Tools to Support This Phase:

Take additional time with this step and give students an opportunity to connect with their family members and seek our related phenomena in their home/community experience. Students can capture video/pictures of potentially related phenomena and compare and contrast their phenomena with their classmate's phenomena. Tools like Flipgrid might be useful in capturing and archiving related phenomena. This is a good opportunity to leverage the unique experiences of our students.

How do we make certain that students with preparatory privilege do not take over the board with their thoughts and wonderings? A virtual environment introduces a new set of needed teaching skills in order to bring forward the voices of students who are not as science confident.

Equity Considerations:

This phase of the Anchoring Phenomenon Routine provides for direct connections between students' own ideas and experiences and those of the curriculum. Connecting to students' interests and experiences is a key strategy for helping students from nondominant backgrounds see how science can be relevant to their lives. It is important to acknowledge each students' contributions to the related experiences and phenomena and make a plan to return to these at the conclusion of the unit.

Building a Driving Question Board

During this phase, you might return to using tools used for the initial Noticings and Wonderings phase. Using a tool like pinup where students can post virtual stickies to a virtual cork board. Google Jamboard is another new addition to the Google suite that can be used for this purpose. Students can write their individual questions in a private space, push them to a common space, and then compare theirs to others. The tool makes it easy to rearrange stickies into groups and add text to create labels for categories of questions.

Around minute 18 of this Flinn Scientific video, a teacher explains how they build a Driving Question Board using the pinup tool.

What To Attend To In Using Technology Tools to Support This Phase:

With pinup and tools that allow all users to move stickies around, it is important to establish some norms for editing and moving another contributor's stickie, especially if class is asynchronous.

A key aspect of building a Driving Question Board in the classroom is that every student reads their question and equally importantly, all students hear the questions of their peers read aloud. In order to encourage students to read the questions contributed by their peers and make connections, you may want to incorporate a new protocol after the creation of the driving question board that asks the students the following questions: (1) "Find a question on the board that is similar to your question. What was it and who contributed it?" (2) "Find two questions that are different from your question. What were they and who wrote them?"

Equity Considerations:

As with each of the steps, it's important to make sure each student contributes questions to the board. Using a tool like Padlet that identifies each student readily is one way to check that all students have contributed.

If students don't have access to tools like pinup, invite them to email or text you their questions so that you can add them to the group's board.

Brainstorming Possible Investigations

In this phase, typically students imagine ways that they could investigate their questions using laboratory investigations in class. Here, teachers may consider how students can investigate questions with their families in the home, on walks nearby, or by exploring resources they find online. The OpenSciEd and inquiryHub curriculum materials include online simulations and models. If students have technology access, they can be invited to ask what kinds of data they could look for or what a simulation would need to show to help them answer their questions. You may also think about having students conduct their own investigations on their own, or consider using class meetings or office hours as "lab meetings" where they interpret their results.

Center the eight science and engineering practices and think with the lenses of the seven crosscutting concepts as tools for investigating a novel phenomenon.

For this phase, a tool like Padlet or adding investigation ideas to questions on the Driving Question Board in Pinup could be useful.

What To Attend To In Using Technology Tools to Support This Phase:

This is a good step to take slowly, by chunking driving questions, and then sending out questions in batches of questions at a time. Students could be asked to think about how each proposed investigation could help them answer a question on the Driving Question Board or what kinds of data would need to be collected or information sought on the web to answer their question.

If you are working asynchronously within a system that allows for threaded discussion, students could propose investigations linked to questions that are listed in separate threads, and focus on only one or two threads (questions) at a time.

Invite students to think about safety. How can we make sure our investigation doesn't hurt anybody or anything?

Equity Considerations:

A primary consideration for equity here is what is available in the home or nearby to conduct investigations. Students could be encouraged to identify investigations they could conduct with materials available in all students' homes, and distribute responsibility for conducting them with families. If choosing this route, it is important to make sure all students can conduct a meaningful investigation into some question on the Driving Question Board.

This document was developed collaboratively among a group of OpenSciEd, iHub, and NextGenStorylines developers. Special thanks to the OpenSciEd state leads and the OpenSciEd and iHub facilitators for their participation and valuable contributions.