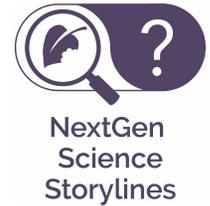


Remote Learning Resource

Navigation Routine



The Navigation Routine is intended as a support for working with students to motivate the next step in an investigation of a phenomenon or in the search for a solution to an engineering design problem.

In a storylined unit, through the iterative design process writers have developed a sequence of lessons that are connected to one another and motivated by ideas that are likely to be raised by students. Many of the students' questions and ideas have been anticipated, as teachers of storylined units have discovered. At the same time, not all students' ideas are captured, and so a challenge teachers face is how to advance the learning goals for the unit while honoring the ideas and questions of all students.

The Navigation Routine is designed to facilitate a partnership between students and the teacher so that:

- The curriculum is experienced as coherent from the student point of view
- Student questions are at the center and motivate the next investigations
- Students connect the day's lesson to the big picture of what the unit is all about.

From research on the [OpenSciEd curriculum](#), teachers report that when they use the navigation routine regularly, their students experience less "phenomenon fatigue." That is, they are more likely to maintain interest in the anchoring phenomenon over the length of the unit than if the navigation routine is not used.

Elements of Navigation

The Navigation Routine are the "bookends" to each lesson in a storylined curriculum, as the image from the [NextGen Storylines](#) website shows.



The Navigation Routine includes the following aspects, all of which need to be considered when moving learning to a remote setting.

- **Looking back** - At the beginning of each lesson, the class reflects on where they are in their learning mission, what understandings have come to light thus far, and what they will work on next.
- **Taking stock** - There are several opportunities during a lesson when the class can assess their current situation and make connections between their activities and the storyline.
 - During or between activities students should consider how what they are doing is in service of the bigger question they are trying to answer.
 - At the end of a day when a lesson is not yet complete, students should take stock of progress they've made and what still needs to be accomplished in the next class.
 - When resuming an incomplete lesson in a new class period, students should reflect on what they were in the process of figuring out in the previous class and where they should pick back up in their learning.
- **Looking forward** - Each lesson should end with a collective reflection on what has been accomplished and where the class is in its learning mission. Students should recall their driving question and determine the next question they need to answer.

One consideration for adaptation is that typically this routine relies heavily on verbal expression. It would be valuable to encourage students to respond through other modalities, such as drawing and gesture.

Students' Role in Navigation

Navigation is ideally a *partnership* between students and teachers. That is, students propose questions to investigate, contribute ideas for investigations, and say what they think they have figured out, but the teacher plays a role in guiding students' questioning and summarizing. Ideally, the "we" in what we figure out and what we decide to do next encompasses both students and teachers.

Teachers vary in how ready they feel to partner with students. Collaboration with students becomes more important as students become older for developing their capacity to ask questions. At the same time, partnership with students can work for any age group, with good scaffolding. In remote learning environments, giving students a significant role in navigation may be challenging, either because lessons must be given out in packets far in advance, or because asynchronous technology tools make it difficult to achieve consensus on a direction

to pursue or agreement on what the class has figured out. Encourage students to take photos of their learning if they are using packets so that you can leverage the ideas of students who are less connected. Getting students to collaborate in the same document can help everyone stay connected.

Five broad strategies for giving students a say in navigation may support them:

1. **Anticipating possible student questions:** If you have to prepare a packet for several days of instruction, you can provide students with a list of possible questions to investigate, and ask them to write down the one they think should be investigated next and why, before going on to the next one.
2. **Providing an opportunity for students to reflect and provide feedback on the questions actually addressed:** In the above situation, students may be surprised or disappointed by the question that was pursued next in their packet. You can ask them to reflect on how the question they addressed helped them make progress in explaining the anchoring phenomenon or solving the design problem. You can also provide them with an opportunity to share their responses to the focus of that day's lesson (e.g., they were disappointed, happy, etc).
3. **Use an online survey to elicit students' proposed questions for the next day.** If working in an asynchronous or synchronous environment, it may be possible to use an online survey to find out students' ideas for questions they want to investigate next. The Student Electronic Exit Ticket (SEET) used in OpenSciEd data collection and in iHub units ([Sample from Ecosystems Unit](#)) can be adapted for this purpose. SEET surveys and data can also be used formatively to elicit information on students' perception of the class.
4. **Using chats to enable additional voices to participate.** In a synchronous environment, students can be speaking but also adding their voices via chat. When using chat to enable more people to participate, saying the ideas on chat out loud so they become part of the conversation can make those students feel heard.
5. **Using live polling in conjunction with discussion.** In a synchronous environment, you can use a polling tool like [PollEverywhere](#) to get students' ideas in real-time about questions they would like to pursue. Students should be tasked with arguing for *why* their particular question would be a good one to pursue. This helps build students' capacity to ask questions and connect questions to a larger phenomenon they are studying.

Connecting to Students' Interests and Identities in Navigation

The teacher plays a key role in helping make any curriculum relevant to teachers' interest and identities. Doing so can enhance students' learning ([NASEM, 2019](#)) and promote equity ([NRC, 2012](#)). [This STEM Teaching Tool](#) identifies a number of strategies that can be used to connect curriculum to students' interests.

When looking back and looking forward, return both to the Driving Question Board and a Related Experiences Board, as well as Ideas for Investigations, to consider possible questions to take up for the day. Drawing on related experiences will help connect the day's lesson to students' concerns. The following are some additional considerations when attempting to connect with students' interests and identities:

- Taking stock of what students have learned is a good time to help students connect to their own interests and experiences. You can consider using [these strategies](#) for providing students with an opportunity to articulate why what they did in class matters to them.
- Some ideas for connecting to the [Driving Question Board virtually](#) are here. You can also rely on photographs of student questions.
- If you're working asynchronously, it can be helpful to monitor it closely or "accept" student responses to determine where you've been and where you're going. A Google doc can be a way to do this asynchronously.
- Slow down. Connecting to student interests will require more time than it used to in an asynchronous space.
- Tie it back. Connect to the anchor to make sure that remote learning still "sticks" to the phenomenon.

Pedagogical Strategies to Support Navigation in Remote Learning Environments

Although the purpose of navigation will be very similar, it might look different in remote learning. What constitutes a "day's" lesson may not be consistent with curricular resources or even for students in different situations. The use of the student progress tracker as a tool to support coherence may be particularly important. Both [OpenSciEd](#) and [iHub](#) support the use of progress trackers to record individually, in partners, in small groups, or in whole-class settings to track progress toward answering lesson and unit-level questions. Depending on your situation, there are a variety of pedagogical strategies to support navigation. Chicago teacher [Gretchen Brinza](#) shared some general advice for remote navigation with teachers on the remote teaching webinar [here](#).

Pedagogical Strategies to Support Navigation in Remote Learning Environments: Looking Back

	Synchronous	Asynchronous	Without Technology
<p>Looking Back: Reviewing what we figured out last time</p>	<ul style="list-style-type: none"> ● If using Google Jamboard for the Anchoring Phenomenon Routine, copy or move questions and ideas for investigations into a new lesson space. Pinup.com is another alternative app. ● Create a Padlet or three-column Google doc for students to complete together: What did we figure out? What are we wondering now? How can we investigate that? ● Ask students to share what they figured out last time with a family member, and elicit family members' questions. 	<ul style="list-style-type: none"> ● Create a short video clip reminding students what they figured out last time. Using a tool like Flipgrid allows students to view and respond to each other. ● Use Google Jamboard's "pen" features to add symbols for agreement/disagreement on what's already been done. ● Show images from last time of what was done, ideas from what students have figured out. ● Ask students to complete an individual survey (e.g., using a Google Form shared on Google classroom) ahead of time as to what they did and figured out, then present a summary to the group with prompts to consider what there is agreement on and where there is still uncertainty. ● Have students record a 30-second Flipgrid summary at the end of a lesson and then (with their permission) share the summaries at the beginning of the next lesson. 	<ul style="list-style-type: none"> ● In between sending out packets, send a summary of everyone's ideas to students, and ask students to write a reflection on how their ideas compare to other students'. ● If students have phones they can use apps like Poll Everywhere to ask questions in a closed-ended format. Students can also use phones and use PDF apps to submit their answers easily. ● Ask students to share what they figured out last time with a family member, and elicit family members' questions.

Pedagogical Strategies to Support Navigation in Remote Learning Environments: Looking Back

	Synchronous	Asynchronous	Without Technology
Looking Back: Reviewing or discussing what we need to investigate today	<ul style="list-style-type: none"> • Ask students to return to their Progress Tracker to review what they have figured out so far and discuss together what needs to be investigated next. 	<ul style="list-style-type: none"> • Create a short video presenting the question to be investigated that day, and describing how it will help them make progress in explaining the Anchoring Phenomenon. • End the previous lesson with a digital collection of student ideas for what they figured out that day, then start the next lesson by looking at that collection to identify what the most common elements are. • Present results of a student survey to the class about what question should be addressed next. • Ask students to use their Progress Tracker to propose what could be investigated next. 	<ul style="list-style-type: none"> • Create student activity sheets that identify navigation clearly from one “packet” to the next. • Since there may be multiple days in between one lesson and the next, review the possible investigations boards and/or ask family members to propose an investigation that could be done at home with everyday materials.

Pedagogical Strategies to Support Navigation in Remote Learning Environments: Taking Stock

	Synchronous	Asynchronous	Without Technology
<p>Taking stock: What we figured out today that helped us make progress on the day's question</p>	<ul style="list-style-type: none"> ● Ask students to discuss in paired breakouts or over text/chat what their answer to the day's question was, then share back with the group. 	<ul style="list-style-type: none"> ● Ask students to write individual answers to the day's question, which could be used in a subsequent class. 	<ul style="list-style-type: none"> ● Ask students to annotate the Student Procedures sheet by saying how different activities helped them answer the day's question. ● Scaffold the navigation through the lesson in the "packet". ● Ask students to share their ideas with their friends/families, to explain what they have figured out and respond to their questions.
<p>Taking stock: What we figured out today that helped us make progress in explaining the anchoring phenomenon or solving the day's problem?</p>	<ul style="list-style-type: none"> ● Ask students to update a class Progress Tracker together in a shared Google doc. 	<ul style="list-style-type: none"> ● Ask students to complete a version of the Progress Tracker online, either in an individual submission or in a shared Google doc. 	<ul style="list-style-type: none"> ● Ask students to add to their Progress Tracker. They can take a photo of it to submit, or simply submit the new information to the teacher when turning in a packet. ● Ask students to talk to a family member about what they figured out today in any language they speak at home. ● Invite students to phone a friend and share what they figured out today. ● Have as a culminating question for each lesson the question to the left, tailored to the phenomenon or problem. ● Could be in multiple ways of explanation, drawing of models, home-made diagrams or models, written explanations.

Pedagogical Strategies to Support Navigation in Remote Learning Environments: Looking Forward

	Synchronous	Asynchronous	Without Technology
Looking forward: What do we need to investigate next?	<ul style="list-style-type: none">● Use the chat feature to elicit a question from each student.● Have students create Google drawings to propose investigations that the students can all help carry out.	<ul style="list-style-type: none">● Use a survey to elicit what questions students think should be answered next.● Use Flipgrid as a tool for students to record questions they think should be investigated next.	<ul style="list-style-type: none">● Ask students to propose a question from the DQB to investigate next, and suggest how the class could investigate it with materials at home.● Ask students to propose an investigation that the teacher can conduct and report the results next week with packets.● Ask students to use their friends and family as they might use a small group at school, to generate more questions together.

Equity Considerations for Navigating in Remote Environments

In classrooms with storylined curriculum, it is possible for some students who contribute quickly to leave others behind in a synchronous environment. Instituting practices of think first, polling, and surveys can help get all voices on the floor before deciding on a direction for the day's lesson or determining whether the class as a whole agrees that they've figured something out.

This routine can be "word-heavy," and so providing multiple means of expression of ideas can make the ideas more accessible to a wider range of students. In addition, educators can create short video presentations--including ones in which students' ideas are featured--can facilitate more equitable participation in the routine.

The following are some additional equity-related recommendations:

- Include images with text where possible to complement meanings of text.
- If students have phones, this routine is a good one for students to pair up and work together, or use a text chain to develop ideas together.
- Enable expression of ideas in any language or mode. There is no need to limit students to express themselves in English through spoken word or writing.
- Take care to revisit norms of participation and solicit all students' ideas.
- Consider bundling packets science learning opportunities with meal services.

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.

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.