



The Five Most Common OpenSciEd Instructional Routines

The five most common *OpenSciEd* Instructional Routines using the “Storyline” approach as an instructional model. This *OpenSciEd* Instructional Model uses a logical sequence of lessons that are motivated by students’ questions that arise from students’ interactions with phenomena. Storylines are lesson sequences that guide students in developing their understanding of phenomena. They are the vehicle for teaching science content in an NGSS-aligned classroom. To help teachers and students advance through a unit storyline, the instructional model takes advantage of five routines—activities that play specific roles in advancing the storyline with structures to help students achieve the objectives of those activities. The routines typically follow a pattern as students kick off a unit of study, investigate different questions they have, put the pieces together from those investigations, and then problematize the next set of questions to investigate.

Anchoring Phenomenon Routine

Kicking off a Unit with an Experience to Motivate Investigation

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. More specifically, the Anchoring Phenomenon routine serves to ground student learning in a common experience and then use that experience to elicit and feed student curiosity, which will drive learning throughout the unit. The Anchoring Phenomenon routine also serves as a critical place to capture students’ initial ideas as a pre-assessment opportunity. The Anchoring Phenomenon is introduced at the beginning of a unit. The Anchoring Phenomenon routine pushes students to represent their initial thinking. Students might represent their thinking in the following ways:

- Drawing or writing initial science models, explanations, or design solutions in their science notebooks
- Discussing an initial model, explanation, or design solution with a classmate
- Creating a shared classroom representation of an initial class consensus model, a Driving Question Board, and ideas for potential investigations

Navigation Routine

Motivating the Next Step in an Investigation

The Navigation routine enables students to experience the unit as a coherent storyline in which each activity has a purpose and is connected to what has gone before and what is coming. It also provides a valuable opportunity for students to reflect on their learning over time. The Navigation routine is conducted throughout the unit at transition points to further solidify the connection between related science classroom resources and topics. The Navigation routine is all about linking learning across lessons and activities. Students might represent their thinking in the following ways:

- Revisiting their initial ideas and focus questions in their science notebooks
- Revisiting their individual models in their notebooks to add to or revise their thinking
- Recording a “consensus” science model, using a Model Tracker, in their notebooks and publicly in the classroom
- Returning to the Driving Question Board to answer questions, add new questions, or refine their questions

Investigation Routine

Using Practices to Figure Out Science Ideas

The purpose of the Investigation routine is to use questions around a phenomenon that lead the class to engage in science practices to make sense of the phenomenon, and then develop the science ideas as part of the explanation. This is the basic structure of the work of three-dimensional learning. The Investigation routine is conducted throughout the unit, whenever students identify gaps in their understanding of the Anchoring Phenomenon. Students represent their thinking during Investigation routines in many different ways, including these:

- Developing a plan of action
- Recording observations and measurements
- Organizing evidence
- Articulating new ideas and comparing them to current models
- Revising science models
- Revising the Driving Question Board

Problematizing Routine

Motivating Learning through Each Part of a Unit

In OpenSciEd's science classroom resources and units, the purpose of the Problematizing routine is to reveal a potential problem with the current model or explanation in order to motivate students to extend or revise their models. The teacher seeds, cultivates, and capitalizes on an emerging disagreement that reveals the potential problem and gets students to focus on an important question that could extend their science models. The Problematizing routine is often conducted after a Putting Pieces Together routine or at strategic locations where students need to recognize that there is more to figure out.

Putting the Pieces Together Routine

Using the Science Ideas We've Built So Far

In the Putting Pieces Together routine, students take the ideas they have developed across multiple lessons and figure out how they can be connected to account for the phenomenon the class is working on. In our science classroom resources, this routine serves to help students take stock of their learning and engage with the class to develop a consensus representation, explanation, or model to account for the target phenomenon (the phenomenon anchoring the unit or learning set).

The Putting Pieces Together routine is conducted at strategic moments when students have synthesized evidence from a range of situations to construct an important component of the explanatory model. This is often at the end of a lesson set and at the end of the unit.

Students typically represent their thinking through the following:

- A gotta-have-it checklist
- A class consensus model

Examples can be found on the Ambitious Science Teaching website:

<https://ambitiousscienceteaching.org/tools-face-to-face/>