**Planning and Carrying Out Investigations**

*Time: 45 minutes*

**Goals:**

* Develop an understanding of what it means for students to engage in “planning and carrying out investigations”
* Engage in the science practice of planning and carrying out investigations
* Evaluate and improve a “typical lab” activity
* \*Explore how student engagement in this science practice progresses across grades
* \*Design or revise a lesson that engages students in planning and carrying out an investigation

*\*If the extension activities are completed*

**Materials:**

* Air Lesson Plan handout
* NGSS Appendix F handout (for the extension activity)
* Typical Lab handout
* Video Note Catcher handout
* For the air investigation:
	+ Round balloons
	+ Plastic zip bags
	+ Clear straws
	+ String
	+ Paper clips
	+ Tape

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| **Activity** | **Description** | **Time** |
| Air Investigation | * Explain the context of this activity to participants. This activity comes from the FOSS 6th grade Weather & Water Unit, and specifically from *Investigation 2: Where’s the Air?* At this point in the unit students have already learned that air has mass.If participants want more information about the lesson from which this activity came from, give them the Air Lesson Plan handout
* Direct participants to examine the materials that are available at their tables, which include: round balloons, plastic zip bags, clear straws, string, paper clips, and tape
* In small groups, have participants use the materials to design and carry out an investigation that demonstrates that air has mass. Give participants about ten minutes to complete this task.
	+ Encourage teachers to engage in this task as their students would, but also to wear their “teacher hats” and to think about how they might prepare and support their students in doing such a task.
* Afterwards, conduct a whole group discussion around the following questions:
	+ Would any group like to share how they went about completing this task?
	+ Did all of the groups plan and carry out their investigations in the same way?
	+ What were some similarities between the different investigations?
 |  15 min |
| Defining Planning and Carrying out Investigations | * Conduct a think-pair-share with the following question:
	+ What do you think of when you hear the term “investigation”?
* Show the graphic from the sciencepracticesleadership.com website that illustrates how the three groups of science practices (Investigating, Sensemaking, Critiquing) work together
	+ Remind participants that they saw and discussed this graphic during the Introductory Module
	+ Explain that “planning and carrying out investigations” falls under the group of Investigating Practices
* Share and read text from sciencepracticesleadership.com, which defines an investigation as “a systematic way to gather data about the natural world, either in the field or in the laboratory setting.” This text also describes what it looks like for students to engage in this science practice in the classroom.
* Tie this definition to the teachers’ earlier understanding of this science practice
 | 5 min |
| Evaluating a Typical Lab | * Explain to teachers that with the definition of this science practice in mind, they will now evaluate a “typical lab” that was designed for elementary aged students exploring how magnets interact with other objects.
* Pass out the Typical Lab handout, and have teachers read through it.
* Prompt teachers to compare the experience students would have conducting this lab to the description of this science practice.
	+ Encourage teachers to consider the extent to which it allows students to “plan” and “carry out” investigations
* Discuss with teachers how they might redesign this typical lab to better align it with this science practice.
* \*Note: Point out to participants that a lot of existing curriculum has students conduct experiments, but few of them have students design the experiments. Thus, it is important to modify curriculum to better align with this science practice.
 | 10 min |
| BPS Video Example | * Explain to participants that they will now watch a video of a kindergarten class from BPS that is “planning and carrying out investigations.” The lesson the class is engaged in comes from the FOSS Wood & Paper Unit, and specifically from *Investigation 1, Part 1: Sink the Pine and Plywood.*
	+ https://www.youtube.com/watch?v=sXO7jneoL6U
	+ *\*Note: The entire video, which is ~14½ minutes long, is of snippets of a whole lesson. If time is of essence,* *the video showing can be condensed further to show snippets of the lesson launch, the students engaged in the investigation, and then the lesson closure. Suggested times for the “condensed viewing” are:*
		- *Lesson launch: 1:48- 3:48*
		- *Investigation: 5:20-9:20*
		- *Closure: 12:26-14:26*
* As participants watch the video, ask them to jot down notes in the Video Note Catcher handout of how they see and hear the students engaged in this science practice.
	+ Before watching the video, encourage participants to look at their NGSS Appendix F handout and re-read the definition of this science practice and what it looks like for grades K-2
* Afterwards, conduct a whole group discussion around the following questions:
	+ How did you see and hear students engaged in this “planning and carrying out investigations” in the video?
	+ What challenges do you think your students might encounter when engaged in this science practice? What instructional strategies might you use to support them?
	+ What questions do you still have about the science practice of “planning and carrying out investigation”?
 | 15 min |
| Extension – Creating or Revising a Current Lesson  | * Work Time:
	+ Provide teachers with time to get some work done that will actually be useful! Encourage teachers to think of an investigatory lesson plan that they currently teach (or plan to teach). Have them use the NGSS Appendix F handout to consider the ways that this lesson aligns (or does not align) with the expectations for this science practice outlined in their grade band.
	+ Afterwards, encourage teachers to make revisions to their current lessons, or to write a new one, in order to better provide their students with the opportunity to plan and carry out an investigation.
	+ Teachers can work independently or in groups depending on individual needs.
* Share Out:
	+ Give each group or individual a few minutes to share the lesson they created or revised, and to receive feedback from their colleagues.
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| Extension – How the Science Practice Progresses Across Grades | * Inform teachers that student engagement in this science practice progresses throughout grades K-12. Pass out the NGSS Appendix F handout, and conduct a think-pair-share in which participants read what “planning and carrying out investigations” looks like in different grade bands, and then discuss:
	+ In what ways does student engagement in this science practice progress across K-12?
* How does this progression align (or not align) with how students currently engage in “planning and carrying out investigations” in your classroom?
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