

Purpose

In this activity, we will reflect on your experience facilitating an investigation.



How does a teacher facilitate an investigation?

Predictions, Observations and Making Sense

Part 1: Sharing Your Ideas about Your Experience

?  What went well during your facilitation of the parachute activity?

?  What was challenging?

?  Did anything unexpected happen?

Investigations and inquiry can vary widely in how much input the child or the teacher has into the activity. The table below describes what a classroom might look like at either end of the spectrum for three of the practices we have discussed in depth so far in Next Gen PET. For the first one, an example is provided of what a classroom that falls in between the two ends of the spectrum might look like. Fill in the blank cells for the other practices to show what such an “in-between” class might look like.

Practice	More learner directed ← → More teacher directed		
Asking questions (for science)	Learner poses a question.	Learner selects among questions.	Learner engages in question provided by teacher, materials, or other sources
Analyzing and interpreting data	Learner determines what constitutes evidence, collects it and determines how to analyze it.		Learner is given data and told how to analyze it.
Planning and carrying out investigations	Learner determines the process for collecting data needed to answer the question.		Learner is given instructions about how to carry out an investigation.

Adapted from NRC (2000). Inquiry and the National Science Education Standards. Adapted to use the NGSS practices.

Now that you have completed the chart, consider the investigation you taught. Where on the teacher-directed to learner-directed continuum do you think the lesson fell for each of the three practices in the chart?

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Planning and carrying out investigations	Learner determines the process for collecting data needed to answer the question.		Learner is given instructions about how to carry out an investigation.

CQ 6-1: For the practice Asking Questions, which term best describes your instruction?

- A. More learner-directed
- B. In between learner directed and teacher-directed
- C. More teacher-directed

CQ 6-2: For the practice Analyzing and Interpreting Data, which term best describes your instruction?

- A. More learner-directed
- B. In between learner directed and teacher-directed
- C. More teacher-directed

CQ 6-3: For the practice Planning and Carrying Out Investigations, which term best describes your instruction?

- A. More learner-directed
- B. In between learner directed and teacher-directed
- C. More teacher-directed



Given more time, how would you change the activity to be closer to the learner-directed end of the continuum for any of the practices listed above?

Part 2: Connecting to Content

In addition to thinking about the practices, it is also important to think about how the activity was also developing the children's understanding of scientific content.

Think about how the parachute activity relates to the content you have been learning in the *Forces and Interactions* module of Next Gen PET.



Drawing on what you are learning in Next Gen PET, or what you observed in the third-grade classroom video, use friction (or air drag) ideas to explain why a larger canopy resulted in a slower parachute. Include some drawings and force diagrams in your explanation.

CQ 6-4: Which of the following qualities of the larger parachute do you think was most important making the parachute fall slower?

- A. The larger parachute was heavier.
- B. The larger parachute required longer support strings.
- C. The larger parachute had a larger surface area.

In the video of children conducting this experiment, one child makes the prediction that a parachute with a smaller canopy will fall the slowest because that parachute is the lightest.



Why do you think this idea might make sense to a student?



How do you think the investigation helped him develop his ideas about (air) friction and forces?

Think about your own interview with children. Were their ideas mostly consistent or inconsistent with the way you have been learning about forces and friction?

CQ 6-5: Did the ideas about forces and friction expressed by the students you interviewed seem consistent or inconsistent with the ideas you had as you were learning about forces and friction in Next Gen 8PET?

- A. The children's ideas were mostly consistent with the ideas I had as I learned about forces and friction.
- B. The children's ideas were mostly inconsistent with the ideas I had as I learned about forces and friction.

Investigations can be used to help students collect evidence that could support their *rethinking* about their existing ideas. During a previous extension you (may have) read about students' common ideas about force and motion.



Choose one idea and design an investigation that might lead to data that could help students begin to change the way they are thinking about the relationship between force and motion. Share your design with the students near you.

References

- National Research Council. (2012). *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*. Washington, DC: The National Academies Press.
- Achieve (2012). *Next Generation Science Standards*. Available at <http://www.nextgenscience.org/>
- National Research Council (2000). *Inquiry and the National Science Education Standards*. Washington, DC: The National Academies Press.