**Analyzing and Interpreting Data**

 *Time: 45 minutes*

**Goals:**

* Engage in analyzing and interpreting data
* Define and give examples of what it means for students to engage in the science practice of analyzing and interpreting data
* Examine a progression of this science practice for student performance
* Assess the use of this science practice in current classroom instruction

**Materials:**

* Thermal Energy Activity handout
* Science Practices Definitions and Examples handout (pg. 3)
* Science Practices Continuum handout (pg. 2)
* Instructional Strategies handout

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| **Activity** | **Description** | **Time** |
| Defining “Analyzing and Interpreting Data” | * Conduct a think-pair-share with the following questions:
	+ What do you think “analyzing and interpreting data” looks like in a science classroom?
	+ What are students doing?
	+ What is the teacher doing?
* Share and read text from sciencepracticesleadership.com, which defines this science practice as students “making sense of the data produced during investigations. Because patterns are not always obvious, this includes using a range of tools such as tables, graphs and other visualization techniques.”
* Tie this definition to the teachers’ earlier understanding of this science practice
 | 5 min |
| Thermal Energy Activity | * Distribute the Thermal Energy Activity handout to each participant
* Have teachers work in groups of 2-3 to complete the activity and answer the conclusion questions. The graph teachers create may look like this 🡪
* Facilitate a whole group discussion around the following questions:
	+ Howdid you analyze and interpret data during this activity. What types of things did you do?
		- Record comments that relate to this science practice, making sure to include the types of data, and the ways that data can be interpreted. Groups may also share their graphs during this time. As groups share out, highlight the following as they are mentioned:
			* *Analyze and interpret data to determine patterns and relationships*
			* *Represent data in tables and graphs to reveal patterns and relationships*
			* *Consider the limitations of data analysis as sources of error*
	+ Re-examine questions “a” through “e” on the activity handout. Which of these question(s) do you think focus most on “analyzing and interpreting data”? Why do you think so?
* It might be helpful to re-show teachers the definition of this science practice.
* Teachers might bring up that question “a” aligns with “using mathematical and computational thinking”, questions “b” through “d” align with “analyzing and interpreting data”, and that question “e” pushes a bit beyond this practice and starts getting into “constructing explanations”
* Once the activity is over, point out the ways that teachers engaged in this science practice during this activity. During this discussion pass out page 3 of the Science Practices Definitions and Examples handout
 | 15 min |
| Video Example and Discussion | * Watch the “Average Drop Speed” video:
	+ http://eie.org/engineering-elementary/resources/average-drop-speed
* After watching the video, discuss the following questions (first in a small group, and then as a whole group):
	+ What did the teacher do to promote this science practice?
	+ What did the students do that highlights or builds on skills related to this science practice?
 | 10 min |
| Continuum for Student Performance | * Pass out page 2 of the Science Practices Continuum handout
* Ask teachers to examine the handout, and discuss the following questions:
	+ Do you agree with the progression? Why or why not?
	+ What are examples of what these different levels might look like in the classroom?
	+ How would you rate your students’ current engagement in this science practice using this progression?
 | 5 min |
| Reflecting on Instructional Strategies  | * Pass out the Instructional Strategies handout and give teachers time to read through them
* Ask each teacher choose one strategy that they have tried, or would like to try, in their own classroom. In small groups, discuss the following questions:
	+ What strategy did you select?
	+ How do you think this strategy would support your students’ learning of and engagement in this science practice?
	+ What challenges do you think you might face when using this strategy in your classroom? How might you overcome these challenges?
* As a large group, have each small group share out one highlight from their conversation.
* Make connections between what teachers are sharing, and encourage them to use some of these strategies the next time they have students analyze and interpret data
 | 10 min |
| Extension – Connection to other Science Practices | * Share the list of all of the science practices and ask teachers to brainstorm and then share out ways that “analyzing and interpreting data” connects with the other science practices.
* Some example connections include:
	+ Mathematical and computational thinking is often used to analyze data.
	+ Data that has been analyzed and interpreted can be used to construct explanations or support a scientific argument.
	+ An investigation needs to be carried out in order to obtain data for analysis.
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| Additional Resources | * Share some ways that teachers can learn more information about “analyzing and interpreting data”
	+ Watch the first two minutes of the Bozeman Science Video on Analyzing and Interpreting Data –<https://www.youtube.com/watch?v=9NkT-oYPkOA>
	+ Appendix F: Science and Engineering Practices from the NGSS
		- Specifically, page 9 and pages 23-24
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