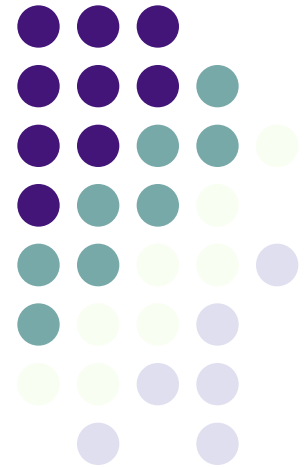
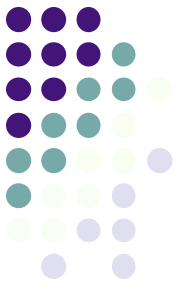

Introductory Module to the Science Practices



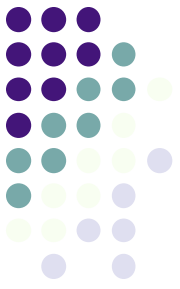


Agenda

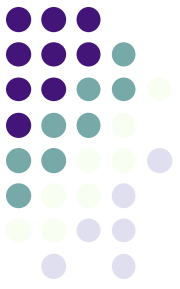
1. Conduct shadow investigation
2. Watch video on science practices
3. Present 3 groups for science practices
4. Discuss shadow investigation
5. Reflect on Instruction and next steps
 - **Extension reading – What do scientists really do?*

Introduction:

A shift in science education



- Historically, science education has overemphasized students learning a myriad of facts rather than understanding how ideas are developed and transform over time (Roth & Garnier, 2006).
- “Science is not just a body of knowledge that reflects current understanding of the world; it is also a set of practices used to establish, extend, and refine that knowledge. Both elements – knowledge and practice – are essential” (NRC, 2012, p. 26).

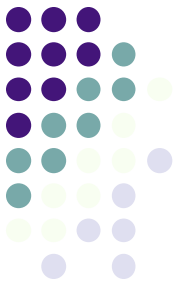


Shadows Investigation


- This lesson is targeting the following standard:
 - Use observations of the sun, moon, and stars to describe that each appears to rise in one part of the sky, appears to move across the sky, and appears to set. [MA.1-ESS1-1]
- Think-pair-share: *When you are outside, how does the shadow of your body change during the day?*



Shadows Investigation

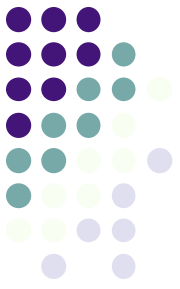


- With your group, complete the investigation (including the conclusion questions) to explore how shadows change when a light source moves.

| WHERE TO PUT THE FLASHLIGHT | DRAWING OF SHADOW AND OBJECT | LENGTH OF SHADOW (CM) |
|--|------------------------------|-----------------------|
|  X | | |

- Questions to Keep in Mind:
 1. How did the shadow change when you moved the flashlight?
 2. Why do the shadows that you see outside change shape, size and location depending on the time of day?

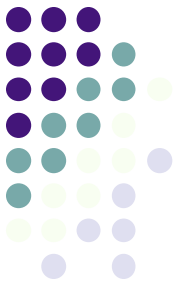
Shadow Investigation - Discussion



- Conclusion questions:
 - Share your claim and evidence – How did the shadow change when you moved the flashlight?
 - Given your findings from today's investigation, why do you think the shadow of your body changes during the day?
- How did your observations align with what you discussed before the investigation about shadows outside?



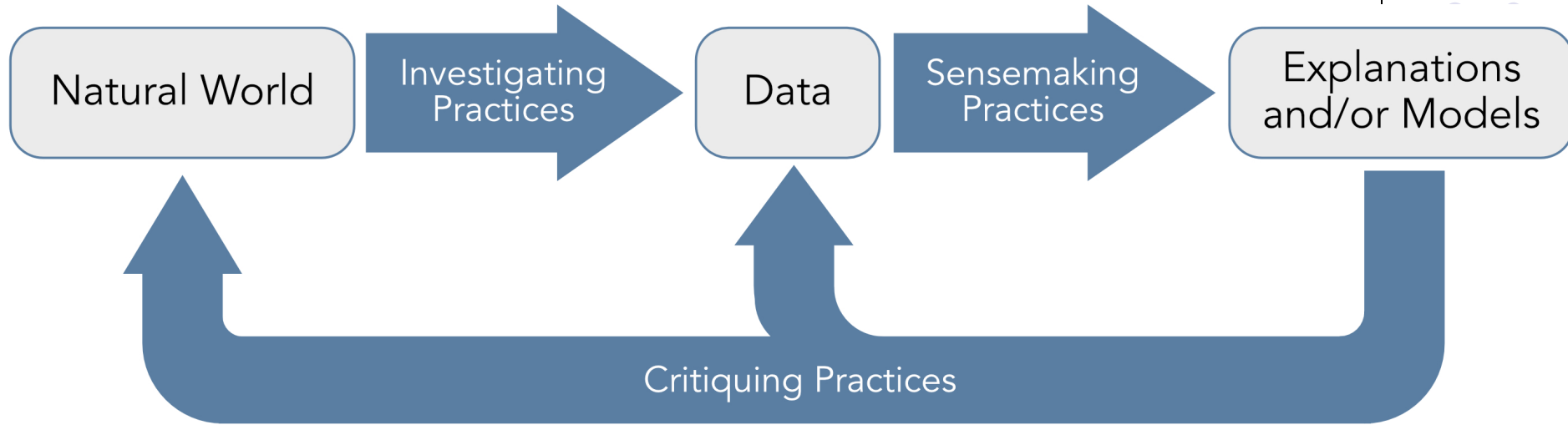
Watch Video on Science Practices



- The video below was produced by Achieve and Teaching Channel
- Discussion Questions:
 - How is this vision of science practices similar and different from what is currently in science curriculum?
 - How could you envision using the science practices in your classroom?

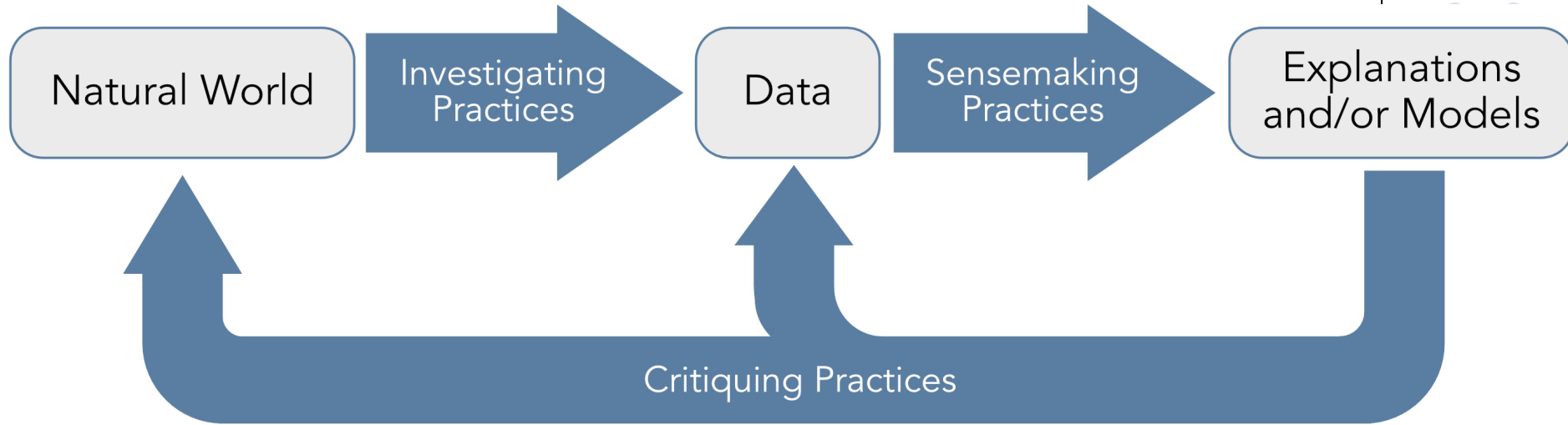
Grouping the Practices

(McNeill et al., 2015)



Grouping the Practices

(McNeill et al., 2015)



| Investigating Practices | Sensemaking practices | Critiquing Practices |
|--|--|---|
| 1. Asking questions 3. Planning and carrying out investigations 5. Using mathematical and computational thinking | 2. Developing and using models 4. Analyzing and interpreting data 6. Constructing explanations | 7. Engaging in argument from evidence 8. Obtaining, evaluating and communicating information |

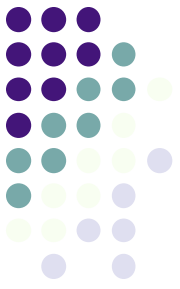
Discuss Shadow Investigation



- Considering the 8 Science Practices in the three groups of Investigating, Sensemaking and Critiquing, which of these practices did you engage in? Why do you think so?
- What are the strengths of this lesson? How could it be improved?

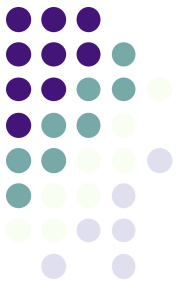
| Investigating Practices | Sensemaking practices | Critiquing Practices |
|--|--|---|
| 1. Asking questions 3. Planning and carrying out investigations 5. Using mathematical and computational thinking | 2. Developing and using models 4. Analyzing and interpreting data 6. Constructing explanations | 7. Engaging in argument from evidence 8. Obtaining, evaluating and communicating information |

Reflect on Instruction and Next Steps



- How often does your current instruction provide opportunities for the three groups of science practices (Investigating, Sensemaking and Critiquing)?
 - Is there one group where there are more opportunities?
 - Is there one group where there are less opportunities?
- In Future Modules, we will:
 - Explore each group, and each individual science practice, in more depth.
 - Provide strategies to revise current science instruction to align more closely with this new focus on science practices

Extension reading – What do scientists *really* do?



- Read selection from *Ready, Set, Science*
- Annotate text
- Answer the two text dependent questions at the end of the reading:
 1. How do the authors define the “scientific method”?
 2. Historically, the “scientific method” has been provided to students as the way that scientists “do science”. Would the authors agree with this representation of science?