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**Module: Supporting Decisions with Assessment**  
**Exercise for In-the-Moment Assessment**

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**Example Prompt Response and Commentary**

A key to turning this classroom activity into an assessment opportunity is to be purposeful with our observations and the ways in which we insert ourselves into the conversations happening in small groups. Making the assessment a valuable part of classroom practice then requires the teacher to make quick use of what they see and hear, and turn that back around to students to further instruction responsively and effectively. Those aims drive the orientation and actions described below.

One source from which we can derive purpose is a set of relevant learning goals. Where do we want students to go, through this unit? The Next Generation Science Standards (NGSS) include the following performance expectations that could be relevant to the outset of our unit:

HS-ESS1-2: Construct an explanation of the Big Band theory based on astronomical evidence of light spectra, motion of distant galaxies, and consumption of matter in the universe.

HS-ESS1-3: Communicate scientific ideas about the way stars, over their life cycle, produce elements.

HS-ESS1-6: Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.

HS-ESS2-7: Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.

HS-PS1-1: Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

Other performance expectations in the NGSS articulate student actions related to chemical reactions and the strengths of electrical forces between particles. Those standards may not factor directly into this unit on chemical elements, but they may be good to keep "on the horizon", as we think about how this unit will connect with other units in the course. Also, ELA standards, such as in the Speaking and Listening section of the Common Core State Standards, that focus on collaboration/comprehension in discourse and presentation of ideas might be relevant and useful for connecting across the curriculum.

We also want to keep in mind the practice standards and crosscutting concepts that are a part of the NGSS framework. The most relevant ones to our unit and especially the first few class sessions may include the following:

*Practice Standards*

- Asking questions and defining problems
- Developing and using models
- Constructing explanations and designing solutions
- Engaging in argument from evidence
- Obtaining, evaluating, and communicating information

*Crosscutting Concepts*

- Patterns
- Cause and effect
- Systems and system models
- Energy and matter
- Stability and change

Before the small-group activity, we will want to anticipate how students will react to the prompt, and plan some questions or feedback to use in-the-moment. Let's consider three different places students could be in as they talk with their group: 1) on-target but needing elaboration; 2) off-task or off-target; 3) well-articulated but off-target. For students reflecting #1, we could prepare some quick prompts that reference or prod the student toward the practice standards listed above. For students reflecting #2, we could prepare a reminder of the task at hand, maybe re-stating it in a different way. We could also ask the students what they think Carl Sagan meant by being made of star stuff. What *is* star stuff? We can anticipate misconceptions that may be present in students' thinking, and draft questions that challenge those misconceptions. For students reflecting #3, we could prepare statements that acknowledge could application of a practice standard or crosscutting concept, and then look to pair those statements with some of the preparation we have made for #2.

We also want to plan for the kinds of student verbalizations, dialogue, and visual representations that will be worthy of recording. Again, keeping a tight focus to the NGSS standards can assist us. We might decompose the standards into concrete demonstrations the students might make, listing these possibilities in brief bullet points. We could also re-read the relevant standards before class, so that they are fresh in our minds (or share them with students as broad learning goals for the unit).

While students are in discussion, we can learn from Heritage and Wylie<sup>1</sup>, who talk about evaluative listening versus interpretive listening. We want to strive for the latter. As we go from group to group, we should aim to listen for what students are saying and what that reveals about their thinking, rather than listening for what is right or wrong. Following our plan, we will make notes of what students are writing and saying. We will ask questions to probe thinking and steer the students toward the learning goals, aiming to keep their flames of thought burning. We can also call attention to and reinforce student application of practice standards and crosscutting concepts. As students progress, we can task each group to come up with one question that identifies something they want to learn or further consider in support of their argument.

As we near the end of the discussion time, we will need to summarize and synthesize what we observed. It will help if we were strategic and kept our notes manageable so that we can quickly process them. In this process of summarizing and synthesizing, we want to think like a researcher. We will look for themes and patterns. We were probably already doing this while we were taking notes, and maybe even stopped recording certain observations when we reached a point of *saturation* within a theme (i.e., when continuing observations reaffirm a theme more than they signal something new).

Following group discussion, we could end the class session with a whole-class debrief. We can use professional judgment, based on what we observed in the group discussions and previous performances of the students in whole-class discussion, to determine to what extent we drive the debrief (e.g., starting with the themes we derived from our observations) versus letting the students drive the debrief after a basic opening question (e.g., "so how did your group respond to Carl Sagan's claim?"). We can take additional notes during this discussion, or record it so that we can be present in the conversation and review it later. At some point, we will want to be sure to let the groups share the questions they came up with for further learning.

In this class activity, we have assessed in-the-moment, through observation, listening, and documentation, and turned that assessment into immediate instructional decision-making. We also have information to carry forward into the next few class sessions. We can marry our unit and lesson plans with the students' self-identified learning needs to determine specific class activities. We can save the big sheets of paper for students to continue to refine their thinking and/or to serve as something to reflect upon at the end of the unit, as a way for students to observe their own growth.

If you are a science teacher, the book, *Ambitious Science Teaching*<sup>2</sup>, features a chapter on “Talk as a Tool for Learning”. It provides further detail and ideas that are helpful for leveraging a class activity, such as the one featured in this exercise, as an in-the-moment assessment opportunity.

<sup>1</sup> Margaret Heritage and E. Caroline Wylie, *Formative Assessment in the Disciplines: Framing a Continuum of Professional Learning* (Harvard Education Press, 2020)

<sup>2</sup> Mark Windschitl, Jessica Thompson, and Melissa Braaten, *Ambitious Science Teaching* (Harvard Education Press, 2018)