Assessing three-dimensional performance: sense-making

SENSE-MAKING | SEPs | DCIs | CCCs

One clear lesson-learned through the Task Annotation Project in Science (TAPS) was that **requiring students to figure something out** is a central feature that distinguishes tasks that represent the *Framework's* vision for student learning and performance from more traditional expectations in science. TAPS highlights when tasks require sense-making and when they do not. While tasks that do not regularly require sense-making can often provide a helpful window into specific ideas and skills students are developing, making a claim or inference about proficiency or whether students can use the three-dimensions to make sense of phenomena requires that tasks elicit student sense-making.

What we've learned about sense-making in science assessments:

When students make sense of phenomena and problems, they demonstrate that they deeply understand the three dimensions, as well as how and when they can be used to figure out something in the world around them.

Implications for educators and developers:

Educators should make sure sense-making opportunities are an important component of the evidence of student progress used to make decisions about teaching and learning as well as grades, advancement, and pathways.

Developers should make sure that assessments routinely include opportunities for students to actively and authentically engage in sense-making. This should be true for both formative and summative assessment opportunities.

✓ Sense-making is the glue.

Sense-making is the binding agent that connects the three dimensions to the vision of student learning and performance embodied by three-dimensional standards.

✓ Practical definition for tasks.

In tasks, sense-making happens when students have to apply, via the science and engineering practices, their understanding of core ideas and crosscutting concepts to address the uncertainty associated with a scenario.

✓ Sense-making requires multiple dimensions.

Meaningful one-dimensional performances may ask students to reason with one dimension in isolation, but sense-making requires that students use multiple dimensions together to figure out a phenomenon or problem.

✓ Sense-making distinguishes 3D performances.

Sense-making distinguishes between three-dimensional science assessments and more traditional tests, including assessing practices vs. skills, core ideas vs. factual knowledge, and meaningful engagement of the crosscutting concepts

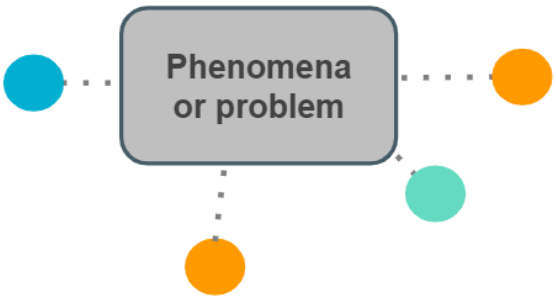
✓ The phenomenon or problem matters.

Meaningful sense-making requires a compelling phenomenon—something uncertain that students need to figure out using their understanding of the three dimensions.

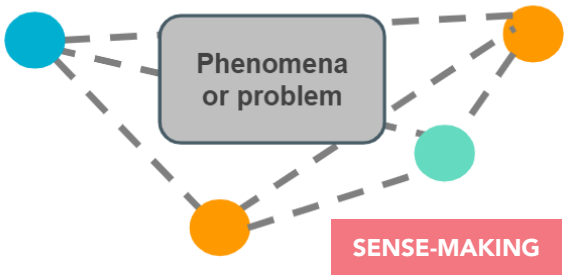
! Assessments look less like asking students to…	✓ Assessments look more like asking students to…
Represent exactly what they have already learned and experienced.	**Connect what they have learned and experienced in a new way.**
Explain a phenomenon or addressing a problem students fully understand.	**Connect their learning to a phenomenon or problem that involves authentic uncertainty (from the student perspective).**
Provide just a factually correct or incorrect answer.	**Make their thinking—including their evidence-based reasoning—visible through models, explanations, arguments, investigation plans, questions, and/or predictions.**

Visualizing the Sense-Making Process

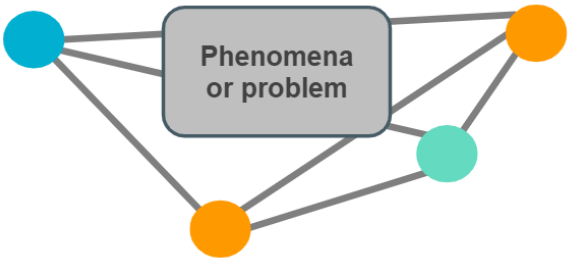
Each dot represents ideas, abilities, and experiences that students have developed. These can include disciplinary core ideas, crosscutting concepts, and practices as well as explanations for particular kinds of phenomena or solutions for particular kinds of problems. While sense-making was likely involved in developing these understanding, students no longer need to figure them out—when asked about them, the responses are more rote. Importantly, students have not connected these ideas before in a particular way.



A new phenomenon or problem is presented that is not immediately explainable by students prior experiences, and this phenomenon or problem activates these ideas, abilities, and experiences. This may happen through direct or indirect cuing, scaffolding, or because of connections students make themselves.



Sense-making occurs when students connect their previously developed ideas, abilities, and experiences together to address the uncertainty presented by the phenomenon—to figure out why the phenomenon occurs, to propose possible mechanisms or solutions, to ask further probing questions, etc. This can be heavily or lightly scaffolded, and independently or collaboratively pursued, as long as students are still responsible for having to put these pieces together.



If students are asked to address the same (or highly similar) phenomena and problems repeatedly, over time the connections between ideas require less figuring out and become increasingly rote.

Eventually, that whole experience becomes one that students can leverage as a schema or an understanding that they have figured out, and can connect with others to figure out new phenomena and problems.