Applying ECD Principles: Developing a NGSS Assessment Argument

NSTA Professional Development Institute

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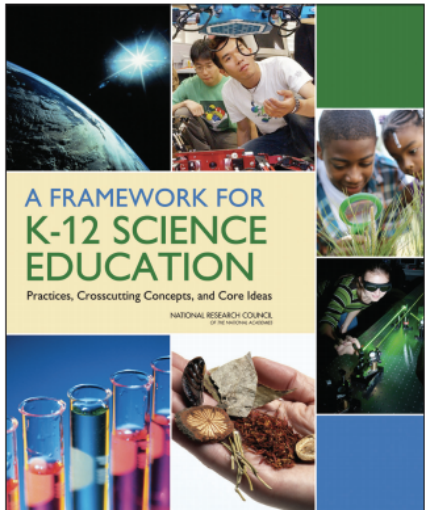
What we will do…

- Discuss the core questions and principles of Evidence-Centered Design
- Learn about how to create an Assessment Argument to guide the development of tasks aligned with PEs
- Create your own NGSS Assessment Argument



NEXT GENERATION SCIENCE STANDARDS

Think back to the task analysis…

- How did you know which tasks were more “NGSS-like” than others?
  - What were the features of these tasks?
  - What were they really measuring that seemed more in line with the NGSS?

- When you think about the task(s) you liked more
  - How can you create similar tasks?
  - In designing similar tasks, what would you keep the same and what should you change in new tasks and why?

The Value of Evidence-Centered Design

- A systematic process to facilitates consensus about the design principles of tasks (in this case, NGSS assessments)
  - Meaning of performance expectations
  - Evidence to look for in student work
  - Task features

- Benefits
  - Developing a shared vision about assessments with colleagues
  - Documentation of design decisions for reuse
  - Creating more well-aligned tasks
  - Scalability

The Value of Evidence-Centered Design

- We aim to articulate clear and logical vision of the evidence we need to look for in student responses that will demonstrate proficiency (meeting a performance expectation).

What's the alternative?

- Skip documenting design decisions and move right from a performance expectation to creating a task
  - Design designs are implicit
  - Inconsistencies in how core ideas, practices and cross-cutting concepts are elicited across PEs
  - Lots of variation in contexts, difficulty, evidence elicited from students, and approaches for scoring across tasks…How do we know we're all really measuring the same PE?

Three Basic Questions

- What **claims** do we want to be able to make about what students know and can do?
- What kinds of **evidence** will students need to provide to demonstrate proficiency? (What does it look like when students are successful?)
- What kinds of **tasks / task features** will elicit the desired evidence?

When we have logical and coherent answers to these three questions, we have an *assessment argument*.

Building an Assessment Argument

- A structure to scaffold the development of an assessment argument
- Categories to support initial responses to those three questions, as well as a few others…

Building an Assessment Argument

MS-PS1-1 Develop models to describe the atomic composition of simple molecules and extended structures

- Clarification Statement: Emphasis is on developing models of molecules that vary in complexity. Examples of simple molecules could include ammonia and methanol. Examples of extended structures could include sodium chloride or diamonds. Examples of molecular-level models could include drawing, 3D ball and stick structures, or computer representations showing different molecules with different types of atoms.

- Assessment Boundary: Assessment does not include valence electrons and bonding energy, discussing the ionic nature of subunits of complex structures, or a complete description of all individual atoms in a complex molecules or extended structure is not required.

Assessment Argument Components

Claim

Which performance expectation are you targeting for your assessment?

MS-PS1-1 Develop models to describe the atomic composition of simple molecules and extended structures`

Evidence

What student behaviors or performances will provide evidence of this performance expectation?

Student's model (representational) should include (1) Components: Atoms (same or different types); (2) Relationship: The same types of molecules should have the same number and types of atoms present.; (3) Connection (with theory): Simple molecules composed of two or more atoms joined together as a groups of atoms with actual number of atoms in the molecule.

Assessment Argument Components

Additional Knowledge, Skills and Abilities

What background knowledge and experiences do students need to respond to the task?

Are there ELA or mathematics skills that will be required?

What skills do students need to express a correct response?

5-PS1-1 Develop a model to describe that matter is made of particles too small to be seen.

Knowledge that a model can be used to describe phenomena

Ability to construct a written response

Ability to create drawings (paper-pencil and on computer)

Assessment Argument Components

Characteristic Task Features

What features are common across all assessment tasks for this performance expectation?

Extended structures in this assessment will not include metal and polymer.

What are the assessment boundaries to consider?

Atoms are not expected to include components of sub-particles and shells, and bonds.

Assessment Argument Components

Variable Task Features

How can you vary contexts for tasks?

How can you vary the complexity of tasks?

How can you increase or reduce demands for ELA and math skills?

Format of model: Drawing, 3D-ball and stick model, sphere model or computer simulation

Substances: Number and types of atoms in simple molecules and extended structures

Using the Assessment Argument

- What kind of features should I build into my tasks?
- How can adjust tasks for eliciting student ideas about this PE at the beginning, middle and end of a unit?
- Will tasks allow my students to demonstrate the evidence that I think is relevant and important?

Create Your Own Assessment Argument

1. Select a performance expectation from the packet
2. Unpack the performance expectation to define
   - Claims
   - Evidence
   - Additional Knowledge, Skills and Abilities
   - Characteristic Task Features
   - Variable Task Features

Discussion