What to Look For in a 3-Dimensional Science Classroom – Guidance for Administrators

Overview for Administrators about the Arizona Science Standards (AzSS):

- A major difference between the 2018 Arizona Science Standards and previous science standards is "3-Dimensional Learning" (3-D).
- 3-D Learning refers to the thoughtful and deliberate integration of the three dimensions: Scientific and Engineering Practices (SEPs), Core Ideas (CIs), and Crosscutting Concepts (CCCs).
- Through 3-D Learning, the AzSS emphasize that science in not a series of isolated facts.

General Information about This Document:

- This document is designed to support science classrooms in transitioning to the AzSS.
- This document is not intended to evaluate teachers, but rather to gain insights into the effectiveness of instructional practices for engaging students in 3-dimensional science learning.
- This document **should not be used as an observation "checklist**," but can serve as a tool that describes what it might look like as science teaching and learning shifts to align with the new AzSS best practices.
- For more information about instructional shifts, please review this document. To review a quick case study comparing a "traditional" approach to instruction and a 3-dimensional approach, please read these Classroom Vignettes.

Look-For #1: Sense-Making of natural or designed phenomena that requires the use of the 3-dimensions.

Teachers:

- Present students with **phenomena,** or observable events that occur in nature (science) or designed systems (engineering), that they have to figure out how to scientifically explain and/or develop solutions to solve problems.
- Guide students in their use of the eight **science and engineering practices (SEPs).**
- Guide students in their use of the seven **crosscutting concepts (CCCs).**
- Guide students in their use of the ten **core ideas of knowing and three core ideas of using science (CIs).**

Students:

- Use **science and engineering practices** to observe and ask questions about phenomena, plan and carry out investigations, gather and interpret data, make claims using data as evidence, argue for and against claims using evidence, and elaborate their understanding of what causes phenomena using scientific principles provided by text or direct instruction.
- Use **crosscutting concepts** to establish underlying causality essential for making sense of science phenomena, they develop understanding of the systems being investigated, and recognize and use patterns as evidence to support explanations and arguments.
- Use **core ideas of knowing science** to develop explanations and reasoning for the explanation, and use **core ideas of using science** to connect scientific principles, theories, & models; engineering and technological applications; and societal implications.

Look-For #2: Making Thinking Visible using models, explanations, and arguments that best fit the evidence available at the time.

Teachers:

- Elicit student ideas, provide neutral responses, ask students questions that encourage students to make their ideas visible.
- Provide opportunities and supports that help students make their thinking visible through representations using words and visuals.

Students:

- Share their science ideas through representations using words and visuals.
- Revise their ideas in light of new experiences, data, and/or other student ideas.

Look-For #3: Engaging ALL Students Equitably in a science community and culture that values ALL ideas and voices.

Teachers:

- Establishes classroom discussion norms, including lesson structures to facilitate participation for all students.
- Use strategies to elicit ideas from all students, such as talk protocols to provide structure and routines.
- Less use of the IRE talk pattern: teacher *Initiates* a question, student *Responds*, the teacher *Evaluates*.
- More use of a pattern of engagement that is student focused T-S-S- S-T, rather than teacher focused T-S-T-S-T.

Students:

- Adhere to norms developed to maintain a productive classroom culture.
- Listen to and respond to other's ideas.
- Paraphrase and agree/disagree with others using evidence.
- ALL students feel comfortable sharing ideas, revising ideas, and disagreeing.