

# A MODEL OF 3-DIMENSIONAL SCIENCE LEARNING

## Criteria for Curriculum & Instruction

### Learning Experiences are:

- ✓ Accessible for all learners-everyone feels actively involved
- ✓ 3-dimensional (students use elements of SEPs to make sense of Disciplinary Core Ideas and CCCs)
- ✓ Grade-appropriate (in all 3 dimensions)
- ✓ Designed to identify & build on students' prior knowledge
- ✓ Coherent (across time, disciplines and a unit)
- ✓ Integrated across disciplines when appropriate (units)
- ✓ Designed to integrate Engineering with Science content
- ✓ Scientifically accurate

### Phenomena are:

- ✓ Observable
- ✓ Engaging for all students
- ✓ Thought-provoking (can spark student questions)
- ✓ Relevant to students
- ✓ Authentic/real world
- ✓ Address targeted Disciplinary Core Idea(s)
- ✓ Rich in science content that can be unpacked
- ✓ Age-appropriate so students can figure them out with guidance over time

### Science & Engineering Practices (SEPs):

- Asking Questions and Defining Problems
- Developing and Using Models
- Planning and Carrying Out Investigations
- Analyzing and Interpreting Data
- Using Mathematics and Computational Thinking
- Constructing Explanations and Designing Solutions
- Engaging in Argument from Evidence
- Obtaining, Evaluating and Communicating Information

### Assessments are:

- ✓ 3-dimensional
- ✓ Designed to provide direct observable evidence
- ✓ Formative, summative and include self assessment
- ✓ Equipped with scoring guidance in all 3 dimensions
- ✓ Accessible and unbiased for all students

### Nature of Science ideas include:

- ✓ Science is an exciting way of learning about the world.
- ✓ We use science every day (at school & at home).
- ✓ Everyone can be a scientist.
- ✓ The most important tools of scientists are their minds, imagination & creativity. However, they often use tools to gather more information than they can with their senses.
- ✓ Scientific ideas keep changing based on new evidence.
- ✓ There is often no single right answer in science.
- ✓ Scientific investigations often don't turn out as expected, but lead to new questions or ideas.
- ✓ Scientists always work safely and have respect for living things and the environment.

### Crosscutting Concepts (CCCs):

- Patterns
- Cause and Effect: Mechanism and Prediction
- Scale, Proportion and Quantity
- Systems and System Models
- Energy and Matter: Flows, Cycles and Conservation
- Structure and Function
- Stability and Change

Adapted from the EQUIP rubric, NGSS Appendix H.  
Copyright © Janet MacNeil 2017.