

NGSS Talking Points

What is NGSS?

The Next Generation Science Standards are based on *A Framework for K-12 Education*, a report by the National Research Council. These standards provide a framework to help students engage in science in a more authentic way. Students make connections across content areas through real-world phenomena that invites them to figure out what is going on by asking questions like “why?” and “how?” Science, Technology, Engineering, and Mathematics (STEM) are deeply integrated into these standards and lend an opportunity for students for hands-on, integrated learning. Students are assessed by being asked to apply new information that allows students an opportunity to demonstrate what they have learned.

Terms to know:

Storylines:

A storyline is what links a series of lessons in which are driven by student’s questions that help explain a phenomenon or solve a problem. By tying each lesson back to the storyline, students can use the science and engineering practices, cross cutting concepts, and disciplinary core ideas to develop a deeper understanding.

Phenomena:

Phenomena is an observable event or a real-world problem that can drive instructions. Students can develop their own questions about the phenomena and develop ways to figure out a solution or understand what is happening by applying the Science and Engineering Practices, Disciplinary Core Ideas and Cross Cutting Concepts. The phenomenon links the learning goals to the purpose of building knowledge.

Science and Engineering Practices (SEP):

There are 8 practices that students should engage in to investigate the natural world. The practices allow students to engage in real world problem, many of which include applying mathematical skills and engineering. As students use these practices, they connect their knowledge and skills to understand how real scientists and engineers investigate ideas or solve problems. The practices are:

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

Disciplinary Core Ideas (DCI):

This is the content that students learn, but rather than a set of facts that they have to memorize, it is material they investigate and make sense of themselves through discovery. The content builds upon itself from Kindergarten through High School and often overlaps within content areas for a more integrated approach to learning. The 4 disciplinary core ideas are:

- Physical Science
- Life Science
- Earth and Space Science
- Engineering, Technology, and the Applications of Science

Cross Cutting Concepts (CCC):

The cross cutting concepts help students find a connection across scientific disciplines. They build as students move from Kindergarten to High School to provide a common thread and anchor their learning. The concepts are:

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

3D Learning and Assessments:

Three Dimensional Learning involves students engaging in the SEPs, CCCs, and DCIs to build their understanding based around a phenomena or problem. Performance Expectations in the standards describe what a student should be able to do at the end of instruction. Assessment should be written to allow students to show what they have learned through using and understanding the SEPs, CCCs, and DCIs.

5E Lesson Plan:

A common format for designing NGSS lessons is the 5E lesson plan, which includes: *Engage, Explore, Explain, Elaborate, Evaluation*. When designing the lesson, it is helpful to start with identifying the performance expectations and what you want your students to be able to do. Determine which DCIs are relevant and what phenomena could be used to direct learning. Focus on which SEPs your student's with use to make sense of the phenomena and which CCCs can help make connections across units and other disciplines.

Resources:

The Next Generation Science Standards: <https://www.nextgenscience.org/>

STEM Teaching Tools: <http://stemteachingtools.org/>

Achieve: <https://www.achieve.org/>

Next Generation Science Storylines: <http://www.nextgenstorylines.org/>