A look at the *Next Generation Science Standards*

By Ted Willard

The final version of the *Next Generation Science Standards* (*NGSS*) is expected later this spring. Once it is released, educators across the country will need to carefully study the standards as plans are made for adoption and implementation. The following text and diagram provide an overview on the architecture of the standards.

Overall architecture

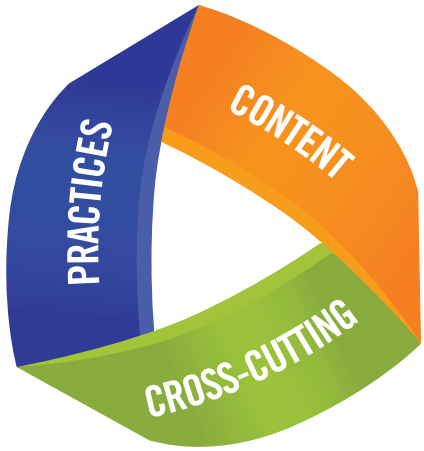
NGSS differs from prior science standards in that they integrate three dimensions (science and engineering practices, disciplinary core ideas, and crosscutting concepts) into a single performance expectation and have intentional connections between performance expectations. The system architecture of *NGSS* highlights the performance expectations as well as each of the three integral dimensions and connections to other grade bands and subjects. The architecture involves a table with three main sections.

What is assessed (performance expectations)

A performance expectation describes what students should be able to do at the end of instruction and incorporates a practice, a disciplinary core idea, and a crosscutting concept from the foundation box. Performance expectations are intended to guide the development of assessments. Groupings of performance expectations do not imply a preferred ordering for instruction—nor should all performance expectations under one topic necessarily be taught in one course. This section also contains *Assessment Boundary Statements* and *Clarification Statements* that are meant to render additional support and clarity to the performance expectations.

Foundation box

The foundation box contains the learning goals that students should achieve. It is critical that science educators consider the foundation box an essential component when reading the *NGSS* and developing curricula. There are three main parts of the foundation box: science and engineering practices, disciplinary core ideas, and crosscutting concepts, all of which are derived from *A Framework for K–12 Science Education.*



During instruction, teachers will need to have students use multiple practices to help students understand the core ideas. Most topical groupings of performance expectations emphasize only a few practices or crosscutting concepts; however, all are emphasized within a grade band. The foundation box also contains learning goals for *Connections to Engineering, Technology, and Applications of Science* and *Connections to the Nature of Science.*

Connection box

The connection box identifies other topics in NGSS and in the Common Core State Standards (CCSS) that are relevant to the performance expectations in this topic. The *Connections to other DCIs in this grade level* contains the names of topics in other science disciplines that have corresponding disciplinary core ideas at the same grade level. The *Articulation of Disciplinary Core Ideas (DCIs) across grade levels* contains the names of other science topics that either provide a foundation for student understanding of the core ideas in this standard (usually standards at prior grade levels) or build on the foundation provided by the core ideas in this standard (usually standards at subsequent grade levels). The *Connections to the Common Core State Standards* contains the coding and names of CCSS in Mathematics and in English Language Arts & Literacy that align to the performance expectations.

Ted Willard (twillard@nsta.org) *is a program director at NSTA.*

Inside the NGSS Box

What is Assessed

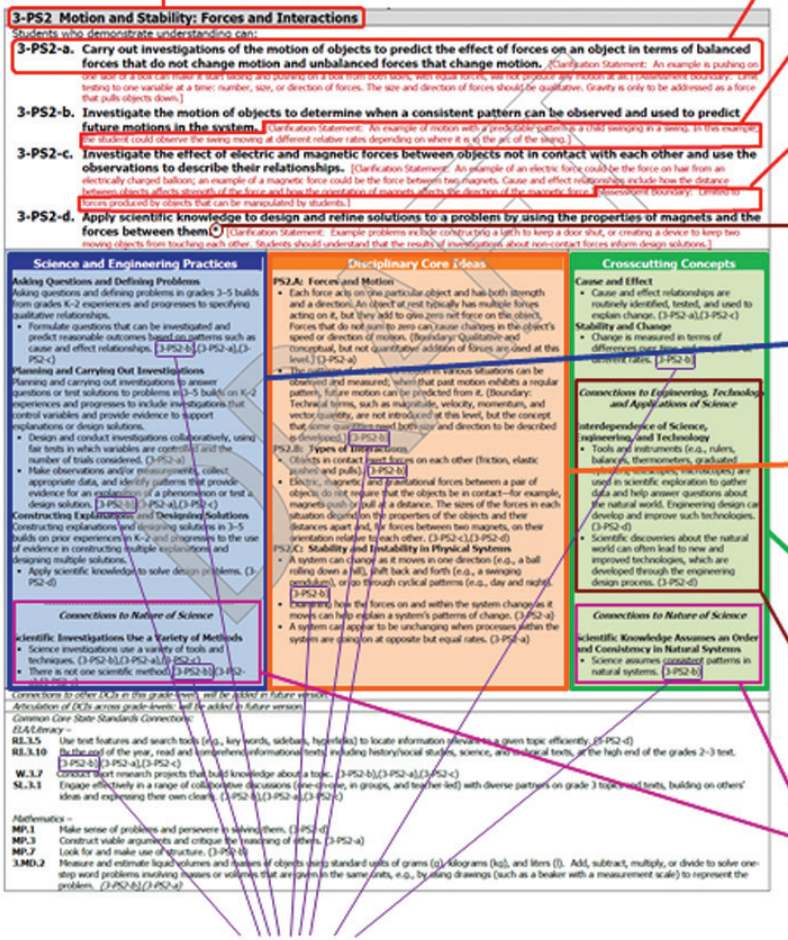
A collection of several performance expectations describing what students should be able to do to master this standard.

Foundation Box

The practices, core disciplinary ideas, and crosscutting concepts from *A Framework for K–12 Science Education* that were used to form the performance expectations.

Connection Box

Other standards in the *Next Generation Science Standards* or in the *Common Core State Standards* that are related to this standard.



Title and Code

The titles of standard pages are not necessarily unique and may be reused at several different grade levels. The code, however, is a unique identifier for each set based on the grade level, content area, and topic it addresses.

Performance Expectations

A statement that combines practices, core ideas, and crosscutting concepts together to describe how students can show what they have learned.

Clarification Statement

A statement that supplies examples or additional clarification to the performance expectation.

Assessment Boundary

A statement that provides guidance about the scope of the performance expectation at a particular grade level.

Engineering Connection (*)

An asterisk indicates an engineering connection in the practice, core idea, or crosscutting concept that supports the performance expectation.

Scientific and Engineering Practices

Activities that scientists and engineers engage in to either understand the world or solve a problem.

Disciplinary Core Ideas

Concepts in science and engineering that have broad importance within and across disciplines as well as relevance to people's lives.

Crosscutting Concepts

Ideas, such as *Patterns* and *Cause and Effect*, which are not specific to any one discipline but cut across them all.

Connections to Engineering, Technology, and Applications of Science

These connections are drawn from the disciplinary core ideas for engineering, technology, and applications of science in the *Framework*.

Connections to Nature of Science

Connections are listed in either the practices or the crosscutting connections section of the foundation box.

Codes for Performance Expectations

Codes designate the relevant performance expectation for an item in the foundation box and connection box. In the connections to common core, italics indicate a potential connection rather than a required prerequisite connection.

Based on the January 2013 Draft of NGSS