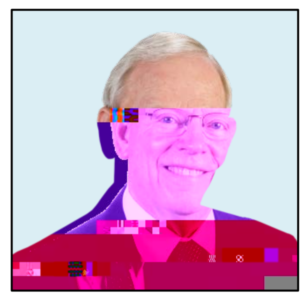
NGSS
Next Generation Science Standards



taught as separate entities, these dimensions are intertwined in a manner reflecting how scientists and engineers work in the real world. Arguably, the most significant innovation in NGSS is the inclusion of student performance expectations to demonstrate understanding of these “practices,” “core ideas,” and “crosscutting concepts.” Thus, performance expectations are used to inform instruction as well as assessment. Most importantly, this integrated design is intended to inform the way units of instruction are organized, and the manner in which they are taught.

The architectural structure for each standard visually supports the intended integration of performance expectations, scientific and engineering practices, disciplinary core ideas, and crosscutting concepts. This unique organization provides an invaluable template for constructing coherent developmental sequences of lessons—an instructional materials developer’s dream.

5-ESS1 Earth’s Place in the Universe

Students who demonstrate understanding can:

5-ESS1-1. **Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from the Earth.** [Assessment Boundary: Assessment is limited to relative distances, not sizes, of stars. Assessment does not include other factors that affect apparent brightness (such as stellar masses, age, stage).]

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Engaging in Argument from Evidence Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s). • Support an argument with evidence, data, or a model.	**ESS1.A: The Universe and its Stars** • The sun is a star that appears larger and brighter than other stars because it is closer. Stars range greatly in their distance from Earth.	**Scale, Proportion, and Quantity** • Natural objects exist from the very small to the immensely large.

Scientific and Engineering Practices

Scientists and engineers utilize a combination of knowledge and skills, referred to as practices in the NGSS, as they investigate and develop scientific explanations or design models and systems. These practices include: asking scientific questions, defining problems, developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematical and computational thinking, constructing explanations from evidence, engaging in argument from evidence, and obtaining, evaluating, and communicating information.

do not prescribe specific teaching methods. They do, however, provide a framework to inform science education in matters of teaching, learning, and assessment.

- Actively modeling and reflecting on the integration of practices and content must become a priority for professional development workshops. In these workshops teachers should be engaged in sequences of science lessons and assessments, developed from specific NGSS performance expectations, where they have opportunities to learn in roles both as students and as teachers.
- Science content courses for prospective elementary and middle school teachers should actively engage students in the integration of practices and content. NGSS scientific and engineering practices, core ideas, and crosscutting concepts, informed by expected student performances, should form the curriculum framework for science courses for pre-service teachers.
- While the NGSS do not suggest specific teaching methods and strategies, they do have implications for pedagogy. The emphasis on coherent progressions of learning outcomes, intertwining practices and content, requires flexible integrated classroom instruction. Teachers should be able to employ a variety of instructional methods promoting learning through inquiry. Instructional models, including the widely accepted 5E learning cycle model, allow for flexibility, coherence, and effective use of classroom time.
- The development of curriculum materials, consistent with the goals and intent of the NGSS is imperative. The national impact of the NGSS will become significantly diluted and ineffective unless teachers have ready access to NGSS based curriculum materials. "Curriculum materials will be the missing link if they are not developed and implemented. The absence of a curriculum based on the new standards will be a major failure in this era of standards-based reform and assessment-dominated results." (Bybee, 2013, p. 7)
- Those involved in modifying existing instructional materials or developing new materials must focus on coherent sequences of integrated learning experiences to help students demonstrate the full range of performance expectations for a single grade level standard.
- Adoption commitments from a large cross section of the states are critical if we are to witness significant improvement in the quality of science curriculum and instruction nationally.

Is the science education community up to the challenge? Only time will tell.

References:

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