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Your Guide to Understanding NGSS and Evaluating Solutions

There's a lot of noise and confusion about what constitutes a true NGSS program. This guide will simplify your evaluation process by helping you:

- understand what features and qualities are required for a program to meet the NGSS criteria
- identify those programs that are merely repurposing existing materials with NGSS labels

NEXT GENERATION SCIENCE STANDARDS

HMH SCIENCE DIMENSIONS™

What Is NGSS?

The *Framework for K–12 Science Education* and the Next Generation Science Standards (NGSS)* intend to **transform** the way science is taught. Historically, science has been taught as a series of facts about the natural world, delivered by the teacher and memorized by students, with labs to confirm those facts. The NGSS vision puts the control of learning in the hands of students. They learn science by doing what scientists do—by investigating problems and phenomena, gathering data, and analyzing that data. In addition, NGSS promotes the engineering design process to the same level as science instruction.

The NGSS suggest that science programs:

- **Clearly integrate Three-Dimensional Learning** (DCIs, CCCs, and SEPs)† throughout the lesson's activities
- Open lessons with a **phenomenon** to explain or a **problem** to solve
- Link the **NGSS Performance Expectations** and the **Three Dimensions of Science Learning** across multiple lessons
- Include a **variety of methods** to gather data, including hands-on, simulations, animations, data tables, online research, and media
- Integrate a learning model, like **Claims-Evidence-Reasoning**, to promote student-centered work
- Include strong connections to Common Core **ELA** and **Math** to strengthen science literacy

† Disciplinary Core Ideas, Crosscutting Concepts, Science and Engineering Practices

Additional tips on evaluating programs as effective NGSS solutions::

- NGSS requires much more than just "inquiry††" and "hands-on" learning. As such, a kit-based program isn't automatically a good NGSS solution.
- Related PEs should be bundled together, and it may take several lessons for students to master them.
- Add-on "STEM activities" may not be suitable for NGSS unless properly structured to involve the Science and Engineering Practices.
- A true NGSS curriculum properly prepares students for assessments based on the **NGSS Performance Expectations**.

††Achieve, the framer of NGSS, has actually gone out of its way to avoid using the term inquiry because NGSS requires so much more.

In addition, Achieve.org's **EQuIP/PEEC rubrics** (nextgenscience.org/districts) can also help you assess the strengths and weaknesses of programs claiming to be NGSS-aligned.

These suggestions are derived from resources found at www.nextgenscience.org.

Does Your Science Program Truly Integrate All Three Dimensions of Learning (DCIs, CCCs, and SEPs)?

Nearly all science instructional materials address the Disciplinary Core Ideas (DCIs). Some predominantly kit-based programs emphasize a few of the Science and Engineering Practices (SEPs), such as SEP 3, "Planning and carrying out investigations." *But many programs don't thoroughly integrate ALL the other Science and Engineering Practices (SEPs 1–8) or the Crosscutting Concepts (CCCs).* They lack the variety of learning methods required to be thoroughly three dimensional.

HMH Science Dimensions™ is the *only* program built from the ground up to fully integrate the Three Dimensions of Learning. Here's an example of how this new program addresses the SEPs that are often left out of common kit-based curricula.

***HMH Science Dimensions* Lessons**	**Science & Engineering Practices**
Each lesson begins with a **phenomenon** to explain or **problem** to solve as the motivating goal for the lesson.	**SEP 1** Asking questions and defining problems **SEP 2** Developing and using models solutions (for engineering).
Students explore and gather evidence through lessons that include **hands-on, digital** and **print -based** activities.	**SEP 3** Planning and carrying out investigations **SEP 4** Analyzing and interpreting data **SEP 5** Using mathematics and computational thinking
The "Can You Explain It" feature at the end of the lesson, along with Performance Tasks, and "You Solve It" interactive simulations, wrap up the **Claims-Evidence-Reasoning** model.	**SEP 6** Constructing explanations (for science) and designing **SEP 7** Engaging in argument from evidence
Frequent **"Evidence Notebook"** prompts encourage students to document, evaluate and communicate their activity-based evidence.	**SEP 8** Obtaining, evaluating, and communicating information

Instructional Scenarios That Differentiate NGSS-based Learning from Other Approaches†††

With an NGSS* approach:

- Students conduct investigations, solve problems, and engage in discussions with the teacher's guidance, instead of the traditional teacher-driven instructional approach.
- Students discuss open-ended questions that focus on the strength of the evidence used to generate claims; teachers no longer pose questions with only one "right" answer.
- Students read from multiple sources to develop their own conclusions rather than reading only the textbook to answer questions at the end of the chapter.
- Students conduct investigations with a range of possible outcomes that collectively lead to a deep understanding of core scientific ideas, rather than participating in "cookbook"-style labs in which every student is expected to achieve the exact same results and data.
- Students write journals, reports, posters, and media presentations that explain and argue, instead of focusing on a set of worksheets with lower-level recall-type questions.

††† Adapted from National Research Council. (2015). *Guide to Implementing the Next Generation Science Standards* (pp. 8-9). Washington, DC: National Academies Press. http://www.nap.edu/catalog/18802/guide-to-implementing-the-next-generation-science-standards

Learning from the Past

Unlike the changes brought by the Common Core ELA and Math Standards, the Next Generation Science Standards require a completely new pedagogical approach to teaching. As NGSS was completed in 2013, any program with a copyright of 2013 or earlier (or updates to a pre-2013 curriculum) cannot be considered NGSS-designed.

Recognizing the need to build an all-new approach to accommodate NGSS, HMH has invested the time and resources to create a complete K–12 program that is designed to meet the letter and spirit of the new standards.

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