The release of the Next Generation Science Standards (NGSS) has states examining them carefully to determine whether they provide the best foundation for their state's grades K-12 science education program. This Policy Update is the third in NASBE's series of briefs intended to inform policy decisions around the NGSS and their use. It looks at several implementation issues, in particular how the NGSS might affect graduation requirements, professional development needs, certification and preservice development, and science assessment.

Along with the earlier Policy Updates that discussed how different the NGSS are from previous standards and the necessity for new curriculum materials, these briefs highlight the need for states to carefully plan ahead for the use of the NGSS in schools—and to understand that the implementation process may take time. Being deliberate and thoughtful about the ways the NGSS will affect science education may be the best approach after their adoption.

Issues to Consider

Graduation requirements. Depending on a state's current college- and career-readiness expectations, NGSS may require a big change in graduation requirements. The suggested models for students in high school include at least three years of science to meet the NGSS. Many states already have a three-year course requirement in science, so the NGSS would not mean a change. For those states without a three-year requirement, a re-examination of why their lower requirement is necessary. The course topics will also have to be examined to figure out where students will receive engineering and Earth and space sciences content in the NGSS, as many states do not require these topics under their current graduation requirements. Additionally, CTE and GED programs will need to be examined to consider their alignment with NGSS expectations.

Professional development. Meeting the professional learning needs of teachers and administrators will be critical for states to realize the full vision of the NGSS for their students. The comparison chart on page 2 illustrates the broad similarities and differences in how the National Science Education Standards and the NGSS present science—and hence, the changes that will be required for science educators teaching under the NGSS.

Educators will find many differences, including: the NGSS has fewer topics, but they are covered in more detail; the NGSS are more about doing science in the scientific and engineering enterprise and how these are integrated into the content (previously, “scientific inquiry” was the part of the standards about doing science and it was separate from the content); the NGSS's disciplinary core ideas have broad importance across multiple science or engineering disciplines and/or are key organizing concepts that are teachable and learnable over multiple grades at increasing levels of depth and sophistication. It will be important for teachers to understand the coherence and how ideas build over time in the NGSS, as well as that students should be active learners doing science.

These changes will impact the systems that support educators of science. There are two resources available to assist in identifying the professional development aspects of the NGSS. The first is a resource developed for the NGSS called the Next Generation Science Standards Adoption and Implementation Workbook. Second, the 1996 National Science Education Standards (NSES) has several sections that explain how to improve the system at the state, district, and school levels. NSES can still be used, although they are somewhat dated, to understand changes in teaching, assessment, professional development, program and system levels.

Preservice teacher training programs and licensure and certification requirements will need to be reviewed. Changes will be most acute for teaching at the secondary level, but the NGSS is a change for all teachers of science.

Licensure requirements will need to be robust enough for elementary teachers to succeed with the NGSS. The NGSS incorporates a more complex idea of science and how it utilizes language skills in the teaching of science. For the secondary level, where preservice classes are commonly focused on specific sciences such as biology or physics, the classes will have to be reviewed to see how they align with the NGSS core ideas and performance expectations. The NGSS are written in four disciplinary content areas: physical science, life science, Earth and space science and engineering, technology and application of science in
addition includes the practices and cross-cutting concepts. These four areas do not exactly match the traditional secondary class topics. For example, a physics teacher will have to think about how the NGSS combine physics and engineering. But what this will mean for certification (e.g., how will engineering be included in the certification process or in teacher preparation programs) is unknown.

**Science assessments.** Tests designed to measure student achievement under the NGSS are not yet available. The National Research Council is working on a report describing the types of assessments that would be effective for measuring success with the NGSS that will be released in the near future. There are some large-scale assessments currently being used that incorporate a similar vision for science education as the NGSS, including NAEP and PISA, as well as some of the College Board’s AP exams, especially in biology and in some of the chemistry and physics exams. These are not a proxies for NGSS assessments, but they are indicative of a shift occurring in expectations for students. Also, a few states are working on formative assessments that will have a decidedly classroom-level look, so they may not be suitable for measuring the effectiveness of a state’s science program.

State boards will need to become good consumers of the range of possible types of assessments, what they can measure, and which are best used for policy decisions.

**Resources**


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