Next Generation Science Standards and Building Capacity for State Science Education

Background

The *Next Generation Science Standards* (NGSS) are being developed based on a vision for science education established by *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas,* published by the National Research Council in 2012. Publication of the *Framework* was the first of a two-step process to produce a set of *Next Generation Science Standards* for voluntary adoption by the states. The NGSS are being developed by a team of writers including researchers, education policy specialists, scientists, and classroom teachers with feedback provided by diverse review teams from 26 lead states and other critical stakeholders, coordinated by Achieve. The second public draft of the NGSS was available for review in January 2013 and the final standards are expected in 2013. These standards describe student performances at the intersection of the three dimensions of science described in the *Framework,* and are designed to provide assessable performance expectations for all students. Understanding the *Framework* and NGSS is essential to implement meaningful changes in science teaching and learning. The potential for the *Framework's* vision to be fully realized hinges largely on the quality of the NGSS and practitioners' understanding of the intersection of the three dimensions of science described in the *Framework*. The *Framework's* vision takes into account two major goals for K–12 science education: (1) educating all students in science and engineering and (2) providing the foundational knowledge for those who will become the scientists, engineers, technologists, and technicians of the future. The *Framework* principally concerns itself with the first task: what all students should know in preparation for their individual lives and for their roles as citizens in this technology-rich and scientifically complex world (NRC, 2012).

Reducing the ideas down to a few core ideas that have utility across all of science helps teachers improve instruction. When students develop a deeper understanding of a few core ideas, they are able to make sense of novel phenomena. Focusing on core ideas requires eliminating ideas that are not central to the development of science understanding. Core ideas should be both foundational in terms of connections to many related scientific concepts and have the potential for sustained exploration at increasingly sophisticated levels across grades. Students are able to make sense of scientific phenomena when they are able to develop causal relationships, supported by evidence, of observed phenomena in defined systems. The crosscutting concepts organize a set of familiar touchstones for students to use in their sense making and evidence gathering. Students utilize these crosscutting concepts in the process of gathering and using evidence for the science and engineering practices. The practices engage students in gathering and using information from investigations and other sources, developing and using models, constructing explanations, and communicating arguments that support these explanations (NRC, 2007).

Possible Implications

Kansas is one of 26 lead states that have been actively involved with the development of the NGSS and one of 45 states involved with the Building Capacity for State Science Education project of the Council of State Science Supervisors. Now that these standards are nearly complete, it is time to think deliberately about implications for adoption and implementation—

ways to leverage partnerships to increase capacity for science education not only within, but also between, states. Instruction that focuses student learning on the three dimensions may be accomplished in a number of ways, but what should be clear is that separating the doing of science from the knowing of science, as many current state standards imply, is not consistent with the *Framework*'s vision.

Furthermore, classroom instruction focused on state standards that distills out practices from content are also swirled with assessments and an accountability model that puts the focus on a single summative event as the only important measure of student learning. Successful implementation of the NGSS not only requires coherence of all the components of the education system (P-20) working in logical ways to support the renewed vision, but also requires active collaboration with informal science educators, business and industry, and local communities.

For More Information

- The *Framework* is available to download at http://www.nap.edu/catalog.php?record_id=13165
- Information about the NGSS is available at http://www.nextgenscience.org/
- Taking Science to School is available at http://www.nap.edu/catalog.php?record_id=11625