

Superintendent Rick Schmitt's Monthly Update

October 2015

Superintendent Schmitt regularly updates the greater San Dieguito Union High School District community through our local media with a monthly update. Topics may include academics, facilities, budget, enrollment, safety, and other specific and special interest topics. Today's update focuses on Next Generation Science Standards and the implications for teaching and learning in science classrooms across our district.

What are the Next Generation Science Standards (NGSS)?

Adopted by California in 2013, The Next Generation Science Standards (NGSS) describe the key scientific ideas and practices that all students should learn by the time they graduate from high school, and emphasize the importance of having a deep understanding of science concepts and engaging in scientific thinking and practices. At their heart, the NGSS advocate that all students should learn science by doing science. In contrast to former California Science Content Standards, the NGSS outline an "All Standards, All Students" approach in which all students in grades K-12 will learn about engineering, life, physical, and earth-space science.

Developed by educators, scientists, and leaders in science and science education from around the country, the NGSS focus on the big ideas in science and emphasize the common practices that scientists use every day, such as planning investigations, developing models, and designing solutions. The intent is to help all students develop a scientific way of thinking that will prepare them to be informed citizens and ready for college and careers. They encourage students to learn the processes of science in a deep, meaningful way through first-hand, authentic investigations, instead of rote memorization of facts for a test.

Why New Science Standards?

The *NGSS Executive Summary* states, "Never before has our world been so complex and science knowledge so critical to making sense of it all. When comprehending current events, choosing and using technology, or making informed decisions about one's healthcare, science understanding is key. Science is also at the heart of the United States' ability to continue to innovate, lead, and create the jobs of the future. All students—whether they become technicians in a hospital, workers in a high tech manufacturing facility, or Ph.D. researchers—must have a solid K–12 science education. Through a collaborative, state-led process, new K–12 science standards have been developed that are rich in content and practice and arranged in a coherent manner across disciplines and grades to provide all students an internationally benchmarked science education." NGSS replaces the previous California Content Standard for Science which were developed over 20 years ago and which emphasized memorization of content rather investigation, scientific thinking, application, and problem solving.

How Were the NGSS Developed?

The NGSS are based on the National Research Council's (NRC) *A Framework for K-12 Science Education*. This framework is grounded in the most current research on science and science education and identified the science all K–12 students should know. The NRC authoring committee was composed of practicing scientists, including two Nobel laureates, cognitive scientists, science education researchers, and science education standards and policy experts. In addition, the NRC used four design teams (engineering, life, physical, and earth-space science) to develop the Framework for their respective disciplinary areas. The final draft was released in July of 2011. Since that time, education teams from 26 states (including California) led the development of the NGSS using this framework, with a 41-member writing team (many of them classroom teachers) and in collaboration with many stakeholders, experts, and partners.

What are the Key Changes in NGSS?

Like learning to ride a bike or play music, the experience of doing science is far more important than just reading about it in a book. The NGSS promote a way of teaching and learning that allows students to actively do and experience science in a deep, meaningful way, not just learn about it from a textbook or a lecture. The standards accomplish this by integrating three dimensions of learning: (1) science core ideas (the content, for example, biology), (2) practices (how science is conducted in the real world, such as carrying out investigations), and (3) crosscutting concepts (science ideas, like cause and effect, that permeate all sciences). The new standards also incorporate engineering principles, starting in elementary school. Most importantly, the NGSS set high expectations for all students, not just those planning to pursue STEM (science, technology, engineering & mathematics) careers.

Many of our San Dieguito Union High School District (SDUHSD) science teachers already incorporate components of NGSS in their classrooms. Last year, science teachers in our district focused on the implementation of two NGSS practices closely aligned with Common Core State Standards in their lessons: (1) arguing from evidence and (2) obtaining, evaluating, and communicating information. As we continue our transition to NGSS, science teachers will emphasize scientific exploration and experimentation, instead of delivering lengthy lectures and expecting students to memorize lists of facts. Engaging classroom experiences will feature students asking more questions, exploring and discussing possible solutions, investigating scientific phenomena, using argumentation, and being fully active in the learning process. This approach mirrors real-world science practices and engages students deeply in the three-dimensional learning process. The NGSS also emphasize the incorporation of engineering in all science courses, and thus problem-solving, design, and redesign will be key features of an NGSS classroom.

How Do NGSS Relate to New English and Math Standards?

The NGSS were developed independently and are not part of the Common Core State Standards (CCSS) initiative. The CCSS initiative (released in 2010) established goals for what students should know and be able to do in mathematics and in English language arts (ELA) at the end of each grade and are now the California standards for those subject areas. While the ELA standards do include goals for reading and writing within content areas, such as science, they do not replace the NGSS, and instead work with NGSS to promote scientific literacy. The NGSS articulate the science content, practices, and concepts students should know at different grade levels and build coherently as they progress from kindergarten to 12th grade. The NGSS development team worked closely with the CCSS writers to ensure the science standards align to the mathematics content and make important literacy connections.

How is SDUHSD Approaching the Transition to NGSS?

Since the adoption of the NGSS by California in 2013, SDUHSD has taken proactive steps to support awareness of and transition to the new science standards. As with any curricular transition, we approach the transition to NGSS as a gradual, multi-year process involving educating our faculty and our community, providing extensive professional development, and ensuring that our instructional materials support student learning. In the Fall 2014, a science leadership team consisting of science teachers, principals, assistant principals, and district administrators attended county and state NGSS symposiums and developed a multi-year transition plan. In the 2015-16 school year, all science teachers will deepen their understanding of our new science standards and will practice planning instruction and assessment that successfully integrate the three dimensions of content, practices, and crosscutting concepts. We will also engage in discussions about potential changes to course content and sequence in the SDUHSD science curriculum to ensure that our course content best meets the needs of our students and our community. To provide families with more opportunity to learn about NGSS, we will host workshops at our schools - dates and times for these opportunities will be announced in the spring. As with recent transitions to new standards for English and Mathematics, we are committed to a gradual and multi-year transition during which we communicate clearly and consistently with our community and provide our students and teachers with the support needed to ensure success.

Additional Information about NGSS

Additional information about the NGSS can be found at <http://www.nextgenscience.org/>.

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