

## Next Generation Science Standards Fact Sheet for Teachers

The need for high-quality science education—beginning at the earliest grades—is more essential now than ever before. Students need the kind of preparation that not only supports their learning now, but also gives them the tools and skills necessary to succeed in a rapidly and continuously changing world. The Next Generation Science Standards (NGSS) are a key component toward advancing high-quality teaching and learning in science.

### Overview

- It has been more than 17 years since the National Research Council and the American Association for the Advancement of Science produced their reports from which most state science standards are based. Since then, there have been major advances in science and our understanding of how students learn science. Our students deserve to learn the most current science available taught using the most effective methods.
- The NGSS are a new set of K–12 science standards that were developed by states, for states. The NGSS identify science and engineering practices, crosscutting concepts, and content that all K–12 students should master in order to prepare for success in college and 21<sup>st</sup>-century careers. Districts, schools, and classroom teachers will determine their own curriculum, including what is taught throughout the year and how it is taught.
- The NGSS were built upon a vision for quality science education for ALL students—not just a select few.
- The NGSS were benchmarked against countries whose students perform well in science and engineering fields, including Finland, South Korea, China, Canada, England, Hungary, Ireland, Japan, and Singapore.

### Why is improving science education important?

- High-quality STEM (science, technology, engineering and math) standards allow educators to teach effectively, moving their practice toward how students learn best—in a hands-on, collaborative, and integrated environment rooted in inquiry and discovery. The NGSS require thinking and reasoning rather than rote memorization.
- The definition of what it means to be “literate” in science continues to grow and now includes the use of technology, critical thinking, and analytical skills. As citizens, we are increasingly asked to make informed decisions on issues ranging from healthcare to energy policy that affect ourselves, our families, and our communities. Having a deep understanding of scientific concepts and processes and the ability to understand and apply this knowledge is essential.
- Our nation’s science teachers are finding that when educators raise expectations and give students the right tools and learning environment, students are capable of remarkable science literacy and achievement.
- A strong science education equips students with skills that are necessary for all careers—within and beyond STEM fields. Students need the right foundation to tackle long-term and difficult issues that face our generation and future generations.

### How will the NGSS and improved science education support college and career readiness for all students?

- According to a 2011 ACT report, only 30% of U.S. high school graduates in 2011 were ready for college coursework in science.<sup>1</sup> The NGSS demand the kind of teaching and learning that will support college and career readiness.

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<sup>1</sup> “The Condition of College & Career Readiness,” ACT, Inc. (2011).

<http://www.act.org/research/policymakers/cccr11/readess1.html>

- According to a study of high school transcripts (reviewing data from 1990, 2000 and 2009), there is still work to be done to ensure students are well prepared for STEM majors and to ensure that minority, low income and female students enter and remain in the STEM pipeline.<sup>2</sup>
- A high-quality, robust science education means students will develop an in-depth understanding of content and will gain knowledge and develop skills—communication, collaboration, inquiry, problem solving, flexibility—that will serve them throughout their educational and professional lives.
- A rigorous science curriculum based on the NGSS can provide all students with the kind of foundational knowledge and skills they need to pursue high-growth potential careers in both STEM and non-STEM fields. Students will face unprecedented competition in the workforce not only within their home states, but also globally.
  - By 2015, 60% of the new jobs being created will require skills currently being mastered by only 20% of the population, according to a recent report from the American Society for Training and Development.<sup>3</sup>
  - According to the same report, job skills in STEM are among the skills experiencing the greatest increase in demand. In 1991, fewer than 50% of U.S. jobs required skilled workers. But by 2015, 76% of all newly created U.S. jobs will require highly-skilled workers with some proficiency in STEM.

### **What will the NGSS look like in the classroom?**

- Classroom instruction based on the NGSS demands that students engage in science learning not as memorization of loosely connected facts, but as a holistic understanding of integrated and interrelated concepts. This is one of the biggest shifts in the NGSS compared to previous sets of science standards.
- The NGSS connect scientific principles to real-world situations, allowing for more engaging and relevant instruction that clearly teaches complicated topics.
- The NGSS better support educators to make science accessible and interesting to ALL students by connecting learning over multiple years and across disciplines and grades; by actively engaging students; and by applying crosscutting concepts to deepen students' understanding of core ideas.
- Teaching based on the NGSS calls for more student-centered learning that enables them to think on their own, problem solve, communicate, and collaborate.
- The NGSS have the potential to revolutionize science education. Not only do they incorporate the most current research and findings of science, they also include the most up-to-date research on how students learn.
- The NGSS introduce science at an earlier age when children are asking lots of questions about the world and how it works. Most kids love science because they are inherently curious and it is an opportunity to have fun and learn at the same time.

### **What is the connection between the NGSS and curriculum?**

- Like all standards, the NGSS are not curriculum. The NGSS articulate what students need to know and be able to do by the end of each grade level; states, districts, and classroom teachers will determine their own curriculum.
- The National Science Teachers' Association (NSTA) and other professional groups are engaging and supporting science teachers to develop curricula and assessment tools aligned with the NGSS.

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<sup>2</sup> U.S. Department of Education (2009). NAEP Data Explorer, <http://nces.ed.gov/nationsreportcard/naepdata/>

<sup>3</sup> "Bridging the Skills Gap," American Society for Training and Development (2010).

<http://www.astd.org/%20About/~media/Files/About%20ASTD/Public%20Policy/%20BridgingtheSkillsGap2010.pdf>

- NSTA is developing a portal for teachers to curate and share resources for use in the classroom.
- Local NSTA chapters are hosting training sessions on the NGSS for teachers and administrators.
- There is a free NGSS app that offers multiple ways to view the standards, as well as a convenient search function.
- The National Academies Press has also released an easy-to-use print, spiral-bound version of the NGSS to complement the website.

### **How are the NGSS different from current state science standards?**

- Every NGSS performance expectation has three dimensions: disciplinary core ideas (content), scientific and engineering practices, and crosscutting concepts. Currently, most state and district standards express these dimensions as separate entities, leading to their separation in both instruction and assessment. The integration of rigorous content and application reflects how science and engineering are practiced in the real world.
- Scientific and engineering practices and crosscutting concepts are designed to be taught in context, not in a vacuum. In the NGSS these are integrated with content throughout each year.
- The science education demanded by the NGSS will provide students with a strong foundation that will better prepare them for rigorous and advanced courses like chemistry and physics.

### **Background**

*The Next Generation Science Standards (NGSS) were developed through a collaborative state-led process. Twenty six states volunteered to work with the 41 members of the writing team to lead the development of the standards. The science supervisors from these state education agencies worked with the writers to provide feedback from their state broad-based committees. These state committees consisted of representatives from the K-12 education, education policy, scientific, post-secondary education, and informal science communities. In addition, a critical stakeholder team comprised of hundreds of members representing K-12 educators, administrators, higher education faculty, scientists, engineers, business leaders, policymakers, and key organizations provided confidential feedback at critical points in the development process. The draft standards also received comments from more than 10,000 individuals during two public review periods. These comments came from teachers, school and school district discussion groups, scientific societies, parents, and students. The writers used this feedback to make substantial revisions to each draft. The final standards were released in April 2013. As of December 2014, 13 states and the District of Columbia have adopted the NGSS as their state science education standards: California, Delaware, Illinois, Kansas, Kentucky, Maryland, Nevada, New Jersey, Oregon, Rhode Island, Vermont, Washington and West Virginia.*