Iowa Science Standards

Fact Sheet for Teachers

The need for high-quality science education — beginning at the very 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. Iowa's new science standards are a key part of advancing high-quality teaching and learning in science.

Overview

- Iowa recently adopted new science standards that set expectations for what all students in kindergarten through 12th grade should know and be able to do. The new standards will be phased in beginning with the 2016-17 school year.
- The new science standards, which are based on the Next Generation Science Standards, identify science and engineering practices and content that all K-12 students should master in order to prepare for success in college and 21st century careers. The standards are organized by grade level for grades K-8 and by grade span for grades 9-12.
- The standards are not a curriculum. Standards articulate what students need to know and be able to do. Districts, schools, and teachers will determine their own curriculum, including what is taught throughout the year, and how it is taught.

Why is improving science education important?

- High-quality STEM (science, technology, engineering, and mathematics) 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. Iowa's science standards 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 health care 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 science standards 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.[1] Iowa's science standards demand the kind of teaching and learning that will support college and career readiness.

[1] "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.[2]
- 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 Iowa science standards 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.[3]
    - 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 Iowa science standards look like in the classroom?

- Classroom instruction 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 Iowa science standards.
- The Iowa science standards connect scientific principles to real-world situations, allowing for more engaging and relevant instruction that clearly teaches complicated topics.
- The standards 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 Iowa's science standards calls for more student-centered learning that enables them to think on their own, problem solve, communicate, and collaborate.
- The science standards 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 science standards introduce science at an earlier age when children are asking a lot 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 science standards and curriculum?

- Like all standards, Iowa's science standards are not curriculum. The standards articulate what students need to know and be able to do; states, districts, and classroom teachers will determine their own curriculum.

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

[3] "Bridging the Skills Gap," American Society for Training and Development (2010). http://www.astd.org/%20About/~/media/Files/About%20ASTD/Public%20Policy/%20BridgingtheSkillsGap2010.pdf

- One benefit of adopting standards based on the Next Generation Science Standards is that we can share ideas and resources with other states and organizations. For example, the Next Generation Science Standards' website, www.nextgenscience.org, includes a resources section. Also, 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 Next Generation Science Standards.
    - NSTA is developing a portal for teachers to curate and share resources for use in the classroom.
    - Local NSTA chapters are hosting training sessions for teachers and administrators.
    - There is a free app that offers multiple ways to view the standards, as well as a convenient search function.
    - The National Academies Press has released an easy-to-use print, spiral-bound version of the Next Generation Science Standards to complement the website.

How are Iowa's new science standards different?

- Every 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 Iowa's science standards, these are integrated with content throughout each year.
- The science education demanded by Iowa's science standards will provide students with a strong foundation that will better prepare them for rigorous and advanced courses, such as chemistry.

Background

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, including Iowa's, 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.

Iowa's new science standards were adopted by the State Board of Education in August 2015 based on a recommendation from an Iowa review team that incorporated scientific expertise and broad public input into a transparent process.

The Iowa review team recommended using the Next Generation Science Standards as the basis for Iowa's science standards. Twenty-six states, including Iowa, led the development of the Next Generation Science Standards, which all states can consider adopting and adapting to meet their needs. The standards were built upon a vision for quality science education for all students, not just a select few. They 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.

In Iowa, the Next Generation Science Standards are known as Iowa's science standards because they have been reviewed, vetted, and modified by Iowans. The review of science standards was prompted by Governor Branstad's Executive Order 83, which called for an ongoing review of the state's academic standards. The goal of the review is to continually improve Iowa's standards and to ensure they are the right fit for the state.