

PROPOSED K-12 SCIENCE STANDARDS: Preparing South Dakota students for success in science

How do children best learn science?

In recent years, researchers have made great strides in understanding how children learn science. This research was compiled in the National Research Council's *Framework for K-12 Science Education* and indicates that even before they attend school, children have developed surprisingly sophisticated ideas about how things work, simply through their interactions with and observations of the world around them. Children are born investigators, asking questions almost from the moment they can talk. A high quality science education fosters this innate curiosity and these early ideas by beginning in kindergarten and building from there.

What is the vision for K-12 science standards?

The proposed South Dakota science standards provide a framework for students to attain knowledge of scientific concepts and engage in the practices of science and engineering. Throughout K-12, students will seek understanding of the world around them and actively solve problems by continuously applying scientific concepts and using science practices. The proposed standards are aligned with postsecondary and workforce expectations and will provide a solid foundation of knowledge and skills for students transitioning to STEM (Science, Technology, Engineering, and Math) related careers.

How were the proposed standards developed?

A work group of South Dakota science educators, higher education representatives and members of the business community drafted the proposed science standards, incorporating the latest research on student learning.

All content standards in South Dakota are reviewed and revised on a regular basis. The science standards work group started by reviewing our state's current science standards. The group then studied the strengths and weaknesses of a variety of standards, including science standards in Massachusetts and South Carolina and the *Next Generation Science Standards*, which are all based on the *Framework for K-12 Science Education*.

After drafting the proposed standards, the work group also reviewed them to ensure:

- 1) Expectations are grade-level appropriate
- 2) All standards build upon previous learning and set the stage for future learning

The draft standards were posted on the Department of Education's website and emailed to science teachers across the state. Four public hearings are being held by the South Dakota Board of Education at locations across the state. Comments will be reviewed to determine if changes are necessary.

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How are the proposed standards the same as the current science standards?

The three strands of science: physical science, life science, and earth and space science are the same, as well as the major concepts within these strands.

How are the proposed standards different?

The proposed standards are three-dimensional, emphasizing equally:

- 1) Core ideas in the physical sciences, life sciences, and earth and space sciences
- 2) Science and engineering practices
- 3) Crosscutting concepts common to science and engineering

The standards balance knowledge and practices, meaning that students at all grade levels will both learn core ideas and engage in inquiry and reason in a scientific context. Also, by focusing on a smaller number of core ideas, the standards will allow students to develop deeper understanding. The standards progress seamlessly so that no concepts are limited to one grade level. Students will continually build upon their knowledge and abilities, refining and advancing their understanding of science.

Crosscutting concepts tie everything together so students comprehend the interconnections among content, practices, science and engineering. The crosscutting concepts and science and engineering practices exist within all three strands: physical science, life science, and earth and space science.

What are science and engineering practices?

In the context of the proposed standards, science is defined broadly as the asking of questions, while engineering is the defining of problems. Science and engineering practices include the ability to:

- Ask questions (science) and define problems (engineering)
- Develop and use models
- Plan and carry out investigations
- Analyze and interpret data
- Use math and computational thinking
- Construct explanations (science) and design solutions (engineering)
- Engage in argument from evidence
- Obtain, evaluate and communicate information

What are crosscutting concepts?

The standards incorporate seven crosscutting concepts, or themes, common to both science and engineering:

- Patterns
- Cause and effect
- Scale, proportion and quantity
- Systems and system models
- Energy and matter
- Structure and function
- Stability and change

For additional information about the South Dakota science standards, contact Sam Shaw, South Dakota Department of Education, at (605) 773-5229 or sam.shaw@state.sd.us