

Iowa Science Standards

An Overview for Principals

Instructional leaders play a critical role in the Iowa Science Standards implementation process. The purpose of this document is to introduce principals to the Iowa Science Standards and to provide a general overview of the key instructional and conceptual shifts required by the Iowa Science Standards.

What are the Iowa Science Standards?

The Iowa Science Standards are standards with a purpose. These K-12 standards set expectations for what students should know and be able to do in every grade and across every scientific discipline, including engineering and the technological applications of science.

A major difference between the Iowa Science Standards and previous science standards is “three-dimensional” (3D) learning.

3D learning refers to the thoughtful and deliberate integration of three distinct dimensions: Scientific and Engineering Practices (SEPs), Disciplinary Core Ideas (DCIs), and Crosscutting Concepts (CCCs).

Through 3D learning, the Iowa Science Standards emphasize that science is not just a series of isolated facts. This awareness enables students to view science more as an interrelated world of inquiry and phenomena rather than a static set of science disciplines.

The Iowa Science Standards represent a fundamental shift in science education and require a different approach to teaching science than has been done in the past. Looking ahead, teachers can use a range of strategies to engage students and create opportunities to demonstrate their thinking and learning.

How will science education change with the Iowa Science Standards?

Science education will involve less:

1. Learning of ideas disconnected from questions about phenomena
2. Teachers providing information to the whole class
3. Teachers posing questions with only one right answer
4. Students reading textbooks and answering questions at the end of each chapter
5. Worksheets
6. Oversimplification of activities for students who are perceived to be “less able” to do science and engineering

Science education will involve more:

1. Systems thinking and modeling to explain phenomena and to give a context for the ideas to be learned
2. Students conducting investigations, solving problems, and engaging in discussions with teacher guidance
3. Students discussing open-ended questions that focus on the strength of the evidence used to generate claims
4. Students reading multiple sources and developing summaries of information
5. Students writing journals, reports, posters, and media presentations that offer explanations and arguments
6. Provision of supports so that all students can engage in sophisticated science and engineering practices

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What are key questions that principals should consider during implementation?

- What kind of professional development is available and how do I ensure my teachers and I have access to it? How do I know if it's high quality?
- What Iowa Science Standards-aligned instructional materials do my teachers and students need and how do I make sure they get them? How do I know if the materials are high quality?
- What formative assessments are available to help teachers continually evaluate their students' learning?
- How can we connect the Iowa Science Standards with work we are doing to improve teaching and learning in English language arts and math?

What can principals do to support implementation?

- Focus on what the students are doing first and then think about what the teacher has designed to make that happen.
- Know the standards enough to identify and provide feedback on aspects of the three dimensions during classroom visits.
- Engage teachers on how the three dimensions are incorporated into lessons.

For more information about the Iowa Science Standards

- The official site for the Iowa Science Standards: <https://iowacore.gov/iowa-core/subject/science>
- Iowa Core science resources: <https://iowacore.gov/content/science-resources>
- The official site for the Next Generation Science Standards <http://www.nextgenscience.org>
- National Science Teachers Association: <http://www.nsta.org>
- STEM Teaching Tools: <http://stemteachingtools.org/>
- National Research Council's Guide to Implementing the Iowa Science Standards: <http://www.nap.edu/read/18802/chapter/1>

Additionally, principals can:

- Build a long-term plan that focuses on the building's collective vision for science education (20)
- Elevate teacher leaders and support them as they work to help their colleagues (38-40)
- Find ways to provide high-quality, intensive professional learning to all teachers (41-46)
- Seek out professional learning for yourself (49)
- Connect what is happening with science in your building to other buildings in your district, state, or any Next Generation Science Standards-adopted state (70-73)
- Be critical consumers of any new curricula (56, 57)
- Provide leadership to develop or revise a system of assessment for measuring student learning in science (61-66)

All parenthetical numbers above refer to pages in the National Research Council's Guide to Implementing the Next Generation Science Standards.

What are some common pitfalls that can undermine successful implementation?

- Expecting instruction to change overnight (35)
- Expecting teachers to do it alone (35)
- Asking "Which standard are you teaching today?" (58)
- Failing to communicate with parents and community about what is changing and why you are changing it (84)

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