

## NSTA's Science Program Improvement Review (SPIR)

Teaching science as envisioned by *A Framework for K–12 Science Education: Practices, Crosscutting Concepts, and Core Ideas* (NAS, 2011) requires that teachers have a strong understanding of the scientific ideas and practices they are expected to teach, including specific pedagogical content knowledge, how scientists collaborate, as well as an understanding of the knowledge students bring to school and how they may best develop an understanding of science and engineering practices, crosscutting concepts, and core ideas across grades. NSTA is committed to providing cutting edge opportunities for educators in support of this vision.

NSTA's Science Program Improvement Review (SPIR) was established in 2004 to assist school districts in establishing a K–12 science program that reflects current research and best practice and is focused on student achievement. SPIR is a research-based strategy that provides a comprehensive assessment of a school or district science program. The review is conducted on-site and collects data through classroom observations, interviews, review of the curriculum, review of instructional materials, and thorough data analysis.

The goals of SPIR are to provide tools and resources that support high-quality and effective science teaching; promote the use of education research to inform policy and practice; inform and help create a professional development program that will improve teacher practice through observation and analysis of science instruction; and develop and offer related school services such as curriculum standards alignment analysis and offering consulting services to help schools/districts improve science teaching and learning in their K–12 science program.

Calling upon the expertise among NSTA's membership and network of leading science educators, expert reviewers are trained to assist district personnel in setting personalized goals and procedures for each review. A team of reviewers visits schools to observe classes and talk to staff, students, and parents. Data is collected from district documents, instructional materials, surveys, and focus groups. A final report summarizes the findings in 15 areas and draws attention to related areas of cause and effect. Fifteen SPIR standards represent the key elements of a science program in a K–12 school district. Each standard is further described by 3–4 objectives central to implementation of the standard. Each objective is detailed in a four-part rubric describing practices at four stages of implementation: component missing, incomplete implementation, basics in place, and best practice. All benchmarking information is consistent with NSTA's official position statements—developed by expert members, opened for member comment, and approved by NSTA's board—as well as research-based information from recent authoritative publications in science education.

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“... to promote excellence and innovation in science teaching and learning for all.”

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A district's review combines the reviewers' observations with collected data to indicate the current level of the science program. District staff can then use the descriptions of practices at the next levels to implement plans for improvement as needed. Recommended resources are provided for further detail on best practices. Following the review, next steps for

district staff are studying and discussing the results among all science program staff, researching best practices using the resources given as a starting point, then prioritizing and planning strategic steps over a 3–5 year period to accomplish any needed improvements. To date, NSTA has conducted SPIRs in over 80 schools.

### SPIR STANDARDS FOR HIGH-QUALITY K–12 SCIENCE EDUCATION

POLICY AND ADMINISTRATIVE SUPPORT OF THE SCIENCE PROGRAM	
Standard 1 <b>GOALS</b>	A multiyear plan with clearly-stated goals guides development and improvement of the science program.
Standard 2 <b>DISTRICT SUPERVISION</b>	A leadership team supervises implementation of a comprehensive, coherent science program.
Standard 3 <b>COMPLETE CURRICULUM</b>	A rigorous, complete curriculum describes what all students should know and be able to do in science, and high-quality instructional materials support its implementation.
Standard 4 <b>RESOURCE ALLOCATION</b>	The science program is supported by adequate resources, facilities, and equipment.
CLASSROOM IMPLEMENTATION OF SCIENCE CURRICULUM	
Standard 5 <b>LEADERSHIP</b>	Leadership of administrators, teachers, and instructional coaches provides guidance, support, and accountability for implementation of the science program.
Standard 6 <b>INSTRUCTION</b>	Instruction develops student understanding of important science concepts, including scientific inquiry, and connects science learning to other subjects.
Standard 7 <b>MATERIALS MANAGEMENT</b>	Instruction is supported by adequate materials supplied in a manner that minimizes classroom preparation time.
CULTURE OF HIGH EXPECTATIONS	
Standard 8 <b>CLASSROOM CULTURE</b>	Classroom interactions develop positive attitudes toward learning science and model scientific inquiry.
Standard 9 <b>PROFESSIONAL DEVELOPMENT</b>	Teachers continually improve their abilities to help students learn science through participation in a professional learning community.
Standard 10 <b>EQUITABLE ACCESS</b>	All students experience the standards-based curriculum, and the school environment values achievement and contributions of all individuals.
Standard 11 <b>STUDENT ASSESSMENT</b>	Student assessments are aligned with the curriculum, appropriate in form, and develop student responsibility for learning.
Standard 12 <b>HIGHLY-QUALIFIED TEACHERS</b>	Students receive instruction from teachers who are academically certified in the science content and demonstrate best practices in science instruction.
Standard 13 <b>ENGAGED COMMUNITY</b>	Parents and the community receive frequent communications and opportunities to participate in goal setting, instructional support, and program evaluation.
ACCOUNTABILITY	
Standard 14 <b>DATA-DRIVEN DECISION MAKING</b>	Assessment/evaluation data are used to improve the science program.
Standard 15 <b>RESULTS</b>	Indicators of student success are positive and improving.