NSTA Position Statement
Professional Development in Science Education

Introduction

To be prepared for the 21st century, it is critical that all students have sufficient knowledge of and skills in science. Studies suggest that high-quality teaching can make a significant difference in student learning. NSTA believes a high-quality science teacher workforce requires meaningful, ongoing professional development. To achieve this goal, schools and school systems must devote time and resources to effective professional development for *all* K–16 teachers of science and science educators to support learning throughout their careers.

There is broad agreement in the field, and increasingly empirical evidence as well, about what constitutes quality professional development for science educators. Key principles, synthesized by the National Institute for Science Education, include reflecting the research on effective classroom learning and teaching; building content and pedagogical content knowledge and skills and examining practice; using research-based methods that mirror those needed in the classroom; facilitating the development of professional learning communities; supporting teacher leadership; integrating professional development with local and state priorities and systems; and continuously evaluating effectiveness.

NSTA strongly believes that we must move forward with professional development programs based on the best information currently available. The science education community should continue to encourage and conduct systematic research about effective professional development to add to our knowledge base for particular purposes in various contexts.

Declarations

Principles Behind Professional Development in Science Education

To achieve the goal of providing professional development for science educators throughout their careers, professional development programs should incorporate the following guiding principles (Loucks-Horsley, Love, Stiles, Mundry, and Hewson 2003; Elmore 2002; Darling-Hammond and Sykes 1999):

- Professional development programs should be based on student learning needs and should help science educators address difficulties students have with subject-matter knowledge and skills.

- Professional development programs should be based on the needs of science educators—of both individuals and members of collaborative groups—who are involved in the program. Ongoing professional development initiatives should be assessed and refined to meet teachers' changing needs.

- To best serve all students as they learn science, professional development should engage science educators in transformative learning experiences that confront deeply held beliefs, knowledge, and habits of practice.

- Professional development should be integrated and coordinated with other initiatives in schools and embedded in curriculum, instruction, and assessment practices.

- Professional development programs should maintain a sustained focus over time, providing opportunity for continuous improvement.

- Professional development should actively involve teachers in observing, analyzing, and applying feedback to teaching practices.

- Professional development should concentrate on specific issues of science content and pedagogy that are derived from research and exemplary practice. Programs should connect issues of instruction and student learning of knowledge and skills to the actual context of classrooms.

- Professional development should promote collaboration among teachers in the same school, grade, or subject.

Considerations for Designing Professional Development in Science: Planning, Implementing, and Sustaining

Planning Professional Development

- A range of effective professional development models should be considered. Those selected should meet the needs of science educators and have a clear set of benchmarks and goals.

- Learning strategies should be selected that take into account the context, issues, and goals of a professional development plan. Examples of strategies that are embedded in the daily lives of teachers and linked to student learning include, but are not limited to, study groups, professional networks, action research, lesson study, and demonstration lessons.

Implementing Professional Development

- Professional development programs should fit into the teachers' schedules and include learning during the school day, after school, and over the summer. Programs should be

continuously monitored and modified to meet the changing needs of teachers and students.

- Access to professional development should be expanded so that both new and experienced teachers can benefit from national meetings and other professional development opportunities that may take place away from their own school and district.

Sustaining Professional Development in Science Education

- Professional development is central to teaching and must be given full support by school districts and their leaders.

- Resources of funding, time, professional materials, and ongoing support from administration should be considered.

- Partnerships with parents, the community, scientists, university faculty, and informal science organizations should be encouraged to enhance the quality of the program and to build support for professional development and quality science education in the community.

Specific Needs of Professional Development Providers

- Programs must be developed to prepare the next generation of professional development providers, and support mechanisms need to be in place to ensure that this training occurs.

- Steps must be taken to build awareness of the importance of professional development, and access must be provided to educators interested in taking a leadership role.

- High-quality professional development materials for teachers should be developed and widely distributed so that professional development providers are using the best standards and research-based tools and strategies in their work.

- Professional development providers should participate in and contribute to the research on professional development.

Adopted by the
NSTA Board of Directors
May 2006

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