

Leadership in Science Education

Introduction

NSTA strongly supports using the *Framework for K–12 Science Education* (NRC 2012) for guiding reform in science education. Essential elements of science education reform include aligning curriculum, instruction, and assessment with national, state, and local standards; implementing professional learning based on district and state needs and objectives; and ensuring that the infrastructure needed to sustain the science program over time is firmly in place. NSTA asserts that the only way to realize these goals is through the presence of strong leaders at the district and state levels.

Declarations

It is important for science leaders to cultivate a leadership network consisting of principals, lead teachers, science department heads, and community leaders to implement science education reform at all levels of the school system. It is equally important for local superintendents, local school boards, and chief state school officers to work closely with science leaders as they move forward with science education reform. Therefore, NSTA strongly encourages local superintendents, local school boards, and chief state school officers to support science leaders by establishing district- and statewide policies that promote effective science education reform.

NSTA makes the following declarations about the crucial role of science leaders and their leadership network in implementing science education reform and the administrative support they need in order to be successful.

In the area of science teaching and learning, it is important for science leaders to

- ensure that science instruction embraces three-dimensional learning as set forth in *A Framework for K–12 Science Education* (NRC 2012);
- encourage student engagement in science and engineering practices to explain phenomena or design solutions to problems;

- encourage opportunities for students to express, clarify, justify, interpret, and represent their ideas and respond to peer and teacher feedback orally and/or in written form as appropriate to support student's three-dimensional learning;
- encourage differentiated instruction that supports all learners;
- regularly communicate progress in student learning to parents and students; and
- build principals' capacities to provide instructional leadership in science and to recognize and to promote three-dimensional teaching and learning in science.

In the area of professional development, it is important for science leaders to

- facilitate regular teacher meetings designed to improve science instruction at both the building and district levels;
- actively involve teachers in the decision making for professional development programs, curriculum changes, and other activities that affect their practice;
- use disaggregated student achievement data and teacher evaluation processes to drive instructional improvement and to plan professional development at the individual, school, and district levels that are rich in science content and model best practices;
- promote collaboration and partnership among district and state policy makers and universities to develop licensure requirements and ensure effective recruitment, induction, and retention of the science teaching workforce; and
- provide appropriate mentoring relationships for new teachers (NSTA 2007).

In the area of science curriculum, it is important for science leaders to

- develop and align curriculum, assessment, and instruction with national and state standards while meeting local needs;
- ensure the development and/or selection of science curriculum that is pedagogically appropriate and encompasses strategies for building conceptual understanding;
- ensure the development and/or selection of standards-based science curriculum that supports the vision of three-dimensional learning; and
- collaborate with post-secondary educators to ensure quality content in the preK–12 curriculum.

In the area of assessment, it is important for science leaders to

- implement assessment methods that elicit direct, observable evidence of three-dimensional learning;
- ensure the use of a variety of qualitative and quantitative assessments for school improvement, instructional improvement, and enhanced student learning;
- provide support for the development and use of assessments that address the needs of diverse learners and that support understanding of science content and processes; and
- promote teacher use of assessment data to inform instructional practice.

Administrative Support: Key to Systemic Science Education Reform

If science leaders and their leadership network are to successfully carry out the roles outlined above, the full support and commitment of the superintendent, the board of education, and the chief state school officer are required. These key players in the reform process must shape policies that support standards-based science education, promote collaboration among an experienced science leadership network, allocate adequate funds to attract and maintain a well-qualified science teaching staff and provide teachers with exemplary science curriculum materials, and build time into the school day for high quality professional development programs.

Only with the kind of administrative support defined here can the science leaders move forward with systemic science education reform. By working as a team, the administration, the science leaders, and the science leadership network can ensure that all students have the opportunity to achieve scientific literacy.

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