

The Role of Research on Science Teaching and Learning

Introduction

Research on science teaching and learning plays an important role in helping all students become proficient in science and making science education more equitable and inclusive, two goals called for in the *Framework for K–12 Science Education* (NRC 2012). NSTA promotes a research agenda that is focused on the goal of enhancing student learning through effective and equitable teaching practices that are based on current research. NSTA encourages ALL stakeholders in science education, including K–16 teachers of science and administrators, informal science educators, and school board members to recognize the importance of educational research, promote more research in schools, and participate in research when possible.

NSTA considers a broad range of activities to be within the scope of research, including research conducted by teachers that can lead to immediate classroom changes as well as research that contributes to a larger body of knowledge such as long-term or large-scale studies. Research on science teaching and learning involves identifying and asking appropriate questions, designing and conducting investigations, collecting evidence, drawing conclusions, and communicating and defending findings.

To produce research that has meaningful outcomes and the ability to improve the teaching and learning of science, NSTA advocates that research and practice be linked and support compatible goals. This synergistic relationship between research and practice includes teachers and researchers communicating goals, activities, and findings with the greater science education community in ways that make research accessible, understandable, meaningful, and relevant to teachers, administrators, and policy makers.

The process of research is the essence of the scientific enterprise and of scientific inquiry. Science education builds on the best of research in both worlds—science and education. By engaging in continual inquiry into teaching and learning, we can promote scientific literacy for students in the 21st century.

NSTA makes the following recommendations to promote effective research on science teaching and learning.

Declarations

Regarding the focus of research on science teaching and learning, NSTA recommends those conducting research

- examine questions that are relevant to enhancing science teaching and learning for all learners;
- focus on ways to make science education more equitable and inclusive;
- address areas that have either been insufficiently investigated or not investigated at all and have the potential to improve what is known about science teaching and learning; and
- extend theories of science teaching and learning in order to contribute to a coherent body of knowledge.

Regarding the practice of research on science teaching and learning, NSTA recommends those conducting research

- draw and build upon previous research that may exist in the area of study;
- focus on studies that build on promising areas of research and link to a larger body of work;
- form collaborations and partnerships among those involved in science education (e.g., teachers, administrators, college faculty, informal science educators) as they examine science teaching and learning;
- demonstrate, when possible, the degree to which student learning is affected;

- engage in rigorous peer review that challenges the status quo and values varying perspectives on research pertaining to science teaching and learning;
- view everyday experiences as opportunities to conduct research that yields findings to improve teaching practices and student learning;
- support the participants in research with ample professional development to enhance their ability to design, conduct, interpret, and apply science education research; and
- share research results with the wider science education community inside and outside the classroom.

Regarding the use of research on science teaching and learning, NSTA recommends

- researchers communicate about research in ways that can be understood and embraced by science educators, administrators, policy makers, and others in the science education community;
- researchers make research readily accessible by disseminating it to teachers and other decision makers using many forms of communication, including practitioner journals, professional conferences, websites, and social media;
- researchers recognize and state the limitations of their research;
- researchers and consumers of research discuss, critique, and apply findings;
- school researchers have ample administrative support, time, and resources to conduct research in the classroom, share their findings with colleagues, and implement results to improve student learning; and
- science educators embrace a culture of inquiry grounded in research that focuses on examining practice and improving student outcomes.

References

National Research Council (NRC). 2012. A framework for K–12 science education: Practices, crosscutting concepts, and core ideas. Washington, DC: National Academies Press.

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