

# The Next Generation Science Standards: Implications for Preservice and Inservice Science Teacher Education

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## Introduction

The long awaited Next Generation Science Standards (NGSS) (NGSS Lead States, 2013) were released during the Spring of 2013 and for K-12 school systems, teacher education programs, and colleges/universities reality is settling in. The NGSS provide an ambitious and complicated vision for K-12 science education in the US and there are plenty of implications for the teaching of science, preparation of science teachers, inservice professional development of science teachers, and for the knowledge and practices of university faculty who work with science teachers. These implications are especially pertinent to the members of ASTE, and for this reason we are dedicating a Special Issue of the journal to the NGSS.

It is obvious that the NGSS provide a comprehensive conception of K-12 science in the US. However, it is approximately 17 years since the release of the *National Science Education Standards* (NSES). Many have already been asking, or will be asking, Is there anything really different? Do we really need another set of standards? Most of us have been through one or more sets of standards or *Benchmarks* and we have either heard or asked these questions before.

As teacher educators, we must wonder if our lives will ever be the same again. Are our teacher education programs still valid? Can we prepare science teachers as we have been trying to do over our careers? If change is needed, what is this change?

Most of us develop and deliver various forms of professional development in a variety of contexts. Hopefully, we have not been delivering “one size fits all” experiences, but how will our professional development programs change with

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respect to content and approach? Teachers are already asking, How do I translate the NGSS into my classroom? Are there enough hours in the day? Are there enough days in the year? As teacher educators, What will we tell them? How can we help them?

We must also take a serious look inward. Do we, as science teacher educators, currently possess the knowledge and skills to prepare science teachers, and help teachers develop professionally within the context of the NGSS? If not, how are we to develop the knowledge and skills that are needed?

The easiest answer to all of these questions is “yes.” Of course we have been doing what we have needed to do all along. Of course, we have the necessary knowledge and skills to prepare teachers and provide the needed professional develop. But, is this really the case or is it analogous to the teachers we know who say they have been teaching through inquiry all along?

For this Special Issue we have invited a prominent group of scholars with particular expertise about the development and/or specific content and implications of the NGSS. Stephen Pruitt, the lead architect of the NGSS document on behalf of Achieve has written about how the standards were developed and the relationship among the various dimensions around which the standards are organized. Joseph Krajcik (with Codere, Dahsah, Bayer, and Mun) was asked to focus on the performance expectations set forth in the standards. Whether good or bad, teachers will be focusing on what will eventually be assessed relative to the NGSS. The implications of the performance expectations on teaching and how we conceptualize assessment are clearly important to the work of teacher educators.

Perhaps the construct of “science practices” as opposed to the use of the perennial phrase of “scientific inquiry” has been the source of much discussion. Jonathan Osborne, the lead writer for the Framework for K-12 Science Education (NRC, 2012) on this topic, discusses the rationale for focusing on science practices and its distinction from scientific inquiry. Is there really a difference or is it the same construct with a different name?

The integration of engineering practices as a key component in science education is a clear difference between previous reform documents and the NGSS. Indeed, the inclusion of engineering practices represents a new challenge for science teachers. Is it necessary? Will it help improve science learning. William Carlsen and Christine Cunningham have were asked to discuss engineering practices and its implications for science teacher education.

All recent reforms have advocated that the vision of science teaching and learning presented is meant to address ALL K-12 students. Okhee Lee, Emily Miller, and Rita Januszyk provide a discussion of the systematic committee work of the National Academies that was charged with determining if the NGSS truly accommodates ALL students and their needs.

Finally, Rodger Bybee discusses the important issue of the knowledge and abilities of science teacher educators within the context of the NGSS. As science teacher educators, we have the responsibility of adjusting our teacher education programs and approaches to professional development to facilitate teachers’ abilities to address the vision of the NGSS. What knowledge do we need and how do we develop this knowledge in ourselves are part of Bybee’s timely discussion.

We encourage you to carefully read the contents of this Special Issue of *JSTE* and use it as a focal point of future discussions about the NGSS and its impact on science education. As usual, please forward any questions and concerns to [JSTE@IIT.EDU](mailto:JSTE@IIT.EDU).

## References

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