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## Effective and Necessary Professional Development for Science Teachers as States Adopt NGSS

Anne M. Krebs  
Kansas State University, [amkrebs@k-state.edu](mailto:amkrebs@k-state.edu)

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## **Effective and Necessary Professional Development for Science Teachers as States Adopt NGSS**

Anne M. Krebs

Kansas State University

**Abstract:** This roundtable will explore the efficacy of professional development opportunities designed to support science teachers during the transition to the Next Generation Science Standards (NGSS).

**Keywords:** continuing professional development, science teaching, NGSS

Science teachers in K-12 programs have been directed to concentrate on science education and science literacy to better educate informed citizens (American Association for the Advancement of Science, 1990; NGSS, 2015). For 18 states, this concern has manifested in the adoption of the Next Generation Science Standards (Next Generation Science Standards adoption map, 2016), a nationally recognized program for K-12 that integrates science knowledge with engineering practices across all domains of science and throughout K-12 instruction (NGSS, 2015). This updated approach to science – a coherent and progressive growth of knowledge, understanding, and explanation – demands that in-service teachers shift daily practices away from traditional science instruction (Reiser, 2013; Wilson, 2013).

The purpose of this roundtable will be to explore the efficacy of currently available adult education opportunities, specifically professional development, for practicing science teachers during the implementation of NGSS requirements. Professional development will be critical in supporting science teachers with the necessary transition to inquiry-based learning and argumentation that is a key component of NGSS (Wilson, 2013; NGSS, 2015). Research suggests that effective science professional development includes active participation and collaboration by the learners, modelling of inquiry-instruction, and learner reflection (Beerer & Bodzin, 2004; Kazempour, 2009). Most successful professional development programs also include a focus on specific content, a coherent approach to the subject, and adequate time to learn and implement (Wilson, 2013). Although these elements have been identified as important, if not critical, to quality professional development, less is known about the efficacy of professional development programs.

In-service teachers receive professional development through a combination of formal, non-formal and informal adult learning experiences. Formal learning experiences are available through college courses and research experiences for teachers (RET). These programs can provide science content and teaching practice instruction for current teachers. Examples of non-formal education includes regional and national conferences offering workshops highlighting NGSS and associated teaching practices and online webcasts available from national science education organizations. Informal learning occurs without plan, often as teachers share ideas with one another during daily activity.

NGSS emphasizes three areas: content, engineering, and explanation (2015). Quality science professional development must support teachers in one or more of those areas. Successful professional development programs must also meet the needs of the participants – the science teachers. It is not enough for teacher-participants to learn about NGSS content and

teaching practices; there must be a reasonable expectation that there will be a transfer of that training to the classroom.

Although the focus on NGSS is relatively recent, continuing professional education (CPE) or continuing professional development (CPD) for science teachers is not. Adult learners, including science teachers, participate in CPD for a variety of reasons including the following: maintaining professional certification, learning about new technology and teaching practices, exploring curriculum developments, and fulfilling personal learning goals. Existing CPD programs may or may not include content that supports NGSS and a delivery method that results in changes in participant knowledge or teaching practice. A review of the literature will provide a starting point for a conversation about the strengths and weaknesses of professional development programs.

In-service science teachers will continue to attend a variety of professional development programs, many focusing on NGSS. States, school districts, and individual teachers must make informed decisions about the quality and efficacy of the available programs. Without a means of evaluating program value and strength it will be difficult to maximize benefit while limiting cost. The goal of this roundtable is to contribute to the conversation about the efficacy of teacher professional development programs, especially those programs designed to support science teachers in the implementation of NGSS.

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