

## Chapter 3.19

# Telementoring and Virtual Professional Development: A Theoretical Perspective from Science on the Roles of Self-Efficacy, Teacher Learning and Professional Learning Communities

**Matthew J. Maurer**  
*Robert Morris University, USA*

### **ABSTRACT**

In science, examining how teachers can effectively learn content and inquiry-based pedagogy can often be nothing short of an intellectual, cognitive, and motivational maze. Professional development (PD) programs constructed specifically to aid teacher learning may fall short of their goals due to the high background variability of the participants, especially when mixing novice and master-level teachers. Only through conscious reorganization of instructional approaches can PD programs effectively address specific content and pedagogical needs while concurrently aiding the transition from novice to master-level teachers. It is time for a shift in how PD providers think

about how teachers learn. Utilizing a theoretical perspective from Science Education, this chapter will demonstrate the benefits of moving to more of a contextual-based discourse that is accomplished through a virtual telementoring-based professional learning community (PLC) in order to enhance content, pedagogy, leadership skills, and positively impact teaching self-efficacy.

### **INTRODUCTION**

As of 2008, approximately 150 institutions of higher education, with 550 partnering K-12 school districts, had received funding from the National Science Foundation (NSF) to implement Math Science Partnership (MSP) programs which focused on improving teacher content knowledge and

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pedagogical skills (NSF, 2008). A common strategy for professional development (PD) in these programs was to develop professional learning communities (PLCs) between teachers and higher education faculty members to collaborate to positively impact student learning. In order to attain this goal, effective instruction of the participating teachers cohorts was essential (Loucks-Horsley, Love, Stiles, Mundry, & Hewson, 2003).

Many educators have likely encountered PD partnerships that have been extremely successful in training teachers, as well as programs that have struggled. Based on years of personal experiential evidence in conducting PD programs, several common challenges for teachers attending one of these programs often include:

1. A lack of background or familiarity with the content or the technology being addressed.
2. A lack of understanding of inquiry and its place in the science classroom.
3. A perceived lack of support from administrators.
4. A perceived lack of acceptance from colleagues (feeling like they are doing this alone).
5. The perception of a significant time commitment to attend the training.
6. Not enough incentive(s) to attend the training.
7. Poor understanding of the context in which the knowledge or methods can be applied in the classroom.
8. The influence of poor teaching self-efficacy.

Normally involvement in a PD program brings numerous incentives for teachers and their partnering school districts. As a result, the composition of the cohort may exhibit a large percentage of novice-level teachers (not master level teachers) who may be more extrinsically motivated to attend rather than intrinsically motivated to better themselves and their teaching. They may see the program as a means to achieve tenure,

points toward re-certification, or even a source of free classroom supplies. While these reasons for participation are not inappropriate, when they become the primary reasons for participation, the long-term success of the PD program may hang in the balance.

All of these issues may impact how effectively teachers will interact with the information being communicated. Lack of personal motivation, inability to visualize context or applicability, and low self-efficacy for teaching may have negative impacts on the learner. As one examines how teachers are learning in science PD programs specifically, it is often evident how many of these issues are not addressed, and may be exacerbated by the program itself.

PD science programs involving master-level teachers have their own challenges. Master-level teachers may not participate in a PD program due to being overtaxed as a resource in the school already, serving a mentor or department chair, or may not feel they need the additional training. Here we find the crux of the issue: should the PD program focus on rudimentary levels of science content and process instruction, or should the PD be more specifically geared toward pushing the participants from a novice/technical level of understanding to a mastery level? Are teachers in current PD programs learning components of content and inquiry, or should they be learning methods, context, and techniques to plan for a more thorough implementation of pedagogy in their classroom? If effective teacher learning is the critical issue, then differing approaches must be taken to achieve the desired master-level goals. Additionally, to what extent is technology-based mentoring in a PD partnership program effective in accomplishing this? Should PD in inquiry-based science be moving more towards a virtual community model where many of the objectives of the program are achieved electronically?

This chapter will focus on addressing these questions through a literature-based discussion of current PD strategies in Science Education where

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