Chapter 13
Collaborative Learning in Pre-Service/In-Service Communities of Practice:
Discovering How and When to Integrate Technology in Senior High Science

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ABSTRACT

This chapter will describe how a research-based Community of Practice (CoP) of pre-service and in-service teachers supported teachers' reflection and learning about how and when to integrate hand-held data loggers. This study suggests that the CoP narrowed the gap between theory (in teacher education) and practice (in the school classroom). Findings will describe effective ways to use hand-held data loggers in senior high school science classes, as well as in pre-service teacher education courses. The possibilities of building even stronger connections between the traditionally theoretical world of teacher education and the real world of school are suggested.

INTRODUCTION

The theme of this book – what teacher educators think and do when adopting new technologies – is of the utmost importance in today's ever-shifting educational and technological landscape. Many teacher educators think long and hard about the potential implications of embracing new technologies. They will not institute a technology for its own sake; rather they will only embed and model new technologies if they believe they can benefit students.

Technologies have been found to enhance student achievement, promote collaboration (BECTA, 2005; Cox, Webb, Abbott, Blakeley, Beauchamp, & Rhodes, 2003; Inkpen, Ho-Ching, Kuederle, Scott, & Shoemaker, 1999) and improve student motivation (Passey, Rogers, Machell, McHugh, & Allaway, 2003). Studies also suggest that when digital technologies are used in ways that support student ownership of educational processes and products, conceptual understanding improves (Dex-

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ter, Anderson, & Becker, 2000; Dwyer, Ringstaff, & Sandholtz, 1991; Hennessy, Deaney, & Ruthven, 2003). It has been reported, however, that many teachers are barely coping with the new demands of technology integration and sustainability and so do not achieve these potential benefits (Cuban, 2001; Hennessy, Ruthven, & Brindley, 2005; Tearle, 2003).

Why are technologies not integrated in sustainable ways to benefit student learning? How can teacher educators model technologies that may lead to pre-service teachers' embedding technology in ways that truly support their future students' learning?

Researchers suggest that research on particular technologies has not been sufficient to point to ways to successfully embed these technologies. They report that teachers must be involved in the process of learning about embedding technologies in schools (Hennessy et al., 2005). I suggest that not only should in-service teachers be involved in the research processes that help discover ways to effectively integrate technologies but pre-service teachers too can contribute to as well as directly benefit from becoming part of the research process. A Community of Practice (CoP) (Lave & Wenger, 1991; Wenger, McDermott, & Snyder, 2002) has shown promise as a collaborative mechanism to learn about technology integration and teaching. It is through this CoP that teachers are afforded essential opportunities to reflect on their teaching (Chalmers & Keown, 2006).

In this chapter I describe how a CoP of pre-service and in-service teachers reflected on and made decisions regarding the use of hand-held data loggers in high school science. Findings regarding the workings of the CoP and how the integration of data loggers affected student attitudes (such as self-confidence in learning science and technology usefulness) will be shown. Issues and values of the collaborative CoP model for teacher education will also be discussed.

BACKGROUND

The following section presents background on communities of practice and design-based research employed in this study.

Communities of Practice: Spaces and Places for Teacher Reflection

Collaborative learning and research can be supported through a CoP. In this community, individual teachers' needs can be addressed (Hennessy et al., 2005). Kirschner & Lai (2007), describe CoPs as "places where a process of social learning occurs between people with a common interest in a subject or a problem who collaborate over longer periods of time to share and exchange ideas, find solutions, and build knowledge" (p.128). Member of CoPs collectively decide on goals, the ways to reach these goals and methods of assessing progress (MacDonald, 2008). In previous research, CoPs have been shown to be successful as a collaborative way to address educational challenges (Bereiter, 2005; Lave & Wenger, 1991; Olitksy, 2007; Scardamalia, 2003).

Barab, Barnett, & Squire (2002) suggest that we become good teachers by, reflecting on our teaching and talking with colleagues about our reflections. The study reported in this chapter is based on this guiding principle. A CoP was designed to provide opportunities for pre-service and in-service teachers to reflect on their practice and then openly discuss these reflections. When CoPs are organized to provide the necessary time in teachers' busy lives to reflect on their teaching then lasting pedagogical change may occur (Schlager & Fusco, 2003).

An important facet of CoPs is its potential to support educational goals by giving ownership to the participants in the research. This can be done in a number of ways: by giving CoP members the opportunity to contribute to the research design and