

# Chapter 14

## Fostering Educational Technology Integration in Science Teacher Education: Issues of Teacher Identity Development

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### ABSTRACT

*This chapter describes one science teacher educator's attempts to integrate various educational technologies in an elementary science methods course, her students' responses to her attempts, and the tensions that emerged. The science teacher educator employed teacher action research as a means of systematic, reflective inquiry to examine critically how preservice elementary school science teachers think about, use, and reflect on educational technologies and how their developing professional identities intersect with adoption of these technologies. Tensions emerged from a dichotomy between what methods students perceived as "traditional" science teaching and science teaching using technology. Resulting problems of practice included: expertise in/with science and negotiating a new curriculum, control in the classroom, content coverage, and support and sense of community. The authors conclude their chapter with implications and recommendations for future research related to the significant role educational technology can play in science teacher education and science teacher identity development.*

### INTRODUCTION

Although technology has proliferated in recent years, it has produced relatively little change in classroom practice. In this chapter, we suggest that teacher identity plays an important role in the

adoption of educational technology. In our context, an elementary science methods course, we suggest that the use of educational technology challenges traditional images of an elementary school science teacher and science instructional ideologies. We briefly describe the attempts one science teacher educator made at integrating various forms of educational technology in an elementary science

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education methods course over the course of two academic semesters and among 50 preservice elementary school science teachers. The science teacher educator's primary goal was to employ teacher action research as a means of systematic, reflective inquiry to examine critically the different ways preservice elementary school science teachers think about, use, and reflect on different educational technology applications and how their developing professional identities intersect with the adoption of these educational technologies.

The research questions that guided this study included the following:

1. What attempts did the science teacher educator make to integrate educational technologies in an elementary science education methods course?
2. What were students' responses to the teacher educator's attempts to integrate educational technologies?
3. What tensions did the science teacher educator and preservice science teachers confront while learning to use educational technologies in the science classroom?
4. How did preservice science teachers' formative professional identity encourage or discourage adoption of educational technology practices?

This study draws upon two strands of literature: 1) teacher identity and 2) the use of educational technologies in preservice teacher education. We briefly describe the relevant areas of literature here before describing the particular context and methods of the study.

### **Teacher Identity**

Teacher professional identity has emerged as an area of research, particularly within the last decade or so (Beijaard, Meijer, & Verloop, 2004; Enyedy, Goldberg, & Welsh, 2006; Leuhmann, 2007; Olitsky, 2007). Our conception of identity draws

from the work of Markus and Nurius (1986) and others in which researchers explore the conception of "possible selves." Possible selves represent individuals' ideas and beliefs about who they might become, who one hopes or expects to become, as well as who one fears becoming (Dunkel & Kerpelman, 2006; Markus & Nurius, 1986). This view aligns with Helms' perspective that the self comes not just from what a person does, or his/her affiliations, but also from what a person believes, values, and wants to become (Helms, 1998). Helms argues that while much has been done, for example, on teachers' understandings of the nature of science (Brickhouse, 1990; Lederman, 2007), the ways in which science teachers obtain a sense of personal or professional identity from their subject matter are not sufficiently considered. Volkmann and Anderson (1998) have argued that the development of professional identity is a complicated process that makes preparing and mentoring teachers difficult. Affiliation and loyalty to subject matter, such as science, is critical to teachers' formation of professional identity, and to this study. We acknowledge that while affiliation to subject matter helps foster a science teacher's sense of belonging to a community, it ironically creates barriers to adopting new classroom approaches and pedagogical strategies such as the use of educational technologies. Simply put, the integration of technology in the science classroom challenges traditional images of a science teacher and science instructional ideologies (Helms, 1998; Pedretti, 2003; Pedretti, Bencze, Hewitt, Romkey, & Jivraj, 2006; Shumba, 1999). This may create a barrier to the adoption of educational technologies in science teaching and learning.

### **Educational Technologies in Preservice Teacher Education**

Computers and allied technologies have been influencing education for more than a quarter century, and in that time we have witnessed a shift from an early emphasis on teaching programming

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