

Chapter 12

Pre-Service Teachers’ Self-Efficacy and Attitudes toward Learning and Teaching Science in a Content Course

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EXECUTIVE SUMMARY

Science teaching is approached with hesitation by many PreK-8 teachers. This chapter explores the research on attitudes toward science and learning science as well as the perceived science efficacy of elementary pre-service teachers. It also describes a content-based, pedagogically rich life science course for pre-service preK-8 teachers that incorporates active and interactive teaching techniques in lieu of the traditional science methods course. Using evidence from this project and other research studies, the chapter argues for the inclusion and modeling of these approaches when preparing teachers of science and proposes that this non-traditional approach for teaching content-based courses for preparing teachers be considered in place of traditional science methods courses.

ORGANIZATION BACKGROUND

Over twenty years ago, a large public university in the southeastern United States took a bold step and changed their science methods course from a traditional, pedagogically focused format to a duo of content-based courses: one in biology, and one in chemistry/physics. This unusual move was in response to a growing body of research indicating that increasing teachers' content knowledge of science leads to increased achievement of their students (Druva & Anderson, 1983; Wayne & Youngs, 2003). Teacher preparation programs were being criticized for their superficial curriculum that lacked appropriate emphasis on preparing pre-service teachers to teach rigorous content (National Commission on Teaching and America's Future, 1996). This university felt it was imperative to increase the content knowledge preparation of its PreK-8 teacher graduates and thus changed their requirements.

Teacher preparation program design and requirements vary throughout the United States. Additionally, states have different requirements for obtaining a teaching certification. Typically, secondary level teacher candidates must hold a degree in a specific field of study (English, music, science, mathematics, etc.) and a minor in education. However, students seeking elementary certification are required to take fewer courses in each field of study and more courses in education. These candidates usually take a minimum number of college credit hours in science content courses along with an additional science education methods or integrated methods course to prepare them for the classroom (U.S. Department of Labor, 2014). At this university, preK-8 pre-service teachers complete eight hours of content-based science, but in lieu of the typical science methods course they take an additional eight hours of content-based courses specifically designed for elementary education majors. Four of these additional hours consist of the course, Biology 3000, Life Science for Elementary Teachers. The first author has taught this course for over twenty years with a focus on providing the deep understanding of science content needed by elementary teachers, through reform-oriented, research-based pedagogical techniques. This study examines whether this life science content course for pre-service teachers experiences results in increased science attitudes and increased self-efficacy.

SETTING THE STAGE

Elementary teachers are expected to be all things for all students: content delivery experts, special education providers, learning disabilities specialists, guidance counselors, health advisors, and pedagogy authorities, as well as content specialists in all traditional subject and skill areas. This is a tall order for anyone, particularly a new teacher who is years away from becoming a master educator (Berliner, 1988).

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