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A Study Of Pre-Service Teachers' Science Teaching Efficacy Beliefs During The Elementary Science Laboratory Course

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Abstract

The purpose of this study was to investigate effects of the teaching science laboratory course on pre-service teachers' self-efficacy beliefs about science teaching. Seventy-two pre-service teachers enrolled in two sections of the course from two different departments, elementary and gifted education at a large urban university in Turkey participated in the study. The Turkish version of Science Teaching Efficacy Beliefs Instrument (Hazir-Bikmaz, 2004) was administered twice to the participants at the beginning of the course and at the end of the course. Results indicated that overall pre-service teachers' self-efficacy beliefs significantly increased during the course. Although pre-service teachers' personal teaching efficacy beliefs significantly increased, their outcome expectancy beliefs did not change.

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Keywords: Pre-service elementary and gifted teachers, teaching science laboratory course, self-efficacy, science teaching efficacy beliefs;

1. Introduction

Teacher education programs play a critical role in preparing pre-service teachers to teach science (Bleicher, 2007; Hechter, 2011). Pre-service teachers enter teacher education programs with values, attitudes and beliefs based on their former education and their personal experience. Research on pre-service teachers indicates that pre-service teachers come to their methods courses in science with limited conceptual understanding of science (Huinker & Madison, 1997; Tekkaya, Cakiroglu, & Ozkan, 2004), with negative attitudes toward the science learned in high

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school (Abell & Smith, 1994; Mulholland & Wallace, 1996; Palmer, 2001) and lack confidence in their ability to teach the subject (Young & Kellogg, 1993). This situation is a significant problem due to its impact on classroom practice in the future (Palmer, 2001). Many scholars agree that teacher beliefs are a major predictor of their decision and behaviors (Bandura, 1986). Therefore, the issue of how to increase pre-service teachers' beliefs about science and their ability to teach science during their teacher education program is of considerable interest to researchers in science education (e.g. Bleicher, 2007; Bleicher & Lindgren, 2005; Gunning & Mensah, 2011; Hechter, 2011; Uludag-Bautista, 2011). The present study is designed to investigate effects of a teaching science laboratory course on pre-service elementary teachers' self-efficacy beliefs about science teaching.

2. Studies of self-efficacy beliefs

A considerable amount of research has focused on how to increase pre-service elementary teachers' beliefs of self-efficacy during teacher education programs (Bayraktar, 2011). Most of these studies have examined the influence of science methods courses on pre-service teachers' self-efficacy (Bleicher, 2007; Bleicher & Lindgren, 2005; Brand & Wilkins, 2007; Cantrell, Young, & Moore, 2003; Gunning & Mensah, 2011; Hechter, 2011; Huinker & Madison, 1997; King & Wiseman, 2001; Palmer, 2006a; 2006b; Uludag-Bautista, 2011). Research shows that teacher personal self-efficacy, outcome expectancy and conceptual science understanding increased significantly during science methods courses (Bleicher, 2007; Bleicher & Lindgren, 2005; Uludag- Bautista, 2011). Moreover, research also indicates that types of experiences especially mastery experiences (Brand & Wilkins, 2007; Gunning & Mensah, 2011) and some additional sources namely, cognitive content mastery, cognitive pedagogical mastery, and simulated modelling in addition to the sources proposed by Bandura (1986) are some key factors affecting pre-service teachers' self-efficacy beliefs during science methods courses. In addition, Hechter found that the number of postsecondary science courses completed, and prior school science experiences had a significant main effect on personal science teaching efficacy but not science teaching outcome expectancy. Palmer (2006a) found that the effect of the methods courses on pre-service teachers' self-efficacy beliefs still present after a long time period. Some studies also investigated effects of a teacher education programs on pre-service teachers' self-efficacy beliefs (Bayraktar, 2011; Bursal, 2010; Lin, & Gorrell, 2001). Although studies regarding self-efficacy beliefs are well documented in the literature, there is little known about the effects of teaching elementary science laboratory course on Turkish elementary and gifted pre-service teachers' self-efficacy beliefs. The purposes of this study were to identify pre-service teachers' self-efficacy beliefs in terms of department and gender and explore the changes in their beliefs during teaching elementary science laboratory course. Therefore, the present study was guided by the following research questions:

1. Is there any significant difference of pre-service teachers' self-efficacy beliefs in terms of gender and department?
2. Does the teaching elementary science laboratory course influence on the personal teaching efficacy of pre-service teachers about science teaching?
3. Does the teaching elementary science laboratory course influence on outcome expectancy beliefs of pre-service teachers about science teaching?

4. Methodology

A one-group pre-test – post-test design was utilized in this study. A repeated measures t test and an independent t test were calculated using SPSS 18.0 program in order to response research questions. The Science Teaching Efficacy Beliefs Instrument (Enochs & Riggs, 1990) was used to collect the data in the current study. Hazir-Bikmaz (2004) translated the science Teaching Efficacy Beliefs Instrument (STEBI) into Turkish and conducted a factorial analysis, which indicated that Turkish version of STEBI-B has the same factorial structure of the STEBI-B developed by Enochs and Riggs (1990). In the current study, Cronbach alpha was calculated as .71 for the whole instrument, .73 and .71 for the PSTE and STOE, respectively.

Participants of the study were seventy-two pre-service teachers enrolled in two sections of teaching elementary science laboratory course from two different departments, elementary and gifted education at the Northwest of Turkey. All students enrolled in the course were informed about the study and voluntarily participated in the study. Forty three of the participants (33 females and 39 males) were studying at the elementary education program while