ABSTRACT. This study investigated Turkish preservice, elementary teachers’ personal mathematics teaching efficacy (PMTE), and science teaching efficacy (PSTE) beliefs at the end of their teacher education program. A majority of the participants believed they were well prepared to teach both elementary mathematics and science, but their PSTE scores were significantly lower than their PMTE scores. However, a significant correlation was found between the PMTE and PSTE scores. No significant gender effect on PMTE and PSTE scores was observed, but unlike the results from other countries, Turkish female preservice elementary teachers were found to have slightly higher PMTE and PSTE scores than their male peers. High school major area was found to be a significant predictor of participants’ PMTE and PSTE scores. Participants with mathematics/science high school majors were found to have significantly higher PMTE and PSTE scores than those with other high school majors.

KEY WORDS: high school major area, personal mathematics teaching efficacy, personal science teaching efficacy, preservice elementary teacher

INTRODUCTION

Previous research on student attitudes toward mathematics and science indicates that teachers are the most important single influence on students’ attitudes toward these areas, and one fourth of these influential teachers are reported to be the elementary school teachers (Cox & Carpenter, 1989; Putney & Cass, 1998). Since many of tomorrow’s teachers are today’s preservice teachers, the beliefs they hold should be of concern to teacher educators. The quality of mathematics and science instruction at the elementary school level depends on the preparation of preservice elementary teachers with appropriate content knowledge and pedagogical content knowledge and also positive beliefs about teaching these courses (Briscoe & Stout, 2001; Harper & Daane, 1998). Without sufficient knowledge, enthusiasm, and self-efficacy in these areas, it is unlikely that future elementary teachers will be able to provide effective instruction (Battista, 1986; Stevens & Wenner, 1996; Tosun, 2000).
There has been a great deal of concern expressed in the literature about preservice elementary teachers’ low level of mathematical and science knowledge. For example, it was repeatedly reported that preservice elementary teachers have problems in simple mathematical skills (e.g., interpreting decimals) and operating with decimals and fractions (Battista, 1986; Graeber, Tirolsh, & Glover, 1989; Quinn, 1997; Thipkong & Davis, 1991). Similarly, science education researchers noted that elementary teacher candidates possess a low level of knowledge of the concepts, facts, and skills concerning science (Stevens & Wenner, 1996; Tekkaya, Cakiroglu, & Ozkan, 2004; Tosun, 2000; Wenner, 1993). Furthermore, preservice elementary teachers were found to have problems in constructing and expressing mathematical relationships from scientific data (Briscoe & Stout, 2001).

Numerous researchers have concluded that the weak mathematics and science backgrounds of preservice elementary teachers significantly contributed to their lack of content knowledge in these areas. However, overcoming these problems does not merely depend on increasing the content of coursework that teacher candidates take in college; it is well documented that increasing the amount of content has little effect on preservice teachers’ confidence to teach (Hadfield, Littleton, Steiner, & Woods, 1998; Palmer, 2006; Stevens & Wenner, 1996; Young & Kellogg, 1993). In light of the previous studies, teacher candidates should be taught in environments where they not only learn the mathematics and science content but also enhance their self-efficacy beliefs about teaching these disciplines (Cantrell, Young, & Moore, 2003; Harper & Daane, 1998; Putney & Cass, 1998; Stevens & Wenner; Swars, Daane, & Giesen, 2006; Tosun, 2000).

The term self-efficacy was introduced by Bandura (1977) as part of his social cognitive theory. He used the concept of reciprocal determinism to explain that each behavioral, personal, and environmental factor influences—and is also influenced by—the other factors. Later, he argued that, “People’s level of motivation, affective states, and actions are based more on what they believe than on what is objectively true.” (1997, p. 2). Self-efficacy represents the belief that an individual possesses and is defined as, “the beliefs in one’s capability to organize and execute the courses of action required to produce given attainments” (p. 3). Bandura emphasized that self-efficacy beliefs are situation-specific; therefore, people undertake and perform the activities that they believe they have the capability of handling but tend to avoid situations that are believed to challenge their capabilities.