IMPACT OF PROSPECTIVE ELEMENTARY TEACHERS' SUCCESS IN SCIENCE AND TECHNOLOGY TEACHING I AND II ON SELF-EFFICACY BELIEF

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Abstract. The purpose of this study is to examine the impact of prospective elementary teachers' success in Science and Technology Teaching I and II on self-efficacy belief. This is a descriptive study. This study was conducted with the participation of 171 (124 female, 47 male) prospective teachers, all of whom were the fourth grade studies at Trakya University, Education Faculty, Elementary Teaching in 2012/2013 academic year. Research data was collected via prospective elementary teachers' class grades at Science and Technology Teaching I and II, and via „The Scale of Self-Sufficiency of Prospective Elementary Teachers in Science Instruction" developed by Riggs and Enochs (1990) and translated into Turkish by Bıkmaz (2002). The data was analyzed processed with the use of SPSS 17.0 statistics software; arithmetical average, standard deviation test, t test and regression. According to the findings of the research, while no difference was detected among the beliefs of prospective elementary teachers on science instruction in terms of gender; only the academic success at Science and Technology Teaching II was detected to estimate these beliefs at low level.

Keywords: self-efficacy, science and technology teaching, academic achievement, elementary school teacher candidates

Introduction

Self-efficacy beliefs as well as qualified education and professional field knowledge are required for teachers and prospective teachers to fulfill their professional duties (Aslan and Uluçınar, 2008). Self-efficacy-belief as one of the basic concepts from Albert Bandura's social learning theory is the beliefs on the measure how much they can complete tasks and affects from the possible outcomes. When individuals with high self-efficacy encounters with a similar situation, their self-confidence reflects upon their behaviors (Israel, 2007).

According to Bandura, self-efficacy is field specific. Therefore, self-efficacy beliefs of individuals towards each task and matters show variety. Science teaching self-efficacy belief is the beliefs and the judgments of the teachers about themselves

to increase the success and efficacy in science education of students (Özkan, Tekkaya, and Çakıroğlu, 2002).

Bandura states that the past experiences of individuals are developed through four resources as observation on the successful people over tasks, social conviction of one to fulfill a task, and physical and emotional attitudes of individuals on themselves. Past experiences are the most effective resources on the self-efficacy beliefs to fulfill a task. For example, beliefs of a student with higher grades on science lessons are higher on pursuing higher grades in the next years on science lessons (Usher and Pajares, 2008).

The vision of science and technology teaching curriculum stresses out that the aim is to educate students individual differences with variety of to be able to decide on the risk and benefits of any problems, reach and use of knowledge, produce new knowledge and become literate of science and technology (Ministry of National Education-MNE-, 2006). Teachers should be role model as well as putting their skills and knowledge to affect the students feels safe and concern on their safeties in their future life (MNE, 2006).

Data on the self-efficacy beliefs of teachers and prospective teachers ,which helps understanding their behaviors correctly, provides significant information to increase the success levels of students and measure precautions in teaching process especially within the science lessons in which students' success levels are highly low (Bıkmaz, 2004).

Studies on teachers' self-efficacy beliefs are important to pursue in teacher training to educate and train qualified and up-to-date teachers (Berkant and Ekici, 2007). In this viewpoint, it is believed that the self-efficacy beliefs of prospective teachers are effected from the science and technology teaching I–II, and it is significant to determine how the prospective teachers are affected.

The purpose of this study is to examine the effects of prospective elementary teachers' academic successes on science and technology teaching I–II towards their self-efficacy beliefs of science teaching and also to determine the effect of gender on these variables. These questions are sought to answer within this aim:

– Is there a direct correlation between prospective elementary teachers' academic success on science and technology teaching I–II and their self-efficacy beliefs of science teaching?

– Is there a meaningful difference between prospective elementary teachers' academic successes on science and technology teaching I-II and their self-efficacy beliefs of science teaching according to gender variable?

Materıals and methods

Model of the Study

This study is in survey model. Descriptive survey model is a research approach that aims to describe the current or past situations as its existing form (Karasar, 2005). In this study, it is attempted to examine the effects of prospective elementary teachers' academic successes on science and technology teaching I-II towards their

self-efficacy beliefs of science teaching and also to determine the effect of gender on these variables.

Study group

This study was conducted with the participation of 171 (124 female, 47 male) prospective teachers, all of whom were the fourth grade studies at Trakya University, Education Faculty, Elementary Teaching in 2012/2013 academic year

Data Collection Tool

Research data was collected via prospective elementary teachers' class grades at Science and Technology Teaching I and II, and via „The Scale of Self-Sufficiency of Prospective Elementary Teachers in Science Instruction" developed by Riggs and Enochs (1990) and translated into Turkish by Bıkmaz (2002).

Turkish scale involves 21 items and 2 dimensions. The first factor as Science and technology teaching self-efficacy belief includes 13 items as 5 positive and 8 negative while the second factor as Result expectations in Science Teaching includes 8 items as 7 positive and one negative item. Croanbach's alpha reliability coefficient for first factor is .89 and for the second factor is .69 while it is .85 for the entire scale.

Data Analyze

The data was analyzed processed with the use of SPSS 17.0 statistics software; arithmetical average, standard deviation test, t test and regression.

Results

Multiple linear regressions is applied for examining the effects of prospective elementary teachers' self-efficacy beliefs of science teaching towards their academic success on science and technology teaching I–II and the results are presented as in Table 1.

Table 1. Result of the perceptions of prospective elementary teachers' self-efficacy beliefs of science teaching towards their academic success on science and technology teaching I–II

Variable B	Std. Error	Beta	t	p	Zero-order Correlations	Partial Correlations
(Constant) 69.655	3.09		22,541	.000		
NOT1 .005	.042	.010	.123	.902	.076	.009
NOT2 .116	.038	.240	3.081	.002	.243	.231
R=.243 F (2, 168)= 5.26	R2=.059 p=.006					

Examining the perceptions of prospective elementary teachers' self-efficacy beliefs of science teaching towards their academic success on science and

technology teaching I, it is concluded in Table-1 that there is a positive and low level relationship (r = .076) between self-efficacy beliefs of prospective teachers and their academic success on science and technology teaching I-II while the Correlation between these variables are calculated as r = .009. However, there is a positive and low level relationship (r = .243) between self-efficacy beliefs of prospective teachers and their academic success on science and technology teaching II while the Correlation between these variables are calculated as r = .231.

It is also seen in Table-1 that there is a meaningful relationship between self-efficacy beliefs of prospective teachers and their academic success on science and technology teaching II (R=.243, p<.05). According to this finding, this point approximates the 6% percentage of the self-efficacy belief variance.

Independent t-test is applied to determine if there is any meaningful relationship according to gender variable between the perceptions of prospective elementary teachers' self-efficacy beliefs of science teaching towards their academic success on science and technology teaching I–II, and the results are as follows in Table 2:

Table 2. Distribution of the prospective elementary teachers' self-efficacy beliefs on science and technology teaching

	Gender	**N**	**Mean**	**Std. Deviation**	**t**	**df**	**p**
Science Teaching Self-efficacy	Female	124	77.3387	6.87033	-1.037	169	.301
	Male	47	78.5532	6.75280			

As seen in Table 2, there is no meaningful relationship according to gender variable between the perceptions of prospective elementary teachers' self-efficacy beliefs of science teaching towards their academic success on science and technology teaching I and II except the first term academic success of the students.

Discussion

This study is conducted with the participation of 171prospective teachers, all of whom were the fourth grade studies at Trakya University, Education Faculty, Elementary Teaching in 2012/2013 academic year and the effects of prospective elementary teachers' academic successes on science and technology teaching I–II towards their self-efficacy beliefs of science teaching are examined. The course of Science and Technology teaching I–II are conducted weekly in 3 class hours at the fifth and sixth terms of the elementary prospective teachers and the curriculum of this course in fifth term includes the basic concepts of science, characteristics of scientific knowledge and the scientific method, science, literacy, community-environment relationships, attitudes and purposes, historical developments, science learning, constructivist approach, cognitive development and science education, program characteristics, relationship to other disciplines, developing skills of scientific process and best practices.

The curriculum of this course in sixth term includes concept development processes, techniques, misconceptions and changes, teaching models, assessment and evaluation in science education: traditional and alternative approaches to assessment (observation, interview, project, performance assessment, portfolio, etc.), developing and presentation of sample activities for science and technology curriculum (Higher Education Council, 2013). According to the distribution of these topics, the scope of the science and technology teaching- I include mainly theoretical issues, while the scope of the science and technology teaching – II course includes mostly the application of theoretical knowledge to the context, teaching methods and technical issues.

Theoretical information is often boring for students, and leads to negative attitudes with a greater challenge, while applied science topics attract the attention of students. Increase in science and technology teaching self-efficacy beliefs of prospective Elementary is possible with test implementation, enforcement, and issues such as the use of technology effectively (Küçükyılmaz and Duban, 2006).

It can be indicated that the science and technology teaching self-efficacy beliefs of prospective Elementary is determined by only the sixth term course of science and technology teaching II since the curriculum of the fifth term is mostly theoretic and sixth term is mostly based on application oriented. Küçükyılmaz and Duban (2006) state in their study on increasing prospective teachers' science and technology self-efficacy beliefs that it is important to increase the duration of laboratory science courses science teaching and using laboratories for more experimentation and prospective teachers should be more effective in these processes.

Another result of the study is that science and technology teaching self-efficacy beliefs of prospective elementary shows no significant difference according to gender. This might be considered as a positive situation. Results of the study are in conflict with certain studies (Morgil, Seçken, and Yücel, 2004; Üredi and Üredi, 2006), while most of the studies in the literature (Akbaş & Çelikkaleli, 2006; Altunçekiç, Yaman & Koray, 2005; Berkant & Ekici, 2007; Denizoğlu, 2008; Ercan, 2007; Karaduman, & Emrahoğlu, 2011; Yaman, Cansüngü & Altunçekiç, 2004) support our conclusion.

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