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ATTITUDES OF PRE-SERVICE SCIENCE TEACHERS TOWARDS EDUCATIONAL RESEARCH AND THEIR SCIENCE TEACHING EFFICACY BELIEFS IN TURKEY

**Nail İlhan,
Zeynel Abidin Yılmaz,
Hülya Dede**

Introduction

The goals of the education system are to educate individuals who produce knowledge, can share that knowledge, and possess scientific attitudes and behaviors. In order to reach these goals, primarily, students must have sufficient knowledge about scientific research methods. Scientific research is described as a procedure of systematic data collection and analysis of collected data for specific purposes (McMillan & Schumacher, 2010). When educational research is analyzed in general, it is seen that many educational research are conducted to produce theoretical knowledge in various fields, in order to determine the possible problems and generate relevant solutions to those problems, and to test how much a process in practice is efficient and productive (McMillan & Schumacher, 2010; Yıldırım, İlhan, Şekerci, & Sözbilir, 2014).

Teachers' awareness from educational research, their understanding and the use of research outcomes in classrooms are important for teachers' professional development. Many studies have been conducted to determine how educational research are effective in practice; however, it has also been observed that these studies fail to generate sufficient solutions to those problems faced in practice by implementers (teachers, managers, politicians etc.) (Biesta, 2007; Everton, Galton, & Pell, 2002; Gore & Gitlin, 2004; Hemsley-Brown & Sharp, 2003; Shkedi, 1998; Yıldırım, et al., 2014). It is necessary for teachers to acquire positive attitudes towards educational research while they are still pre-service teachers, and to realize the ones which are beneficial for their profession, and to use them in education and training so that they could gain professional competence. Teachers' attitudes towards educational research and the effects of such research on teachers have been discussed in previous studies (Çepni & Küçük, 2003; De Jong, 2004; Ekiz, 2006; Everton, Galton, & Pell, 2002). On studying the research on attitudes of the pre-service teachers, teachers and educators towards educational research, it is observed that these studies have been carried out either to analyze attitudes towards

Abstract. *One of the most necessary teaching competencies for science teachers concerns their self-efficacy belief. It is also necessary for teachers to benefit from educational research in order to develop their science teaching efficacy beliefs. However, studies are restricted. This study aims to analyze the attitudes of pre-service science teachers towards educational research and their science teaching efficacy beliefs, and the relationship between the two variables according to some demographical (academic achievement, gender, and the type of high school they attended). The study was conducted according to the survey research design. Sample of the study includes 517 pre-service science teachers (final year students) at five different universities in Turkey. 'Teachers Attitude Scale towards Educational Research [TASTER]' and 'Science Teaching Efficacy Belief Instrument [STEBI]' were used as data collection tools. The data were analyzed using Statistical Package for Social Sciences (SPSS) version 18.0. Analysis of the data has revealed that there is a relationship between the attitudes of the pre-service science teachers towards educational research and their science teaching efficacy belief.*

Key words: *attitude, educational research, self-efficacy, pre-service science teacher.*

**Nail İlhan,
Zeynel Abidin Yılmaz,
Hülya Dede**
Kilis 7 Aralık University, Turkey



scientific research in general or to analyze the educational research only (Cousins & Walker, 2000; Everton, Galton, & Pell, 2002; Isakson & Ellsworth 1978; Korkmaz, Şahin, & Yeşil, 2011a; Oztürk, 2010; Yavuz, 2009; Papanastasiou, 2005; Walker, 2010). In a descriptive study carried out by Korkmaz, Şahin, & Yeşil (2011a) with 713 pre-service teachers, The 'Scale of Attitude towards Scientific Research' was used, and pre-service teachers' attitudes towards scientific research were found to be high in all sub-dimensions of the scale. A qualitative study conducted by Korkmaz, Şahin & Yeşil (2011b) has revealed teachers' opinions about scientific research studies and researchers. According to the study, a great number of the teachers (43%) have positive attitudes towards scientific research whereas one third of the teachers have negative attitudes towards such studies (%27.7).

One of the most necessary teaching competencies for science teachers is the self-efficacy belief. In Bandura's (1997) study, it is stated that a person's judgment about himself is of great importance in the development of an individual's behavior to organize necessary activities in order to show a certain level of performance. In education, sense of self-efficacy is described as teachers' belief in their capability to teach by creating positive changes in a student's level of success and behavior (Dembo & Gibson, 1985; Schriver & Czerniak, 1999). When research on self-efficacy belief is analyzed, it is observed that teachers with higher self-efficacy beliefs apply different methods of teaching in class and do research. Moreover, they are less stressful (Chan, 2003; Küçükylmaz & Duban, 2006). Many studies have been to show how teachers' and pre-service teachers' self-efficacy beliefs are influenced from different variables (Çalışkan, Sezgin, & Özcan, 2010; Cerit, 2010; Yalçın, 2011). It is of great importance for science teachers and pre-service science teachers to have a positive attitude towards educational research so that they can take advantage of these studies. We assume that benefiting from the results obtained from educational research may have an influence on teachers' sense of self-confidence in science teaching. However, within this literature review, the relationship between teachers' or pre-service teachers' self-efficacy beliefs and their attitudes towards educational research have not been studied yet.

Teachers' self-efficacy beliefs are formed more at the time when they are just pre-service teachers (Brandon, 2000), and their internship (teaching practice course) is especially influential on their beliefs (Küçükylmaz & Duban, 2006; Toprakçı, 2003). Likewise, teachers' attitudes towards research studies are formed more at the time when they are just pre-service teachers. 'Scientific Research Methods' is among compulsory subjects to be taken by students in faculties of education in Turkey. Additionally, pre-service teachers have many classes that enable them to use scientific research throughout their training.

Therefore, it is important to determine the pre-service teachers' attitudes towards educational research and their science teaching efficacy beliefs to be able know the type of professional competencies of pre-service teachers to graduate from faculties of education. Additionally, as can be seen in the literature review, there has been a dearth of research on the relationship between teachers' attitudes towards educational research and their science teaching efficacy beliefs. Besides, it is important to point out how self-efficacy beliefs of pre-service teachers may change along with their attitudes towards educational research, and it is also necessary for teachers to benefit from educational research in order to develop their self-efficacy.

Aim of the Study and Research Questions

This study aims to analyze the attitudes of the pre-service science teachers towards educational research and their self-efficacy beliefs in science teaching, and the relationship between the two according to some demographic variables (academic achievement, CPA, gender, type of high school they graduated from). The study tries to find answers to the following research questions.

1. What is the level of attitudes of pre-service science teachers towards educational research and their science teaching efficacy beliefs?
2. How do the GPAs (Grade Point Average) of pre-service science teachers, their attitudes towards educational research, and their science teaching efficacy beliefs differ according to their genders?
3. How do the GPAs of pre-service science teachers, their attitudes towards educational research, and their science teaching efficacy beliefs differ according to the type of high school they attended?
4. Is there a relationship between the GPAs of the pre-service science teachers, their attitudes towards educational research, and their science teaching efficacy beliefs?



Methodology of Research

This study was conducted using the survey research, one of the quantitative research methods. Survey research is used to specify the types of information such as attitudes, beliefs and opinions of people (McMillan & Schumacher, 2010, p.233). In the study, the incidence, frequency, and distribution of the characteristics of the identified sample are described. In addition, we explore the relationship between variables.

Population and the Sample

The research population consisted of all pre-service science teachers (final year) in Turkey. According to OSYM (2009), there are about 4525 pre-service science teachers in 37 faculties of education at universities in Turkey. We aimed to reach 980 pre-service science teachers (final year) in five universities. The data were collected during the end of the academic year 2012-2013. Pre-service teachers were invited to participate in the survey on a voluntary basis. The study sample was identified through the probability sampling in order to ensure adequate representation of the population (McMillan & Schumacher, 2010). The sample consisted of 517 pre-service science teachers (final year) in total, in the faculties of education at 5 different state universities in Turkey, who give lessons at schools as part of their teaching practice (Table 1). Demographic features of the sample are given in Table 1.

Table 1. Demographic features of pre-service teachers.

Gender	n	%
Female	309	59.8
Male	208	40.2
Total	517	100.0
Type of High School Attended	n	%
General High School	293	56.9
Anatolian High School	156	30.2
Science High School	11	2.1
Anatolian Teacher Training High School	36	7.0
Vocational High School	20	3.9
Total	516	100.0
Name of the University	n	%
Atatürk University	129	25.0
Karadeniz Teknik University	157	30.4
Kayseri Erciyes University	62	12.0
Necmettin Erbakan University	108	20.9
Erzincan University	61	11.8
Total	517	100.0

Data Collection Tools

In the study, three different data collection tools were used.

Teachers Attitude Scale towards Educational Research (TASTER): Reliability and validity assessments were performed for this scale, which were developed by İlhan, Şekerci, Sözbilir and Yıldırım (2013). TASTER is a five-point Likert-type scale consisting of 20 items with answers including, 'I Strongly Disagree' (1), 'I Disagree' (2), 'I Neither Agree Nor Disagree' (3), 'I Agree' (4), and 'I Strongly Agree' (5). In a study conducted by İlhan, et al. (2013), reliability coefficient (Cronbach's Alpha) of TASTER was 0.87. Table 2 presents Cronbach's Alpha reliability coefficients of TASTER and its sub-dimensions for the data obtained in the current study. TASTER has three sub-dimensions, which are 'Necessity of Educational Research' (Items 1,3,7,10,14,17,20), 'Value of Educational Research' (Items 2,6,9,11,12,16),



and 'Applicability of Educational Research' (Items 4,5,8,13,15,18,19). The items no 4, 5, 8, 13, 15, 18, 19 are negative items, which are analyzed by converting them into positive statements in data analysis.

Science Teaching Efficacy Belief Instrument (STEBI): The scale was developed by Riggs and Enochs (1990), and adapted into Turkish by Bıkmaz (2004) for classroom teachers. STEBI is a five Likert type scale, which involves 20 items. In the study conducted by Bıkmaz (2004), Cronbach's Alpha reliability coefficient was 0.71 for STEBI. Table 2 shows Cronbach's Alpha reliability coefficients of STEBI and its sub-dimensions for the data obtained in the current study. STEBI involves two sub-dimensions, which are 'Personal Science Teaching Efficacy Beliefs' (Items no 1, 2, 3, 4, 6, 9, 14, 15, 16, 17, 18, 19, 20) and 'Outcome Expectancy in Science Teaching' (Items no 5, 7, 8, 10, 11, 12, 13). In the data analysis, answers to negative items in the scale are converted into positive statements.

Demographic Information Form: It was used to collect data about the demographic information of pre-service teachers. This form provides such information as participants' genders, cumulative grade point average (over 4), the type of high school they attended, and the university they attended et al.

Table 2. Reliability coefficients for the data obtained by taster and STEBI in the current study.

Scale	Number of Questions	Cronbach's Alpha
TASTER	20	0.86
Necessity of Educational Research	7	0.77
Value of Educational Research	6	0.79
Applicability of Educational Research	7	0.71
STEBI	20	0.72
Personal Science Teaching Efficacy Beliefs	13	0.77
Outcome Expectancy in Science Teaching	7	0.66

Data Analysis

Both descriptive (arithmetic mean) and inferential statistical techniques (T-test, Kruskal-Wallis Test and Mann-Whitney Test) were used to evaluate the data. The data was analyzed using statistical software package SPSS 18.0. Independent groups t-test was performed to investigate whether there was a statistically difference in mean scores between the two sample groups in the study. A correlation analysis was performed to determine the significance and strength of the relationship between the two variables.

Results of Research

Descriptive Analysis of TASTER and STEBI

Arithmetic mean scores obtained from the responses given by participants to the questions in TASTER were assessed as follows and interpreted accordingly: the score interval between 1 and 2.59 refers to negative attitudes, 2.60-3.40 score interval refers to moderate attitudes and 3.40-5 score interval refers to positive attitudes. General arithmetic mean score of TASTER was 3.724. According to the mean score from TASTER, the pre-service science teachers in general seem to have a positive attitude towards educational research.

Table 3. Descriptive analysis of TASTER.

Items	Mean (M)	Standard Deviation (SD)
1-Educational researches provide beneficial information that I can use in lectures.	3.99	.78
2-Scientific publications regarding education (dissertations, articles, books etc.) contribute to an increase in the quality of education.	4.08	.82
3-I am pleased to teach a lesson in the class according to the findings of the educational researches.	3.76	.90



Items	Mean (M)	Standard Deviation (SD)
4-Educational researches conducted by academicians are carried out only to enhance their own careers.	2.78	1.22
5-If I teach lessons according to the data obtained from educational researches, the topics cannot be completed.	2.91	.95
6-Teachers should benefit from the findings of educational researches.	4.17	.71
7-I like the seminars on educational researches.	3.52	1.01
8-I believe that the scientific publications regarding education (dissertations, articles, books etc.) are superficial.	3.14	.96
9-It is necessary to benefit from educational researches to become a qualified teacher.	4.11	.80
10-Educational researches contribute to the development and renewal of curricula.	4.06	.81
11-It is necessary to conduct scientific researches regarding education.	4.24	.82
12-It is important to be informed about educational researches.	4.17	.76
13-It is a waste of time to teach lessons according to the results of the educational researches.	3.62	.96
14-Educational researches generate solutions for the problems I encounter in teaching.	3.73	.80
15-I do not think that the educational researches are applicable.	3.17	1.11
16-Educational researches contribute to the development of the teaching profession.	3.97	.77
17-The findings of educational researches that are recounted in seminars are beneficial.	3.85	.79
18-Educational researches do not have applicability in the school environment.	3.37	1.04
19-Teaching lessons according to the findings of educational researches reduces the successes of students.	3.72	.99
20-The findings of educational researches are important for me in the selection of teaching model, method and technique according to the topic in the teaching process.	4.01	.86

When the mean scores obtained from each item in TASTER were analyzed, no item was observed to have a mean score within a score interval (1-2.59) that referred to negative attitudes towards educational research. The items showing moderate attitudes towards educational research are as follows: items 4 (M=2,78), items 5 (M=2,91), items 8 (M=3.14), items 15 (M=3.17). The mean score of other items in TASTER shows positive attitudes towards educational research.

When the results obtained from sub-dimensions of TASTER were analyzed, the mean score for the 'Necessity of Educational Research' was 3.85, whereas the mean score for 'Value of Educational Research' was 4.12. Positive attitudes were observed in both dimensions of TASTER. However, the mean score for the 'Applicability of Educational Research' was 3.25. According to this result, pre-service science teachers seem to have moderate attitudes towards the sub-dimension called the 'Applicability of Educational Research'.

Table 4. Attitudes of the pre-service science teachers towards educational research based on the sub-dimensions of TASTER.

	N	M	SD
Applicability of Educational Research	517	3.25	.63
Necessity of Educational Research	517	3.85	.56
Value of Educational Research	517	4.12	.55
Attitudes towards Educational Research	517	3.72	.48



Mean scores obtained from the items of STEBI were evaluated as follows: 1-2.59 insufficient, 2.60-3.40 moderate enough and 3.40-5 sufficient, and the results were evaluated accordingly. The general arithmetic mean score for STEBI, which was conducted to determine pre-service teachers' science teaching efficacy beliefs, was 3.45. According the mean score obtained from STEBI, pre-service science teachers, in general, seem to have a sufficient level of science teaching efficacy beliefs.

Table 5. Pre-service science teachers' science teaching efficacy beliefs on the sub-dimension of STEBI.

	N	M	SD
Personal Science Teaching Self-Efficacy Belief	517	3.44	.51
Outcome Expectancy in Science Teaching	517	3.45	.47
Self-Efficacy Belief in Science Teaching	517	3.45	.39

When the results obtained from the sub-dimensions of STEBI were observed, the mean score for the dimension of 'Personal Science Teaching Self-Efficacy Belief' was 3.44, whereas the mean score for the dimension of 'Outcome Expectancy in Science Teaching' was 3.45. Based on both dimensions of STEBI, it can be assumed that pre-service science teachers' science teaching efficacy belief is in sufficient levels.

Finding Obtained from TASTER and STEBI according to Gender

The mean scores of TASTER and STEBI of male and female pre-service science teachers were compared on the basis of independent group t-test results (Table 6).

Table 6. Comparison of the finding obtained from TASTER and STEBI according to gender.

	Gender	N	M	SD	t	DF (Degree of Freedom)	Significance (p)
TASTER	Female	309	3.78	.448	3.309	515	.001*
	Male	208	3.63	.515			
	Total	517					
STEBI	Female	309	3.45	.366	.211	515	.833
	Male	208	3.44	.445			
	Total	517					
GPAs	Female	283	2.79	.491	5.373	485	.000*
	Male	204	2.55	.461			
	Total	487					

*p<.05

Results obtained from STEBI reveal that there is no difference in terms of gender with respect to pre-service science teachers' self-efficacy belief in science teaching ($t_{(515)}=2.11$, $p>.05$). However, results obtained from TASTER indicate that there is a statistical significance among pre-service science teachers in terms of gender, which is in favor of female pre-service teachers with regards to their attitudes towards educational research ($t_{(515)}=3.309$, $p>.05$). This shows that female pre-service science teachers have more positive attitudes towards educational research than their male peers. Additionally, when the GPAs of male and female pre-service science teachers are compared, a statistically significant difference is observed in favor of female pre-service science teachers ($t_{(485)}=5.373$, $p<.05$). This result shows that female pre-service science teachers have higher GPAs than their male peers.



Finding Obtained from TASTER and STEBI according to the Type of High School

Kruskal-Wallis H test results (Table 7) show that the type of high school attended does not cause any significant difference in attitudes of pre-service science teachers towards educational research (chi-square_(4,516) = 3.076, df = 4, p>.05). On the other hand, there is a statistically significant difference in pre-service science teachers' science teaching efficacy beliefs according to the type of high school they attended (chi-square_(4,516) = 14.605, df=4, p<.05). Mann-Whitney U Test was used to identify the source of this significant difference observed among different types of high schools. As a result of this test, there was a statistically significant difference between General High Schools (M=3.41) and Science High Schools (M=3.76), which was in favor of the latter; between General High Schools (M=3.41) and Anatolian Teacher Training High Schools (M=3.64), in favor of the latter; between Anatolian High Schools (M=3.453) and Science High Schools (M=3.76), in favor of the latter; and between Anatolian High Schools (M=3.45) and Anatolian Teacher Training High Schools (M=3.64), in favor of the latter. It can be concluded that science teaching efficacy beliefs of pre-service science teachers who graduated from Science High Schools and Anatolian Teacher Training High Schools have higher mean scores than those graduated from General High Schools.

Table 7. Kruskal-Wallis H test results with regards to the type of high school that pre-service science teachers attended.

	Type of High School	N	Mean (M)	Mean Rank	DF	Chi-Square	Significant (p)	Significant Difference
STEBI	GHS	293	3.41	245,32	4	14.605	0.006	GHS - SHS GHS - ATTHS AHS - SHS AHS - ATTHS
	AHS	156	3.45	261,16				
	SHS	11	3.76	349,00				
	ATTHS	36	3.64	329,50				
	VHS	20	3.41	253,33				
	Total	516	3.44					
TASTER	GHS	293	3.70	255,73	4	3.076	0.545	-
	AHS	156	3.74	264,85				
	SHS	11	3.92	315,41				
	ATTHS	36	3.67	232,97				
	VHS	20	3.73	264,28				
	Total	516	3.72					
GPA	GHS	279	2.64	227,36	4	19.994	.001	GHS - AHS AHS - ATTHS
	AHS	146	2.83	285,93				
	SHS	9	2.59	218,44				
	ATTHS	35	2.55	204,34				
	VHS	18	2.71	251,61				
	Total	487	2.69					

General High Schools (GHS), Anatolian High Schools (AHS), Science High Schools (SHS), Anatolian Teacher Training High Schools (ATTHS), Vocational High Schools (VHS)

Kruskal-Wallis H test was used to determine whether the GPAs of pre-service science teachers differ according to the type of high school they attended. It was observed that the GPAs of pre-service science teachers differ significantly according to the type of high school they attended (chi-square_(4,487) = 19.994, df = 4, p<.05). Mann-Whitney U test was conducted to determine the origin of the statistical significance observed among high schools. As a result of the test, a statistically significant difference was observed between General High Schools (M= 2.64) and Anatolian High Schools (M=2.83), in favor of the latter; and between Anatolian High Schools (M=2.83) and Anatolian Teacher Training High Schools (M=2.55), in favor of the former. Hence, it can be concluded that the GPAs of pre-service science teachers who graduated from Anatolian High Schools are significantly much higher than of those who graduated from General High Schools and Anatolian Teacher Training High Schools.



Correlation Analysis of the GPAs, STEBI and TASTER

Pearson's product-moment correlation coefficient was used to determine whether there was a relationship among the GPAs of pre-service science teachers, their attitudes towards educational research and their science teaching efficacy beliefs, and, if so, to determine the power and direction of the relationship, the explained variance, and the level of statistical significance (Table 8).

Table 8. Correlation analysis of the GPAs, STEBI and TASTER.

		GPAs	STEBI	TASTER
GPAs	Pearson Correlation	1		
	Sig. (2-tailed)			
	N	487		
STEBI	Pearson Correlation	.026	1	
	Sig. (2-tailed)	.574		
	N	487	517	
TASTER	Pearson Correlation	.029	.417(**)	1
	Sig. (2-tailed)	.529	.000	
	N	487	517	517

** Correlation is significant at the 0.01 level (2-tailed).

On examining Table 8, no relationship was observed between the GPAs of pre-service science teachers, and their attitudes towards educational research ($r=0.029$, $p>.01$) and their science teaching efficacy beliefs ($r=0.026$, $p>.01$). Additionally, Table 8 shows that there was a moderate, positive and statistically significant relationship between attitudes of the pre-service science teachers towards educational research and their science teaching efficacy beliefs ($r=0.417$, $p<.01$). According to this, it could be concluded that as attitudes of pre-service science teachers towards educational research increase so do their science teaching efficacy beliefs. When determination coefficient (the square of the correlation coefficient, $r^2=0.174$) is taken into account, 17% of the changes (variance) in the pre-service science teachers' science teaching efficacy beliefs are explained through the changes in their attitudes towards educational research.

Discussion

In the current study, attitudes of the final year students (pre-service science teacher) towards educational research at five different universities were assessed by TASTER. According to the data obtained, it was concluded that the pre-service science teachers generally have positive attitudes ($M=3.72$) towards educational research. A study conducted by Yıldırım et al. (2010) with 918 science teachers revealed that the science teachers in general have positive attitudes ($M=3.73$) towards educational research. In the current study, mean attitude score obtained by the pre-service science teachers ($M=3.72$) and the mean attitude score obtained by the science teachers who participated in the study conducted by Yıldırım et al. (2010) were similar.

There are studies, which state that although teachers have positive attitudes towards educational research (Yıldırım et al., 2010; Korkmaz, Şahin, & Yeşil, 2011a), educational research fails to generate solutions to the problems faced in practice (Biesta, 2007; Yıldırım et al., 2014). On examining the results observed from the sub-dimensions of TASTER in the current study, the sub-dimensions called 'Necessity of Educational Research' ($M=3.850$), and 'Value of Educational Research' ($M=4.12$) reveal positive attitudes towards educational research. However, it appeared that the pre-service science teachers have moderate attitudes towards the dimension of 'Applicability of Educational Research' ($M=3.25$). On examining the results according to the sub-dimensions of the TASTER in the study conducted by Yıldırım et al. (2010), it was clear that the science teachers have positive attitudes towards educational research according to the dimensions of the 'Necessity of the Educational Research' ($M=3.89$) and 'Value of Educational Research' ($M=4.43$). However, the mean score for the items under the sub-dimension 'Applicability of Educational Research' ($M=3.04$) shows that the teachers have moderate attitudes towards educational research. The reason why attitudes of the pre-



service science teachers towards educational research were in low levels is that the mean score for the dimension called 'Applicability of Educational Research' in the survey was low too. In the TASTER, the fourth item and the fifth item explain the situation well. Studies in literature show that there have been problems with putting the educational research into practice in classrooms (Ahuja, 2012; Ekiz, 2006; Everton, Galton, & Pell, 2002).

In the current study, results show, that the female pre-service science teachers have more positive attitudes towards educational research than their male peers. On the other hand, in the study conducted by Yıldırım et al. (2010), attitudes of male and female pre-service science teachers towards educational research were compared and no significant difference was observed in the attitudes of the science teachers towards educational research. However, female pre-service science teachers appeared to have more positive attitudes towards the 'Applicability of Educational Research' in the current study. A study conducted by Korkmaz, Şahin, & Yeşil, (2011a) shows that the female pre-service science teachers' attitude scores are significantly lower than those of their male peers in such items as 'Unwilling to Help Researchers' and 'Having a Negative Attitude towards Researches'.

In this study, the mean score (3.45) obtained from STEBI may indicate that the pre-service science teachers' science teaching efficacy beliefs are in sufficient levels. Similar results have been observed in studies that investigate teachers and pre-service teachers' self-efficacy beliefs (Saracoglu & Yenice, 2009; Yalçın, 2011). On the other hand, no significant difference was observed in pre-service science teachers' science teaching efficacy beliefs in terms of gender. Previous literature indicates that there is a significant difference between teachers or pre-service teachers' self-efficacy beliefs and their gender (Opore, 2008; Yalçın, 2011), while some studies show no difference in relation to that (Koparan, Şahin, & Kuter, 2010; Saracoglu & Yenice, 2009). The difference is believed to vary according to region and time.

The current study revealed that attitudes of the pre-service science teachers towards educational research differ according to the type of high school they attended. Consequently, no significant difference was observed according to the type of high school they attended. In addition to this, the study also analyzed whether pre-service science teachers' science teaching efficacy beliefs differ according to the type of high school they attended, and it was observed that science teaching efficacy beliefs differ considerably according to the type of high school they attended. On examining the difference, it has been observed that the mean scores for self-efficacy beliefs of the participants who graduated from Science High Schools and Anatolian Teacher Training High Schools were found higher than those of General High Schools. This is an expected situation for Teacher Training High Schools because there are pedagogical courses within the curriculum at such schools. Additionally, other studies state that pre-service science teachers' levels of science teaching efficacy beliefs differ according to the type of high school they attended (Gerçek, Yılmaz, Köseoğlu, & Soran, 2006; Kahyaoglu & Yangın, 2007).

In the current study, we tried to answer whether the GPAs of pre-service science teachers differ according to their gender and the type of high school they attended. The GPAs of pre-service science teachers were compared and it was found that the GPAs of the female participants are higher than the male participants in the survey. As for the type of high school, the GPAs of the pre-service science teachers who graduated from Anatolian High Schools are significantly higher than those of the participants who graduated from General High Schools and Anatolian Teacher Training High Schools.

Other important data obtained from the current analysis are those that demonstrate the relationship between GPAs of pre-service science teachers, their attitudes towards educational research and their science teaching efficacy beliefs. According to these, no relationship was found between attitudes of pre-service science teachers towards educational research and their GPAs, and between their science teaching efficacy beliefs and their GPAs. Additionally, we observed a positive and significant relationship in a moderate level between attitudes of pre-service science teachers towards educational research and their science teaching efficacy beliefs.

Conclusions

According to this study, it was concluded that science teachers' attitudes towards educational research are formed while they are just pre-service teachers. A study conducted by Yıldırım et al. (2010) shows that and that science teachers' attitudes do not change much after they become teachers. In our study, attitudes of the pre-service science teachers towards educational research for the dimension called 'Applicability of Educational Research' compared with other dimension were in low levels. These results show that there have been problems with putting the educational research into practice in classrooms.

In this study, the mean score obtained from STEBI may indicate that the pre-service science teachers' science teaching efficacy beliefs are in sufficient levels. According to such findings, it was observed a positive and significant



relationship in a moderate level between attitudes of pre-service science teachers towards educational research and their science teaching efficacy beliefs.

The relationship between attitudes of pre-service teachers towards educational research and their science teaching efficacy beliefs are formed more at the time that reveals the importance of relevant courses during undergraduate studies. It is, therefore, important to replace 'Scientific Research Methods' course, which is taught at faculties of education in Turkey, with 'Research Methods in Education', and it is also necessary to emphasize the importance of educational research in order to improve the pre-service science teachers' science teaching efficacy beliefs. In improving the attitudes of teachers and pre-service science teachers towards educational research and science teaching efficacy beliefs, they must be aware of educational research and be knowledgeable about their applicability.

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Nail İlhan (Corresponding author)	PhD., Assistant Professor, Kilis 7 Aralık University, Muallim Rifat Education Faculty, Department of Science Education, 79000, Kilis, Turkey. E-mail: naililhan@gmail.com
Zeynel Abidin Yılmaz	PhD., Assistant Professor, Kilis 7 Aralık University, Muallim Rifat Education Faculty, Department of Science Education, 79000, Kilis, Turkey. E-mail: zeynelyilmaz@kilis.edu.tr
Hülya Dede	PhD., Assistant Professor, Kilis 7 Aralık University, Muallim Rifat Education Faculty, Department of Science Education, 79000, Kilis, Turkey. E-mail: hulyakutu@kilis.edu.tr

