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The Development Process of Classroom Teacher Candidates for Teaching Mathematics: Self-Efficacy, Anxiety and Professional Belief

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In this study, the correlation between the perceived self-efficacy, anxiety levels of prospective elementary school teachers in their mathematics education skills and the correlation between these factors and their professional belief levels were aimed to be measured. The sample of the study consists of 250 prospective elementary school teachers who were continuing their education at a state university in Turkey. The study was formed in accordance with the mixed method research. In the study, "Personal Information Form", "Self-Efficacy Scale for Teaching Mathematics", "Anxiety Scale for Teaching Mathematics ", "Professional Belief Scale" and interview forms were used as data collection tools. Tests which are parametric or non-parametric in terms of their normality distributions in quantitative data analysis were used as statistical packages for social sciences. The analysis of qualitative data was made according to content analysis method. It was determined that the prospective teachers' anxiety level about mathematics teaching was below average and the other variables were in average value. In addition, while there is a positive relationship between self-efficacy perception and professional belief level of teacher trainees to be consistent "candidate" can be used here too, there is a low-level negative relationship between anxiety level and self-efficacy perception level. On the other hand, it was found out that qualitative data showed that teacher candidates perceived themselves as inadequate due to lack of practical training in the university, this situation caused them anxiety and developed belief that they should develop professionally.

Introduction

Teacher training is one of the most important aspects of the education policy of every country. Researchers who are involved in this area of study state that quality of teachers is a variable that directly affects learning (Barber & Mourshed, 2007). So, the quality of teaching is directly related to the teacher's ability to prove themselves. Teachers' self-demonstration is

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related to their self-efficacy and belief in performing their profession. This relationship also gives information about teachers' anxiety towards teaching or learning. When National Council of Teachers of Mathematics [NCTM] (2000) mentions the characteristics that should be present in teachers, they point out that these very characteristics are especially important for the learning process.

The main setting of teacher training programs in our country is faculties of education. The quality of the education given in the faculties of education is important for the prospective teachers to be well equipped and ready for the task at hand. It is obviously clear that the level of education and self-development of the prospective teachers will affect their future professional lives. Mathematics education in particular has become modernized recently and innovative approaches and methods have started to be practiced (Cakiroglu & Isiksal, 2006). In fact, here are many studies in the literature which tried to measure Mathematics prospective teachers' attitude, self-efficacy and anxiety variables towards mathematics education (Alnoor, Yuanxiang & Abudhuim, 2007; Tatar, Zengin & Kagizmanli, 2015). However, the same kinds of studies for prospective elementary school teachers are quite rare. Moreover, the future of mathematics' foundation is laid in primary education. Considering the fact that elementary school teachers are also mathematics teachers, it is necessary to concentrate upon mathematical studies in elementary education. On the other hand, the concept of professional belief represents the psychological aspect of mathematics, such as the concepts of self-efficacy and anxiety. The psychological aspect of mathematics refers to a dynamic process that is highly affected by individual differences. Therefore, investigating these concepts in detail is valuable in terms of strengthening the foundations of mathematics teaching.

In this study, the correlation between the perceived self-efficacy, anxiety levels of prospective teachers in their mathematics education skills and the correlation between these factors and the prospective teachers' professional belief levels were aimed to be measured. For this purpose, answers to the following questions were sought in the study:

(1) What are the central tendency and diffusion measures of prospective elementary school teachers' self-efficacy and levels of anxiety and professional belief regarding mathematics education?
(2) What is the correlation between the levels of self-efficacy and anxiety levels of prospective elementary school teachers regarding mathematics education?
(3) What is the correlation between prospective teachers' levels of self-efficacy and their professional belief regarding mathematics education?
(4) What is the correlation between the levels of anxiety and professional belief of prospective teachers regarding mathematics education?

Theoretical Framework

Self-efficacy

The perception of self-efficacy was first mentioned by Albert Bandura in his social cognitive theory. Bandura defined self-efficacy as the capacity of individuals to organize and carry out the activities necessary for success in a given situation. The perception of self-efficacy is the belief of any given person having the ability to influence events that affect their life (Cakiroglu & Isiksal, 2006). This basic belief is the source of motivation for the successful performances of people against various events (Bandura, 1997). According to Snyder and Lopez (2002), self-efficacy is not something that can be perceived by our sensory organs, but

it refers to the inner beliefs of individuals which are about answering the question of "what can I do with my current talents?" under certain circumstances. These two definitions show that self-efficacy is closely related to motivation. On the other hand, Senemoglu (2003) and Dembo (2004) express self-efficacy as the belief and confidence of an individual in the ability to accomplish a task. Therefore, self-efficacy is not a talent in itself, but rather a person's capabilities which can be realized through their own skills in any particular field (Donald, 2003).

According to the advocates of social cognitive theory, the perception of self-efficacy affects individual choices, the effort to accomplish a task and the degree of anxiety experienced (Isiksal & Askar, 2003). Self-efficacy reflects the individual's perception of his/her own individual competencies as an important factor affecting the transformation of the individual's theoretic knowledge into actual performance (Ulusoy, Gungor, Subasi, Akyol, Unver & Koc, 2011). Thereupon, individuals' own performance is a guideline for evaluating their self-efficacy as success could boost their self-efficacy and failure would have a contrary effect. Based on their level of self-efficacy, individuals decide on the challenges they shall overcome, the amount of effort they will need to achieve success, and the time they will remain patient in the face of negative situations. As a matter of fact individuals must have a solid sense of self-efficacy to be successful against obstacles, difficulties, frustrations, setbacks and injustices (Bandura, 2010). If taken in the context of teachers, self-efficacy is the belief of teachers in their abilities and success in achieving the desired alignment for their students' learning experience, or in bringing their students to the intended level of education (Ashton, 1985; Tschannen-Moran & Woolfolk-Hoy, 2001). According to Guskey and Passaro (1994), teachers' beliefs and confidence in providing good education to their students are equivalent to the concept of self-efficacy.

Teachers who have high levels of self-efficacy and professional beliefs can set goals in order to provide effective education to their students and make efforts to achieve these goals and make corrections by identifying their own mistakes when they receive negative feedback from their students (Cakiroglu & Isiksal, 2006). It is obvious that any high level of self-efficacy and self-belief of the teacher enable students to take an active role in learning, and create an environment in which an increase in the quality and permanence of the information learned can be sustained, and an easier understanding of the courses would be possible (Bandura, 2010). It was found out that teachers and prospective teachers with a higher perception of self-efficacy used different methods and teaching strategies more than others (Riggs & Enochs, 1990). Hoy and Spero (2005) argue that teachers' beliefs of self-efficacy are mostly formed when they are still prospective teachers. Considering the self-efficacy in terms of mathematics education, it is speculated that prospective teachers with higher self-efficacy and professional beliefs would be more aware of their mathematical skills and would provide a better math education (Senay, 2014). It is expected that a well-educated teacher would have high self-efficacy for both mathematics and mathematics education (Doruk, Ozturk & Kaplan, 2016; Umay, 2002). All of these situations are necessary in today's education system in which various approaches are adopted.

Anxiety

Anxiety can be defined as the feeling of fear, tension, and nervousness under a threat (Buyukozturk, 1997). However, if taken in context of mathematics, it is one of the factors that cause individuals to develop negative attitudes towards it, negatively affecting their learning experience (Tooke & Lindstorm, 1998). It is an expected result causing individuals to fail to

understand the course and fail in the math classes. It is quite clear that if this anxiety is not remedied, it will grow and become a bigger problem for the individual and prevent him/her from future development (Yenilmez & Ozbey, 2006).

There are many reasons for anxiety towards mathematics. Lazarus (1974) listed the causes of math anxiety as educational factors, factors arising from family approach, factors related to the structure of mathematics and expectations from the mathematics course. Haris and Haris (1987) divided the causes of math anxiety into three types. These are learner-related, teacher-related, teaching method-related. According to Ugur and Morali (2006), the following are among the most important reasons for mathematics anxiety: mathematics course being highly associated with the success of the students, teaching programs, negative teacher behaviors, and the abstraction and complexity of mathematics course after primary school. Another reason for this anxiety is that students do not see themselves as smart enough to understand mathematics (Yenilmez & Ozbey, 2006). During the course, the teacher's way of explaining the subject, their approach to the students, the methods used, teacher's way of speaking and behavior may cause the student to develop a negative attitude towards the course, if it feels repulsive to the student. It is also a manifestation of mathematics anxiety that some students are afraid to ask questions and be mocked by their peers in the classroom during mathematics courses (Basar, Unal & Yalcin, 2002). Teachers have a very important task, which is to reduce this anxiety of individuals or to completely eradicate it. A teacher who can realize the anxiety of their students towards mathematics course can take this anxiety under control (Peker, 2006). Vinson (2001) stated that in order to reduce the level of anxiety towards mathematics, teachers should try and make mathematics learning a fun experience, adapt mathematics topics in daily life, and teach the methods and techniques which are closely related to the needs and interests of students. Since the formation of this anxiety starts in early ages, it is necessary to take precautions from very early on (Baloglu, 2001). Math anxiety cannot be related to any single cause, on the contrary, it can have many reasons. The important thing is to try to resolve this anxiety by realizing the problem.

Anxiety towards mathematics is not only related to the learning of students, but also the teaching of teachers. In other words, it is also possible to talk about teachers' concerns about mathematics education. Anxiety to teach mathematics is the anxiety experienced by the teachers while teaching mathematical concepts, theorems, formulas, and problem solutions (Peker, 2006). Teacher competence covers content knowledge, pedagogical knowledge, and general cultural knowledge. One of the reasons why teachers have anxiety for teaching mathematics is that they do not find themselves adequate in their content knowledge, which is an important factor on mathematics achievement of students. Teachers who teach mathematics should be aware of the fact if they have mathematics teaching anxiety it is possible to transfer this anxiety, either knowingly or unknowingly, to students and that this very much affects the students' learning adversely. Therefore, they need to find ways to cope with this anxiety (Baloglu, 2001). Anxiety levels of prospective elementary school teachers who are self-sufficient and confident in the content of mathematics are quite low and they can easily demonstrate this competence in their teaching practices (Peker, 2008).

Professional Belief

According to Turkish Linguistic Society (2019) dictionary; belief is a state of heartfelt attachment to an emotion, an ideology, or a thought. It is also defined as the full belief in a thought or individual without seeking any evidence and without asking any question (Oxford,

e-glossary, 2019). Belief is the description of the truth that an individual has the reliability and validity to guide an emotion, thought or behavior (Harvey, 1986).

Beliefs are very important cultural elements in social and personal lives (Yilmaz, Altinkurt & Cokluk, 2011). Beliefs indeed are very effective on human behavior and their impact on humans is stronger than actual experiences (Bandura, 1977). Teachers' behaviors in the education processes and their understanding of the teaching practice are filtered through their own personal beliefs (Chan, 2004). In this case, teachers' professional belief is influenced by many variables such as cognitive or affective status of students, classroom communication, classroom management, curriculum, and program (Guskey, 1988; Soodak & Podell, 1993). As it can be seen so far, the professional belief of a teacher and the teaching-learning processes are integrated within dynamic correlations. In this case, it can be stated that the studies about the professional belief are binding on the decisions to be taken about the teachers. Kagan (1992) claims that the improvement of teacher development systems based on professional belief is actually scientific.

Mathematics education is one of the areas where many students have difficulties in an affective sense, and teachers' professional belief is especially effective in these situations. Professional belief of the teacher is one of the most important factors that affect the learning experience of the student. Lotter, Harwood, and Bonner (2007) state that teachers' professional beliefs are ~~is~~ the most fundamental determinant of students' success. Therefore, it is even more important for teachers to develop their confidence in challenging areas such as mathematics. On the other hand, the development of a false sense of confidence could also lead to hard-to-recover problems in the teaching profession. According to Richardson (1996), this false sense of confidence of the teachers adversely affect the overall education process and causes difficult to recover problems especially on student's learning experience. Belief, in its nature, is a concept that is difficult to change once acquired. Zeichner (1983) states that professional belief can be managed within a structured plan. Therefore, it is important to determine teachers' beliefs about teaching activities and to evaluate the situation.

Method

Research Model

This research was done in two different dimensions, qualitative and quantitative. In this respect, the research falls into the category of mixed research design. According to Tashakkori and Creswell (2007), mixed research design is defined as the studies in which prospective predictions are made by collecting qualitative and quantitative data and analysing them separately and integrating the findings. There are some patterns used in the mixed research design. One of these patterns is embedded pattern. In the embedded design, the basic research method is determined being either quantitative or qualitative, i.e. one becomes more prominent than the other (Creswell & Clark, 2017). Since the correlation between the levels of self-efficacy, anxiety and professional belief levels of prospective teachers towards mathematics education are the subject of research in this study, embedded method was preferred among mixed research designs in order to reveal the depth of this correlations.

Quantitative Pattern

Correlational survey model, which is one of the models of quantitative research methods, was used in this study. The model is the research model used to determine the

existence or degree of differentiation between two or more variables. In the studies that use correlational survey model, the variables to be searched for differentiation should be symbolized separately. This symbolization is done in the form of data pairs that will allow a relational analysis (Karasar, 2016, p. 111). There are two types of correlational survey model as in comparative and correlative. This research is of correlative type. Correlative research examines the correlations between two or more variables and does not interfere with any of these variables (Buyukozturk, Cakmak, Akgun, Karadeniz & Demirel, 2016). In this research, the correlative type of the correlational survey model was used since the aim was to examine the correlation of self-efficacy, anxiety, and professional belief variables.

Qualitative Pattern

The qualitative dimension of this study was designed according to the case studies. Case studies are in-depth studies about an event or concept (Yin, 2011, p. 110). In this study, the aim was to reveal the opinions of prospective teachers about self-efficacy, anxiety, and professional belief.

Participants

The sample of the study was determined with the convenience sampling method which is one of the improbable sampling methods. In improbable sampling, instead of giving equal chance to each individual or object to be selected, individuals or objects are selected according to their characteristics (Aziz, 1994). The workgroup participating in this study consists of students attending the university to which the researchers are affiliated to. This is important in terms of saving time and labour for the researchers.

The sample of the study consists of 250 prospective elementary school teachers who attend a state university in Turkey, during the spring semester of 2018-2019 academic term. The distribution of prospective teachers according to gender and grade levels is given in Table 1.

Table 1. Distribution of prospective teachers according to class levels and gender

Class level	Female	Male	Total
1. Class	45	14	59
2. Class	59	23	82
3. Class	47	23	70
4. Class	20	19	39
Total	171	79	250

In the qualitative dimension of the research, 15 prospective teachers among 250 participants were studied. The selection of these prospective teachers depends entirely on the principle of volunteering, and the data of all prospective teachers participating in the interview were analyzed. Interviews were conducted with three or four prospective teachers from each grade level.

Data Collection Tools

This study is in mixed research design which was formed by collecting both quantitative and qualitative data. As such, both quantitative and qualitative data collection tools were used in the study. In order to collect quantitative data, “Personal Information Form", "Self-Efficacy Perception Scale for Mathematics Teaching”, "Anxiety Scale for Mathematics Teaching” and

"Teacher Professional Belief Scale" were used. Interview method was used to collect qualitative data. Information on these data collection tools is given under their own titles:

Personal Information Form

A personal information form was developed by the researchers for the purpose of collecting personal information of prospective teachers. The Personal Information Form was prepared to determine the teacher candidates' gender and their grade level. The explanation section of the form included the name, purpose of the research, and it was stated that the research in done on a volunteer basis of participation and that the participants could withdraw if they wanted to.

Self-Efficacy Perception Scale for Mathematics Teaching

In order to determine the teacher candidates' perceptions of self-efficacy towards mathematics education, Self-Efficacy Perception Scale for Mathematics Teaching, which was developed by Enochs, Smith and Huinker (2000) and adapted to Turkish by Cakiroglu (2000) was used. The reliability and validity studies of the scale were conducted by Cakiroglu (2000) and it was determined that the scale had two sub-dimensions, namely, personal competence and expectations of outcome. The Cronbach Alpha reliability coefficient of the self-efficacy subscale of the scale was calculated to be 0.83, and the Cronbach Alpha reliability coefficient of the expectations of outcome sub-dimension was calculated to be 0.77.

Anxiety Scale for Mathematics Teaching

Anxiety Scale for Mathematics Teaching developed by Peker (2006) was used to determine the anxiety levels of prospective teachers about mathematics education. The scale consists of 23 items and is of a 5-point Likert type. In measuring the anxiety levels prospective teachers towards mathematics teaching; four sub-dimensions were established: prospective teachers' content knowledge, professional belief levels of prospective teachers, prospective teachers' attitudes, and their content knowledge for teaching. Cronbach's alpha reliability coefficient of the scale was calculated as 0.91.

Teacher Professional Belief Scale

Teacher professional belief scale was developed by Ozgen (2012) and was used to determine the professional belief levels of prospective teachers. The scale has 70 items and is of 5-point Likert type. As a result of the factor analysis applied to the scale, it was seen that the items were accumulated around 6 factors. The factors are as follows; affective, behavioral, developmental, theoretical, cognitive, educational dimensions. Cronbach's alpha reliability coefficient of the scale was calculated as 0.96.

Interview form

Interview is a communication process carried out by two or more people. The interview technique provides in-depth information about research questions (Buyukozturk, et al. 2016). Interview technique is a very flexible data collection tool. It is used during the various stages of research such as in the hypothesis generation, pilot implementation of other data collection tools, supporting the accuracy of the results obtained from the data and so on. In this study,

interview technique was used to support the findings obtained from the previously collected quantitative data.

The interview form developed for this research falls into the category of semi-structured interview form. The semi-structured interview form allows both a multiple-choice survey and an in-depth knowledge of the relevant question (Yildirim & Simsek, 2016, p. 130). The interview form was prepared according to the sub-dimensions of the measurement tools used in the research. There are two sub-dimensions of self-efficacy scale for mathematics teaching, four sub-dimensions of anxiety scale and six sub-dimensions of professional belief scale. Initially, one question was included for each sub-dimension. After the pilot application carried out with three prospective teachers, it was found out that six of the questions predicted similar findings with the other questions, also by referring to expert opinions, these questions were discarded at the end. In this case, there are two questions about the sub-dimensions of each measurement tool in the interview form. Two questions were asked in the context of self-efficacy, as in whether the prospective teachers' find themselves as sufficient in teaching mathematics subjects and who they held responsible for the negativities in the teaching process. Regarding anxiety, prospective teachers were asked whether inadequacies caused anxiety and whether their perspectives on mathematics subjects affect their way of conveying information. Finally, regarding the professional belief dimension of the research, they were questioned whether they considered continuous improvement in teaching as necessary and how they sustain self-improvement, and whether they thought of using the educational courses they had taken during undergraduate level also in their professional lives. The interview form was finalized with these six questions.

Data Collection Process and Analysis

The sample of the study consists of prospective elementary school teachers. For this reason, necessary permissions were obtained from the dean of the university where the application will be made before the data collection process. The prospective teachers who were considered for the data collection process were interviewed and informed about the subject. Volunteer prospective teachers were included in the sample and measurement tools were applied.

The analysis of the data obtained from the research was analyzed in SPSS software package. In the analysis of the data, the inverse items in the measurement tools were identified and the scoring was also inversely performed in the software (1=5, 2=4, 3=3, 4=2, 5=1). As a result of the analyzes performed in the SPSS software, it was examined whether the data showed normal distribution in order to decide which tests to apply to the data (Table 2).

Table 2. Results of the Normality Test Applied to Data

	Teachers' belief		**Self-efficacy**		**Anxiety**	
	Kolmogrov Smirnov		Kolmogrov Smirnov		Kolmogrov Smirnov	
	df	sig	Df	sig	df	sig
Toplam	250	.00	250	.00	250	.20*

As it can be seen in Table 2, it was found that the data obtained from the perception of self-efficacy scale and teachers' belief scale towards mathematics education which are among the applied scales did not show normal distribution and thus, the analyses were conducted using

non-parametric tests for the research questions containing these scales (p<.05). In the normality test applied to the anxiety scale for mathematics education, it was seen that the data were close to normality, and the normal distribution of the data was achieved by taking the square root of the resulting values of the normality test (p> .05). As a result of the normality analyzes, it was found out that the data did not show normal distribution and so non-parametric tests were applied to the data.

Validity and Reliability

As the reliability of the measurement tools on the study group was also important for the reliability of the study, reliability analysis was applied to the data again. As a result of the reliability analyzes, the Cronbach Alpha reliability coefficient of the Mathematics Teaching Self-Efficacy Scale was calculated as 0.865, the Cronbach Alpha reliability coefficient of the Mathematics Teaching Anxiety Scale was calculated as 0.941, and the Cronbach Alpha reliability coefficient of the Professional Belief Scale was calculated as 0.916. The Cronbach Alpha value calculated for all items in the measuring tools indicates the reliability of the scale and is expected to be greater than 0.7 (Field, 2013). For the qualitative findings obtained in the study, the data were first analyzed by two experts simultaneously. The obtained analyzes were compared. The value calculated using Miles and Huberman (1994, p. 64) reliability formula was found to be 96%. Conflict situations were discussed until a consensus was reached. Secondly, these analyzes were shown to an outsider and confirmation was obtained.

Findings

In this section, the findings are discussed separately in quantitative and qualitative dimensions. In the quantitative dimension, prospective teachers' levels of perception of self-efficacy, levels of anxiety and levels of professional belief were compared in pairs; and in the qualitative dimension, the opinions of prospective teachers regarding the structure measured by each scale are provided.

Quantitative Findings

In the study, the mean values and standard deviations of the prospective teachers' scores obtained from self-efficacy scale, anxiety scale and professional belief scale for mathematics education were calculated. The results of these analyzes are given in Table 3.

Table 3. The Results of Descriptive Analysis

	Mean ($\bar{X}$)	**Standard Deviation (SD)**	**Out of 100 Points**
Self-efficacy	75.64	11.96	72.03
Anxiety	51.10	15.63	44.43
Prospective teachers' belief	275.95	33.55	78.84

Since the exact point to be obtained from each scale is different, it was calculated how many score would be equivalent if it was over 100 points in order to catch a standard. When Table 3 is examined, it can be seen that the mean score of self-efficacy perceptions of prospective teachers about mathematics teaching is 75.64, and the standard deviation is SD=11.96. The maximum score that can be obtained from this scale is 105. In other words, this corresponds to an average of 72.03 points over 100 points. According to this finding, it can be said that prospective teachers' perception levels towards mathematics teaching are above average and at a good level. The maximum score that can be obtained from the anxiety scale for mathematics education is 115 and the higher the score is, the higher the level of anxiety is. It was seen that

the mean anxiety scores of the prospective teachers about mathematics education is 51.1 and the standard deviation is 15.63. In other words, this corresponds to an average of 44.43 points over 100 points. Accordingly, it can be said that anxiety levels for mathematics education are below average. The highest score that can be obtained from the professional belief scale applied to prospective teachers is 350. The average score for the prospective teachers participating in the study regarding the professional belief scale is 275.95 and its standard deviation is 33.55. In other words, this corresponds to an average of 78.84 points over 100 points. According to these findings, it can be said that the prospective teachers' professional belief scores are well above the average. Here, the researchers who developed each scale were taken as reference for the interpretation of numerical data (Cakiroglu, 2000; Ozgen, 2012; Peker, 2006).

Spearman correlation analysis was applied to the data containing these two variables in order to question the existence of a meaningful relationship between the prospective teachers' perception of self-efficacy and anxiety levels towards mathematics teaching. The findings of the correlation analysis are given in Table 4.

Table 4. Results of Spearman Correlation Analysis

	Self-efficacy level for mathematics teaching	Anxiety level for mathematics teaching	P
Self-efficacy level for teaching mathematics	1	-.58	.00
Anxiety level for teaching mathematics	-.58	1	

It has been observed that there is a negative and moderate level significant correlation between prospective teachers' perception levels of self-efficacy towards mathematics teaching and anxiety levels towards mathematics teaching ($r = -.58$, $p = .00$, $p < .01$). Accordingly, it can be said that as perception levels of self-efficacy increase, anxiety levels towards mathematics education decrease.

Spearman correlation analysis was used for sub-dimensions of self-efficacy scale and anxiety scale for mathematics teaching. Correlation coefficients and significance levels between sub-dimensions are detailed in Table 5.

Table 5. Results of Spearman Correlation Analysis

			Sub-dimensions of Anxiety Scale			
			Anxiety arising from content knowledge	Anxiety arising from self-confidence	Anxiety arising from the attitude towards teaching mathematics	Anxiety arising from pedagogical content knowledge
Sub-dimensions of the Self-Efficacy Scale	Personal Competence	r	-.61	-.58	-.50	-.50
		p	.00	.00	.00	.00
	Result Expectations	r	-.26	-.26	-.02	-.22
		p	.00	00	.63	.00

When Table 5 is examined, it can be seen that there are significant correlations between the sub-dimensions of the self-efficacy scale for mathematics teaching and the sub-dimensions of the anxiety scale. When approached separately; it can be seen that there is a negative, moderately significant relationship between the self-efficacy subscale of mathematics teaching and all sub-dimensions of the anxiety scale ($p < .05$, $-.69 < r < -.40$). There is no significant

correlation between the expectations of outcome sub-dimension of the self-efficacy scale and the anxiety sub-dimension of the anxiety scale resulting from the attitude towards mathematics teaching ($p>.05$, $-.19<r<.00$). It was also found that there was a negative and low level of significant correlation between the outcome expectations sub-dimension of the self-efficacy scale and the other sub-dimensions of the anxiety scale ($p<.05$, $-.39<r<-.20$).

Spearman correlation analysis was applied to the data containing these two variables in order to question the existence of a significant correlation between the perception of self-efficacy and professional belief levels of prospective teachers for mathematics teaching Correlation analysis results are given in Table 6.

Table 6. Results of Spearman Correlation Analysis

	Self-efficacy perception level for mathematics teaching	Professional belief level	p
Self-efficacy perception level for mathematics tTeaching	1	.23	.00
Professional belief level	.23	1	

There is a positive and low-level correlation between the perception of self-efficacy and professional belief levels ($r=.23$, $p=.00$, $p<.01$). Accordingly, it can be said that the higher the professional belief of the prospective teachers get, the higher the self-efficacy levels for mathematics teaching are.

Spearman correlation analysis was used for sub-dimensions of self-efficacy scale and professional belief scale for mathematics teaching. Correlation coefficients and significance levels obtained between sub-dimensions are detailed in Table 7.

Table 7. Results of Spearman Correlation Analysis

			Sub-dimensions of the self-efficacy scale	
			Personal competence	Result expectations
Sub-dimensions of Professional Belief Scale	Affective	r	.16	.64
		p	.00	.00
	Behavioral	r	.13	.47
		p	.02	.00
	Development	r	.25	.51
		p	.00	.00
	Institutional	r	-.03	.05
		p	.57	.32
	Cognitive	r	.06	.34
		p	.25	.00
	Education	r	-.01	.17
		p	.77	.00

Spearman correlation analysis was applied to the data containing these two variables in order to question the existence of a significant correlation between the anxiety levels of prospective teachers and their professional belief levels. Correlation analysis results are given in Table 8.

Table 8. Results of the Spearman Correlation Analysis

	Professional belief level	Anxiety level for teaching mathematics	p
Professional Belief Level	1	-.10	.08
Anxiety level for Teaching Mathematics	-.10	1	

When Table 8 is examined, it is calculated that the correlation coefficient between the anxiety levels of prospective teachers towards mathematics education and their professional belief levels is r =-.10. A correlation coefficient between -0.30 and 0.00 means a low level and negative correlation. However, this correlation is not significant, as the significance value was calculated as p=.08 (p>.01).

Spearman correlation analysis was conducted for the sub-dimensions of anxiety scale towards mathematics education and professional belief scale. Correlation coefficients and significance levels between sub-dimensions are detailed in Table 9.

Table 9. Results of the Spearman Correlation Analysis

			Sub-dimensions of Anxiety Scale			
			Anxiety arising from content knowledge	Anxiety arising from self-confidence	Anxiety arising from the attitude towards teaching mathematics	Anxiety arising from pedagogical content knowledge
Sub-dimensions of Professional Belief Scale	Affective	R	-.12	-.13	.01	-.18
		P	.03	.02	.75	.00
	Behavioral	R	-.11	-.08	-.01	-.16
		P	.05	.16	.81	.00
	Development	R	-.16	-.09	-.04	-.13
		P	.00	.11	.41	.02
	Institutional	R	.01	.02	-.01	-.05
		P	.81	.67	.83	.39
	Cognitive	R	.,02	.01	.03	-.07
		P	.70	.75	.58	.23
	Education	R	.05	.09	.09	.01
		P	.40	.12	.11	.79

When Table 9 is examined, no significant relationship was found between the sub-dimensions of the anxiety scale and the sub-dimensions of the professional belief scale (p>0.05). When the p values were examined, the significance values for the anxiety subscale of the anxiety scale for the content knowledge and the affective and development subscale of the professional belief scale; anxiety subscale for the professional belief and affective subscale; the anxiety subscale due to content knowledge and affective, behavioral and developmental subscale are at the desired level (p<.05); however, the correlation coefficients indicate that there is no correlation among them (.00<r<.19). When the correlations between the other sub-dimensions are examined, both the significance value and the correlation coefficient showed that there are no significant correlations between them.

Qualitative Findings

In this section, statements of 15 prospective teachers are included. The data obtained will be summarized in three parts as self-efficacy, anxiety, and professional belief.

First of all, if we evaluate the answers of prospective teachers to the first question about self-

efficacy, we can see that 7 out of 15 prospective teachers consider themselves sufficient while 8 do not. Prospective teachers who claim to be self-sufficient stated that they mostly trust their knowledge they obtained in the past. Some student responses are as follows: *"I feel sufficient because I was already good at teaching mathematics", "I feel adequate as I have worked in a private school before"*. Many of the prospective teachers who considered themselves as inadequate stated that their education at university was inadequate. Answers like *"I am not yet qualified because the education I received at the university is inadequate", "I have to make additions to the education I received because we did not receive a good education"* are in abundance. Two students stated that what was explained and what was in practice had different mathematical content. They particularly pointed out the differences between theory and practice. In the second question about self-efficacy, it states that the negativity in the teaching process can be caused by the lack of knowledge of the student ($n = 1$), the lack of knowledge of the teacher ($n = 10$), and the absence of both ($n = 4$). The following answers are among the answers of the prospective teachers who claim responsibility for the process: *"There are teachers who do not teach", "Our job is to teach and we must do it properly", "Because I cannot lower myself to the students' level", "You reap what you sow, there always is something a good teacher can contribute"*. A teacher candidate however, stated that not all students can learn, so the failure in education is the student's own failure.

It can be said that there are two answers to the question whether the possibility of insufficient academic knowledge about anxiety causes anxiety: yes ($n = 11$), no ($n = 4$). Candidates who stated that they were not worried accentuated that their academic knowledge was well established and another one pinpointed that the target audience was under age and therefore their knowledge was already more than enough for the students. In cases of concern, it was seen that one participant highlighted that his/her university professors also had insufficient academic knowledge and that he/she was inadequate because he/she took lessons from such teachers. Other prospective teachers pronounced that not everything can be known and that even the thought of any such thing is quite exhausting. Three of the prospective teachers who expressed concern stated that the anxiety caused by the lack of teaching skills as well as the weakness of academic knowledge would be more intense. For example, a teacher candidate stated his/her concern by saying: *"I have no problems in terms of academic or mathematical knowledge. But I don't think teaching has anything to do with these. I'm worried! I will improve myself on these issues after graduation"*. The answers to the second question, in which it was questioned if the perspectives affect the lectures, are divided into two parts: yes ($n = 7$), no ($n = 8$). Prospective teachers who answered "yes" said: *"Some subjects are difficult.", "Not in a negative sense, but my behavior can change between easy and difficult topics.", "Of course it does, I will probably give the lecture of a subject that I do not like and developed prejudice against with less motivation, compared to a subject that I like"*. Those who answered "No" stated that mathematics is not really related to perspectives and there is no relativity in mathematics. There is only one answer. Thus, it would not be affected by different points of view.

Finally, when the answers regarding the professional belief are examined, all but one participant believe that the prospective teachers need to develop themselves continuously, whether they need to improve or not. The teacher candidate who does not believe in change said that mathematics is a constant/unchanging discipline. In other words, this particular teacher candidate thinks of mathematics as a pile of patterns which does not require anything new to be added. Prospective teachers ($n = 14$) who believe in self-improvement believe that they can achieve this by monitoring up to date information on the field of expertise; *by questioning how to do better; reading books, participating in conferences; reading foreign sources and articles, and getting help from colleagues; by participating in in-service trainings and activities*

supporting personal and professional development; reading books; participating in social activities; communicating with experienced teachers; mastering the curriculum; keeping their beliefs alive; by getting a master's degree; and simply by just practicing. On the other hand, 10 participants answered “yes” and 5 answered “no” to the question of whether they intend to apply their gains in the educational sciences in the future. Two prospective teachers who answered “Yes” actually answered “yes” partially. It was found that the prospective teachers could not give a fully applicable answer as they think that there is a difference between theory and practice. Prospective teachers who answered “no”, complained about the inadequacy of their education at the university. In particular, they complained that many of the concepts they learned in educational sciences did not have any use in real life.

Discussion and Conclusion

In this part of the research, results, and discussions regarding both quantitative and qualitative findings are presented. First of all, the average scores of the prospective teachers' anxiety, self-efficacy and professional belief scales were observed. According to these findings, it was concluded that prospective teachers' perception of self-efficacy for mathematics teaching and professional belief scores were found to be higher than the average, and their anxiety levels towards mathematics teaching were found to be below average. When we look at the literature for the studies in order to determine the levels of perception of self-efficacy for mathematics teaching, we can find studies which resulted in higher than average self-efficacy levels (Parrot, 2001; Chang, 2003, Self, 2004; Cakıroglu & Isiksal, 2006; Yenilmez & Kakmaci 2008). As a result of the study, it was concluded that the prospective teachers' anxiety levels towards teaching were below average. When the studies investigating the anxiety levels of prospective teachers regarding mathematics teaching are examined, it is possible to come across studies that are in line with the results of our research (Bekdemir, 2006; Conrad & Tracy, 1992; Elmas, 2010; Peker, 2009b; Uusimaki & Nason, 2004; Uldas, 2005). For example, Elmas (2010), in his study, examined the anxiety levels of prospective elementary school teachers in mathematics education and the factors that caused this anxiety and concluded that the anxiety levels of prospective teachers were below average. When the results related to the professional belief of prospective teachers are considered, it can be said that professional belief scores are above average. When the related literature is examined, Ozgen (2012) examined the professional belief of elementary school teachers and prospective teachers in his study, and found that the sub-dimension with the highest professional belief level of the prospective teachers was the "affective sub-dimension". When he compared the professional belief levels of prospective teachers and teachers, he concluded that prospective teachers were more idealistic and had higher professional belief compared to the teachers in practice.

In this research, variables were compared in pairs. At first, analyses related to self-efficacy and anxiety levels were provided. These analyses revealed that there was a moderate negative correlation between the prospective teachers' perception of self-efficacy levels and their anxiety levels for mathematics teaching. Accordingly, it is possible to conclude that prospective teachers with higher perceptions of self-efficacy towards mathematics teaching have low anxiety levels. In their study, Brusal and Paznokas (2010) examined the anxiety and self-efficacy levels of prospective teachers towards mathematics teaching, and as a result of the research, they found higher self-efficacy levels and lower anxiety levels for prospective teachers. Temiz (2012) examined the correlations between the perception levels of self-efficacy and anxiety levels of prospective teachers towards mathematics teaching and concluded that there was a high level of negative correlation between these two variables. Another study was conducted by Ural (2015) and investigated the effect of the perception of self-efficacy of

prospective teachers on anxiety towards mathematics teaching and found that prospective teachers' self-efficacy levels was high and their anxiety levels towards mathematics teaching was low. In their study, Doruk and Kaplan (2013) examined the prospective teachers' self-efficacy and anxiety levels for mathematics teaching, and as a result of the research, they found higher than average self-efficacy levels and lower than average anxiety levels. They also stated that this was a very positive outcome.

In the analysis of the prospective teachers' professional belief and self-efficacy perception levels towards mathematics teaching, it was found that there was a positive and low-level correlation between these two variables. Based on this result, it can be said that prospective teachers who have high professional beliefs have a higher perception of self-efficacy for mathematics teaching Holt-Reynolds (1992) aimed to investigate the relationship between pre-service teachers' educational studies and personal history-based beliefs. In this research, it was tried to find out how prospective teachers are using the ideas and information they have gained while they were students. As a result of the research, it has been revealed that prospective teachers frequently use their past learning experiences in the present and it was concluded that they will continue to use such experiences when they start their professional life. Hollingsworth (1989) prepared a report of the first phase of a longitudinal study aimed at examining the change of knowledge and beliefs about reading education before, during and after the teacher trainee education in the last year of the education program. 14 primary and secondary prospective teachers participated in the study. As a result of the research, it was observed that the prospective teachers who participated in teaching trainee courses developed themselves in subjects such as planning and controlling students' prior knowledge. In addition, it is another result of the research that it is important to determine the beliefs of prospective teachers before employing them for the teaching services. Ilgaz, Bulbul and Cuhadar (2013) investigated the relationships between prospective teachers' self-efficacy perception levels and educational beliefs. As a result of the research, a significant positive correlation was found between the self-efficacy perception levels of prospective teachers and their educational beliefs. This result is in line with our research results. The studies conducted by Kasikci (2015) and Ozgen (2010) regarding this result of the research can also be viewed.

If we evaluate the qualitative findings of the research, we can conclude that half of the prospective teachers perceive themselves as sufficient and the other half as insufficient. Prospective teachers who consider themselves self-sufficient, rely on their previous mathematical knowledge and experiences; prospective teachers who deem themselves insufficient on the other hand, mention the inadequacy of their education. There seems to be a slight hint of inadequate education in the answers received from prospective teachers who perceive themselves to be sufficient. In other words, we can say that those who rely on their past experiences think themselves adequate and those who do not rely on their past experience think themselves as inadequate. Moreover, it was found that they tend to relate errors with themselves in cases of failure to achieve success. Prospective teachers' inability to trust themselves, their concerns regarding their education may have fostered this idea of inadequacy. In addition, prospective teachers mostly state that academic insufficiency is a cause for anxiety. On the other hand, half of the prospective teachers underlined that the viewpoint developed on the subject would not affect the way the lecture is conveyed. Moreover, it was seen that they think the gains they had in the educational sciences courses would not work in their professional life and they attributed this to the poor quality of education they received. Prospective teachers' thoughts about the courses they take can shape their competencies and confidence in as well asconcerns about their profession. It has long been the subject of controversy if teachers can be trained adequately or not (Kavcar & Sezgin, 2003). The fact that such results are still expressed

in 2019 means that these issues will be encountered in the future.

Suggestions

In this study, information was given about the self-efficacy-anxiety-professional beliefs of elementary prospective teachers. In the research findings, statistical results showing that the anxiety levels of prospective teachers are negatively correlated with the other two variables are presented. In addition, in the interviews with the prospective teachers, the candidates expressed their concerns about the insufficiency of the education they received.Therefore, it is recommended to consider the attempts to reduce the anxiety of prospective teachers in pre-service education. It is thought that this initiative will have a positive effect on both professional belief and self-efficacy. On the other hand, feedback obtained from prospective teachers during the implementation of the study suggested that it would be useful to include into the process, the "attitude" variable towards mathematics.

References

Alnoor, A.G., Yuanxiang, G., & Abudhuim, F.S. (2007). *Assessment mathematics teacher's competencies*. Retrieved June 15, 2019 from: https://files.eric.ed.gov/fulltext/ED495712.pdf

Ashton, P. (1985). Motivation and teacher's sense of efficacy. *Research on motivation in education*, *2*, 141-174.

Aziz, A. (1994). *Research methods-techniques and communication.* Ankara: Turhan Press.

Baloglu, M. (2001). Defeat the fear of mathematics. *Journal of Educational Sciences in Theory and Practice, 1*(1), 59-76.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavior change. *Psychological Rewiew, 84*, 191-215.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. Newyork: Freeman.

Bandura, A. (2010). Self-efficacy. *The Corsini encyclopedia of psychology*, 1-3.

Buyukozturk, S. (1997). Anxiety scale for research improving, *Educational Administration in Theory and Practice, 12*(12), 453-464.

Buyukozturk, S., Cakmak, E. K., Akgun, O. E., Karadeniz, S., & Demirel, F. (2016). *Scientific research methods.* Ankara: Pegem Academy.

Cakiroglu, E. (2000). *Preservice elementary teachers' sense of efficacy in reform-oriented mathematics.* (Unpublised doctoral dissertation). Indiana University.

Chang L.Y. (2003). *An Examination of Knowledge Assessment and self-efficacy Ratings in Teacher Preparation Programs in Taiwan and The United States USA* (Unpublished Doctoral Thesis). University of Idaho.

Conrad, K. S., & Tracy, D. M. (1992). *Lowering preservice teachers' mathematics anxiety through an experience-based mathematics methods course.* Retrieved August 18, 2019 from: https://files.eric.ed.gov/fulltext/ED355099.pdf

Creswell, J. W., & Clark, V. L. P. (2017). *Designing and conducting mixed methods research*. Sage publications.

Delice, A., Ertekin, E., Aydin, E., & Dilmac, B. (2009). An investigation of the relationship between epistemological beliefs and mathematics anxiety of student teachers. *International Journal of Human Sciences, 6*(1), 361-375.

Donald, M. G. (2003). *Handbook of self and identity*. London: Guilford Press.

Doruk, M., & Kaplan, A. (2013). Examining mathematics anxiety of prospective primary school and prospective primary mathematics teachers. *Kastamonu Education Journal, 21*(4), 1505-1522.

Doruk, M., Ozturk, M., & Kaplan, A. (2016). Investigation of the self-efficacy perceptions of middle school students towards mathematics: anxiety and attitude factors. *Adıyaman University Journal of Educational Sciences, 6*(2), 283-302.

Enochs, L., G., Smith, P., L., and Huinker, D. (2000). Establishing Factorial Validity of the Mathematics Teaching Efficacy Beliefs Instrument. *School Science and Mathematics, 100*(4), 194-202

Field, A. (2013). *Discovering statistics using IBM SPSS statistics*. Sage Publication.

Furner, J. M. (1996). *Mathematics teachers' beliefs about using the National Council of Teachers of Mathematics Standards and the relationship of these beliefs to students' anxiety toward mathematics* (Unpublished doctoral dissertation). University of Alabama, Tuscaloosa. Dayton, OH: Ohio Psychology Press.

Guskey, T. R. (1988). Teacher efficacy, self-concept, and attitudes toward the implementation of instructional innovation. *Teaching and Teacher Education*, *4*(1), 63-69.

Guskey, T. R., & Passaro, P. D. (1994). Teacher efficacy: A study of construct dimensions. *American Educational Research Journal*, *31*(3), 627-643.

Hollingsworth, S. (1989). Prior beliefs and cognitive change in learning to teach. *American Educational Research Journal*, *26*(2), 160-189.

Holt-Reynolds, D. (1992). Personal history-based beliefs as relevant prior knowledge in course work. *American Educational Research Journal*, *29*(2), 325-349.

Hoy, A. W., & Spero, R. B. (2005). Changes in teacher efficacy during the early years of teaching: A comparison of four measures. *Teaching and Teacher Education, 21*(4), 343-356.

Ilgaz, G., Bulbul, T., & Cuhadar, C. (2013). Investigation of the relationship between preservice teachers' educational beliefs and their perceptions of self-efficacy. *Journal of Abant Izzet Baysal University Faculty of Education 13*(1), 50-65.

Isiksal, M., & Askar, P. (2003). The scales of perceived mathematics and computer self-efficacy for elementary students. *Hacettepe University Journal of Education, 25*(25), 109-118.

Isiksal, M., & Cakıroglu, E. (2006). Pre-service mathematics teachers' efficacy beliefs toward mathematics and mathematics teaching. *Hacettepe University Journal of Education 31*(31), 74-84.

Kagan, D., M. (1992). Implication of research on teacher belief. *Educational Psychologist, 27*(1), 65-90.

Karasar, N. (2016). *Scientific research methods* (30. ed.). İstanbul: Nobel Academy.

Kasikci, M. (2015). *The effect of drama techniques on prospective elementary mathematics teachers' knowledge of maths history, beliefs and attitudes in the history of mathematics course* (Unpublised master's thesis). Dokuz Eylul University, İzmir.

Lazarus, R. S. (1974). Psychological stress and coping in adaptation and illness. *The International Journal of Psychiatry in Medicine*, *5*(4), 321-333.

Lotter, C., Harwood, W. S., & Bonner, J. J. (2007). The influence of core teaching conceptions on teachers' use of inquiry teaching practices. *Journal of Research in Science Teaching*, *44*(9), 1318-1347.

Miles, M. B., & Huberman, M. (1994). *Qualitative Data Analysis: A Sourcebook of New Methods* (2nd ed). Beverly Hills, CA: Sage Publications.

National Council of Teachers of Mathematics [NCTM]. (2000). *Principles and standards for school mathematics*. Reston, VA: Author.

Oxford E-Dictionary. Retrieved 13 April, 2019 from: http://oxforddictionaries.com/definition/belief

Ozgen, B. (2012). *A research on teacher and teacher candidate beliefs about teaching,* (Unpublised doctoral dissertation). Marmara University, İstanbul.

Parrot, M.Y. (2001) *An analysis of the mathematics teaching efficacy beliefs of pre-service elementary teachers and pre-service secondary teachers* (Unpublished Doctoral Thesis). USA: Oklahoma State University.

Peker, M. (2006). The development of mathematics teaching anxiety scale, *Journal of Educational Sciences & Practices*, *5*(9), 73-92.

Peker, M. (2009). Pre-service mathematics teacher perspectives about the expanded microteaching experiences, *The Journal of Turkish Educational Sciences*, *7*(2), 353-376.

Richardson, V. (1996). The role of attitudes and beliefs in learning to teach. J. Sikula, T. Buttery, & E. Guyton (Eds), Handbook of Research on Teacher Education: *A Project of the Association of Teacher Educators* (pp.102-119). New York: Macmillan Library Reference.

Riggs, I. M. & Enochs, L. G. (1990). Toward the development of an elementary teacher's science teaching efficacy belief instrument, *Science Education, 74*(6), 625-637.

Senemoglu, N. (2003). *Learning development and teaching from theory to practice*. Ankara: Gazi Publication.

Snyder, C. R., & Lopez, S. J. (Eds.). (2001). *Handbook of positive psychology*. Oxford University Press.

Soodak, L. C., & Podell, D. M. (1993). Teacher efficacy and student problem as factors in special education referral. *The Journal of Special Education, 27*(1), 66-81.

Senay, S. C. (2014). *Investigation of the relation between pre-service mathematics teachers' tendencies of reducing abstraction directed to number theory and their thinking styles and their mathematics self-efficacies* (Unpublised doctoral dissertation). Marmara University, İstanbul.

Tashakkori A., Creswell J., W. (2007). Editorial: the new era of mixed methods. *Journal of Mixed Methods Research, 1*(1), 3–7.

Tatar, E., Zengin, Y., & Kagizmanli, T. B. (2016). Examining levels of mathematics teaching anxiety of pre-service teachers *Journal of Theoretical Educational Science*, *9*(1), 38-56.

Temiz, T. (2012). *The relationship between pre-service elementary school teachers self-efficacy perceptions and anxity towards mathematics teaching* (Unpublised master's thesis). Yuzuncu Yıl University, Van.

Tooke, D. J., & Lindstrom, L. C. (1998). Effectiveness of a mathematics methods course in reducing math anxiety of preservice elementary teachers. *School Science and Mathematics*, *98*(3), 136-139.

Tschannen-Moran, M., & Hoy, A. W. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education*, *17*(7), 783-805.

Turkish Language Society (2019). Turkish Dictionary. Ankara: Turkish Language Institution Publicatons.

Ulusoy, A., Gungor, A. A., Akyol, A. K., Subasi, G., Unver, G., & Koc, G. E. (2011). *Education psychology*. Ankara: Ani Publishing.

Ural, A. (2015). The effect of mathematics self-efficacy on anxiety of teaching mathematics. *Journal of Theoretical Educational Science*, *8*(2), 173-184.

Uusimaki, L. & Nason, R. (2004). Causes underlying pre-service teachers' negative beliefs and anxieties about mathematics. *Proceedings of the 28th Conference of the International Group for the Psychology of Mathematics Education, 4*, 369-376.

Uldas, I. (2005). *Development of a mathematics anxiety scale towards teachers and prospective teachers (MAS-T) and an assessment on mathematics anxiety* (Unpublised master's thesis). Marmara University, Istanbul.

Yenilmez, K., & Kakmaci, O. (2008). The level of self-efficacy beliefs at students at elementary mathematics education department. *Eskisehir Osmangazi University Journal of Social Sciences, 9*(2), 1-21.

Yenilmez, K., & Ozbey, N. (2006). Private and public-school students a research on math anxiety levels. *Journal of Uludag University Faculty of Education*, *19*(2), 431-448.

Yilmaz, K., Altinkurt, Y., & Cokluk, O. (2011). Developing the educational belief scale: The validity and reliability study. *Educational Sciences: Theory & Practice*, *11*(1), 343-350.

Yin, R. K. (2011). *Applications of case study research*. London: Sage.

Zeichner, K. M. (1983). Alternative paradigms of teacher education. *Journal of teacher education*, *34*(3), 3-9.