



## The Examination of Prospective Mathematics Teachers' Mathematics Teaching Anxiety Levels

### Matematik Öğretmen Adaylarının Matematik Öğretmeye Yönelik Kaygılarının İncelenmesi

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**ABSTRACT:** The aim of this research is to determine prospective mathematics teachers' mathematics teaching anxiety level who continue Pedagogical Formation Program and who study in Mathematics Education Department at the Faculty of Education. Besides, it is aimed to examine whether the difference is significant in accordance with the program from which teacher education is received and gender variables. The sample of the research consists of 301 prospective math teachers who are in two groups. The study is a descriptive study which is made in accordance with the general survey model and is also a comparative study in which teaching anxiety mean levels of prospective math teachers about mathematics are examined. "The Mathematics Teaching Anxiety Scale" which was developed by Peker (2006) is used to examine the anxiety levels about teaching math of prospective math teachers. As a result of the research, mathematics teaching anxiety mean scores of the prospective math teachers who continue Pedagogical Formation Program and who are studying in Mathematics Education Department at the Faculty of Education are found very close to each other. It is obtained that the prospective math teachers' anxieties for teaching mathematics in two groups have a significant difference in accordance with gender in favor of female ones.

**Keywords:** mathematics department, teacher candidate, mathematics teaching, anxiety, formation education.

**ÖZ:** Bu araştırmanın amacı Pedagojik Formasyon Programına devam eden ve Eğitim Fakültesinde öğrenim görmekte olan matematik eğitimi bölümü öğretmen adaylarının matematik öğretmeye yönelik kaygı düzeylerini belirlemektir. Buna ilave olarak bu kaygılarının cinsiyet ve öğretmenlik eğitimi alınan program değişkenine göre anlamlı bir fark gösterip göstermediğini tespit etmektir. Araştırmanın örneklemini bu iki grupta olan toplam 301 matematik öğretmeni adayı oluşturmaktadır. Çalışma genel tarama modelinde yapılmış betimsel aynı zamanda da öğretmen adaylarının matematik öğretmeye yönelik kaygı düzey ortalamalarını inceleyen karşılaştırma çalışmasıdır. Matematik öğretmen adaylarının matematik öğretmeye yönelik kaygı düzeylerini belirlemek için Peker (2006) tarafından geliştirilen "Matematik Öğretmeye Yönelik Kaygı Ölçeği" kullanılmıştır. Araştırmanın sonucunda Eğitim Fakültesinde öğrenim görmekte olan öğretmen adayları ile Pedagojik Formasyon programı matematik öğretmen adaylarının matematik öğretmeye yönelik kaygı puan ortalamaları birbirine çok yakın bulunmuştur. İki gruptaki matematik öğretmen adaylarının matematik öğretmeye yönelik kaygılarının cinsiyete göre kızlar lehine anlamlı bir farklılık gösterdiği tespit edilmiştir.

**Anahtar kelimeler:** matematik bölümü, öğretmen adayı, matematik öğretimi, kaygı, formasyon eğitimi.

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## Introduction

Mathematics is a tool used in revealing of the talents of individuals and in giving them a logical thinking habit (Bulut, 1994). The mathematics course which is necessary and important for people in every step of their life is one of the lessons that students have difficulty in learning. At every stage of the education process, we encounter to it as a lesson that students develop negative attitudes with different reasons, and consider in a biased way. This negative attitude affects mathematics achievements of students negatively (Kurbanoğlu & Takunyacı, 2012). The Mathematics teaching anxiety has a very important place in the developing of positive attitude towards mathematics course by students (Peker & Mirasyedioglu, 2003). Baloğlu (1999) stated that the anxieties of students regarding mathematics are one of the important problems. Nolting (2010) stated that the reason of this anxiety is subjective. Apart from this, one of the reasons of math anxiety is the effect of teachers on students (Alkan, 2011). In other words, this is especially the attitudes and behaviors of the teachers. For this reason, every experience that students have with teachers are important about their attitudes towards mathematics. In addition, Ünlü & Ertekin (2013) stated in their research that the teachers transfer their anxieties regarding mathematics to their students. It is not possible that students who follow in their teachers' footsteps do not realize the anxieties of their teachers and are not affected by them. Anxiety towards mathematics is one of the most important obstacles in learning mathematics. In addition to these general reasons, Gresham (2007) said that teaching practices of teachers were one of the reasons causing math anxiety in students. It is emphasized that ability of teachers such as organizing the classroom environment, time management, lesson plan, teaching skills cause emerging of anxiety in teachers (Peker, 2009a). This leads us to math teaching anxiety. Peker (2006) defined mathematics teaching anxiety as “*the feelings of tension and anxiety that are experienced by teachers in teaching mathematical concepts, theorems, formulas or problem solving.*” Gardner and Leak (1994) described this anxiety as “*anxiety belonging to the experiences regarding practice of teaching and classroom activities that involve teaching activities.*” The teaching anxiety also includes the teacher's own teaching activities (Fish & Fraser, 2001). Peker (2009b) noted that the anxiety regarding mathematics teaching is a fairly common fear among prospective teachers. Also Peker (2006) stated that knowledge of the field, self-confidence and attitude towards mathematics are factors affecting mathematics teaching anxiety and mathematics. Karakaş Türker & Turanlı (2008) stated that attitudes of teachers towards teaching mathematics lecture affected attitudes of students. Ameen, Guffey & Jackson (2002) emphasized in the study that difficulty in responding to questions of students, increases mathematics teaching anxiety. Aslan (2013) noted that there are several studies showing that the teachers have higher math teaching anxiety than the prospective mathematics teachers. It was stressed that reducing the anxieties of prospective teachers before they become teacher is an issue requiring attention in this regard (Liu, 2008). Yenilmez & Duman (2008) stated that perspectives of teachers about the anxiety level of mathematics, the quality of knowledge, affect the quality of mathematics teaching. When considering all of these, it is inevitable that the studies done for determining the anxiety of teachers and prospective math teachers in mathematics teaching has increased in recent years (Peker & Ertekin, 2011). When examining the literature, Akinsola (2008) found in the study that the competence of

problem solving skills in mathematics is inversely related to teaching anxiety. Peker (2009a) found a relationship between math teaching anxiety and learning styles in his study. In addition to this he determined that mathematics teaching anxiety was at the highest level in ones who have divergent learning styles, and this was at the lowest level, on the contrary, in those with convergent learning styles. Umay (2001) obtained in the research that prospective mathematics teachers who study on the primary school mathematics teachers education program at Hacettepe University, have a high belief in their own competences in mathematics. At the same time, by emphasizing the importance of dominating every subject in the field, he stressed that prospective math teachers must have high self-efficacy perceptions regarding mathematics. Tatar, Zengin & Kağızmanlı (2016) conducted a research on 475 mathematics teachers in order to detect their level of anxiety towards mathematics teaching in their study in 2014. As a result of this study, it was obtained that anxiety levels of prospective math teachers regarding mathematics teaching are below the average score value. They also found that the anxiety of prospective math teachers regarding mathematics teaching did not differ in accordance with gender.

Levine (1993) conducted a qualitative research in order to determine the anxiety of primary school prospective math teachers regarding math teaching by examining the weekly and daily plans written by prospective math teachers during the semester. Additionally, studies in which many factors affecting math teaching anxiety of prospective math teachers were identified and examined draw attention. The studies which examine the relationship between prospective mathematics teachers' mathematics teaching anxiety and thinking styles (Altundal, 2013) and their learning styles (Peker, 2008), teaching styles (Sarı & Aksoy, 2016), mathematics self-efficacy perceptions (Ural, 2015), have been done. Peker (2009b) found in his study that the prospective math teachers' mathematics teaching anxiety reduces by micro-teaching practices. Sloan, Daane & Giesen (2002) found that the use of manipulative materials reduces anxiety. Peker (2006) found that use of manipulative materials and creative teaching strategies by prospective teachers, and improving skills by them in designing lesson plans for teaching mathematical concepts, reduce their anxiety levels. He also developed anxiety scale in order to determine anxiety of prospective math teachers regarding mathematics teaching. Başpınar & Peker (2016) studied on the math teaching anxieties of prospective math teachers and their beliefs regarding both education and mathematical. They found that there have been significant negative relations between the primary school prospective mathematics teachers. Demir, Cansız, Deniz, Kansu & İşleyen (2016) investigated in the study whether there was a significant difference in the anxiety scores of the students studying at primary school teacher education department according to the gender, the school graduation and the grade level. Ertekin (2010) found between attitude towards anxiety directed at teaching mathematics and the teaching anxiety meaningful correlations. Ural (2015) found a moderate negative relationship between prospective math teachers' anxiety levels of mathematics teaching and self-efficacy perceptions of them. Peker (2015) declared the relationship between mathematics teaching anxiety of prospective primary school teachers by using path analysis. In addition to this he examined their self-efficacy beliefs toward mathematics teaching. Peker (2016) investigated the relationship between pre-service primary school teachers' mathematics teaching anxiety and their self-efficacy beliefs toward

mathematics teaching through path analysis. Yavuz (2018) aimed in his study to find the prospective classroom and mathematics teachers' level of mathematics teaching anxieties with different variables.

Baki & Gökçek (2007) tried to show how prospective teachers should behave in the class during their lessons. Bekdemir (2007) found that elementary school prospective math teachers have mathematics anxiety in some degree in the study in which the causes of their mathematics anxiety were investigated. Baki (1996, 1997) mentioned that all prospective math teachers have content knowledge, education knowledge and content education knowledge is of importance in order to be able to be good in teaching in the future. The fact that prospective math teachers have enough knowledge about how to teach mathematics, and that feel competent in teaching are the main aims of the Faculty of Education, and the same aims are also considered for Formation Education Program. Today's Education Faculties are known as the institutions that educate teachers, but the mission of teacher training has never been left to the Education Faculties at all. A lot of different steps have been taken in this respect; Pedagogical Formation Education Certificate Programs (PFCEP) especially was a very popular program in the years of 2009-2010 (Özkan, 2012). The last amendment regarding teacher education has been made in 2010 at the general assembly of Higher Education Board. Accordingly, graduate programs without thesis were removed and reorganized by replacing with Pedagogical Formation Training. However, these regulations do not give clear information about the attitudes of the students who have taken the Pedagogical Formation Education and graduated from Faculty of Arts and Sciences. And several studies have been made about whether the motivation for loving one's job and sense of service, can be gained with these programs.

As it is known, graduates of Faculty of Education besides graduates of Faculty of Science who had Pedagogical Formation Education started to teach at the primary and secondary schools. The pedagogical formation courses taken by the teacher candidates in both groups are the same and only the teacher candidates in the Faculty of Education receive these courses in their undergraduate education. The main starting point of this study is whether these courses, which are so important for being a teacher, are being internalized or not internalized and contributed to their teaching knowledge and experience. On the other hand, no studies have been found in the country and abroad which examine the relationship between the levels of anxiety levels of mathematics education teacher candidates who are studying in the Faculty of Education and studying in Faculty of Science and continuing Pedagogical Formation education. The aim of this research is to find prospective math teachers' level of mathematics teaching anxieties in department of mathematics who continue Pedagogical Formation Education in order to acquire teaching knowledge and skills for graduates of Science and Arts Department and prospective math teachers' anxiety levels for teaching mathematics who study in Mathematics Education Department at the Faculty of Education and to explore whether there is a relationship between these two. For this purpose, answers to the following questions are sought.

1. What are the mathematics teaching anxiety levels of the prospective math teachers who study in Mathematics Education Department at the Faculty of Education and who continue Pedagogical Formation Program?

2. Do the mathematics teaching anxiety levels of the prospective math teachers who study at the Faculty of Education and who continue Pedagogical Formation Program show a significant difference in accordance with the program from which teacher education is received?
3. Do the mathematics teaching anxiety levels of the prospective math teachers who study in Mathematics Education Department and who continue Pedagogical Formation Program show a significant difference in accordance with their genders?

### **Aim and Importance**

School teaching is a profession that needs to be combined with theoretical knowledge as well as practice and everyday life. When examining in terms of candidates with such a valuable profession, these issues above have great importance for especially mathematics course that is hardly learned and taught. Teaching mathematics in our country causes emergence of mathematics fear and anxiety in the students due to different factors and negatively affects the reactions of students against mathematics course (Şahan, 2006). In addition to this, determining the reasons which increase the anxiety about mathematics teaching, and eliminating them will contribute to the graduation of prospective mathematics teachers who can teach mathematics properly and educate successful students having high self-confidence. It has not been encountered to any studies in Turkey and abroad literature investigating prospective math teachers' anxiety towards teaching mathematics related to the comparison of the Pedagogical Formation Program' and the Faculty of Education'. The aim of this study is to determine prospective mathematics teachers' levels of mathematics teaching anxiety and to examine whether the mathematics teaching anxiety level of them differ in accordance with some variables.

### **Methodology**

This study which is investigated the mathematics teaching anxiety levels of prospective math teachers who study in Mathematics Education Department at the Faculty of Education and the Pedagogical Formation Program is a descriptive study done in accordance with the general survey model. At the same time, it is a comparative study which examines prospective mathematics teachers' average teaching anxiety level for mathematics.

### **Participants**

The sample of this study consists of the 301 prospective math teachers who studied in Math Education Department at Faculty of Education and who continued the Pedagogical Formation Program. Since reaching the whole of the universe was not possible under the present conditions and samples were selected among pre-service teachers with sampling method.

### **Data Collection Tool**

In order to find the mathematics teaching anxiety level of prospective math teachers, a 5-digit Likert-type Anxiety Scale which consists of 23 items and developed by Peker (2006), was used. Anxiety Scale regarding Teaching Mathematics is a scale with 4 factors are given anxiety due to self-confidence (6 items), anxiety due to attitude

towards teaching mathematics (4 items), anxiety due to knowledge about content education (3 items) and anxiety due to content knowledge (10 items). Factor loadings in sub-factors of Mathematics Teaching Anxiety Scale are between 0.53 and 0.86 for anxiety due to content knowledge, between 0.57 and 0.76 for anxiety due to self-confidence, between 0.61 and 0.70 for anxiety due to attitude toward teaching mathematics, and between 0.68 and 0.78 for anxiety due to knowledge about content education. The reliability coefficient of the scale is 0.91. The reliability coefficient calculated for each sub-factor are 0.90 for anxiety sub factor due to content knowledge, 0.83 for anxiety sub factor due to self-confidence, 0.71 for anxiety sub factor due to attitude towards mathematics teaching, and 0.61 for anxiety sub factor due to knowledge about content education, total scale: 0.91.

### Data Analysis

In this research descriptive statistics were used such as arithmetic mean and standard deviation for the anxieties towards mathematics teaching of prospective math teachers who continued Pedagogical Formation Program and who were studying in Mathematics Education Department and Mann Whitney-U statistics were used for data which did not show normal distribution. The prerequisite for the significance tests of independent group averages is that the scale data are intermittent or proportional and have normal distribution (Büyüköztürk, 2010). When these preconditions are examined, it is seen that the data are intermittent. The skewness and kurtosis coefficients and Kolmogorov-Smirnov values of Mathematics Teaching Anxiety Scores (MATAS) were calculated to examine the normal distribution of data. Data values not having normal distribution are given in Table 1.

Table 1

#### *The Results of Kolmogorov-Smirnov Test*

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
anxietyf1	.139	301	.000	.895	301	.000
anxietyf2	.105	301	.000	.977	301	.000
anxietyf3	.204	301	.000	.850	301	.000
anxietyf4	.176	301	.000	.918	301	.000

<sup>a</sup> Lilliefors Significance Correction

### Results

In this section, the findings obtained about the mathematics teaching anxiety level of prospective math teachers were given in the direction of the sub-problems.

#### **Mathematics Teaching Anxiety Levels of the Prospective Mathematics Teachers**

The first sub-problem of the study is addressed with the following question: “What are the mathematics teaching anxiety levels of the prospective math teachers who

study in Mathematics Education Department and who continue Pedagogical Formation Program?"

In order to answer this sub-problem, the descriptive statistical data were examined, and the arithmetic mean and the standard deviation values belonging to the scores of anxiety of the pre-service teachers towards the math teaching were given according to the following scale sub-dimensions: "anxiety due to content knowledge", "anxiety due to self-confidence", "anxiety due to attitude towards mathematics teaching" and "anxiety due to teaching knowledge".

Table 2

*Descriptive Statistics Belonging to Scores of Anxiety of Prospective Math. Teachers towards Math Teaching*

Sub-Dimensions	Faculty of Education			Pedagogical Formation Program		
	<i>n</i>	$\bar{X}$	<i>SS</i>	<i>n</i>	$\bar{X}$	<i>SS</i>
Anxiety due to content knowledge	211	4.05	.686	90	4.07	.730
Anxiety due to self-confidence	211	2.29	.591	90	2.36	.537
Anxiety due to attitude towards mathematics teaching	211	1.79	.683	90	1.78	.599
Anxiety due to teaching knowledge	211	2.05	.550	90	1.96	.618
Anxiety towards math teaching	211	2.94	.318	90	2.95	.279

The mean score belonging to prospective mathematics teachers' mathematics teaching anxiety for Mathematics Education Department was found as 2.94, the mean score belonging to "anxiety due to content knowledge" was found the highest (4.05), and the mean score belonging to sub-dimension of "anxiety due to attitude towards mathematics teaching" was found the lowest (1.27). Since the mean score belonging to anxiety for teaching mathematics corresponds to the value between 2.60 and 3.39 in the evaluation scale, we can say that the prospective math teachers' anxiety level for teaching mathematics is moderate. Since the mean score belonging to "anxiety due to content knowledge" corresponds to the value between 3.40 and 4.19 in the evaluation it can be said that prospective math teachers have fairly anxiety for this issue. Since the mean score belonging to "anxiety due to attitude towards mathematics teaching" corresponds to the value between 1.00-1.80 in the evaluation scale, we can say that the prospective math teachers have low level of math teaching anxiety for this issue.

The mean score of teaching anxiety which belongs to prospective math teachers who continued Pedagogical Formation Program found 2.95, the mean score belonging to "anxiety due to content knowledge" was found the highest (4.07), and the mean score belonging to sub-dimension of "anxiety due to attitude towards mathematics teaching" was found the lowest (1.79). Since the mean score belonging to mathematics teaching anxiety corresponds to the value between 2.60 and 3.39 in the evaluation scale, this says that the prospective math teachers' anxiety level for mathematics teaching is moderate. Since the mean score belonging to "anxiety due to content knowledge" corresponds to the value between 3.40 and 4.19 in the evaluation scale, it can be said that prospective math

teachers have rather than math teaching anxiety for this issue. Since the mean score belonging to “anxiety due to attitude towards teaching mathematics” corresponds to the value between 1.00 and 1.80 in the evaluation scale we can say that the prospective math teachers have low level of mathematics teaching anxiety for this issue.

The fact that the mean mathematics teaching anxiety score of prospective math teachers who studied in Mathematics Education Department and the mean mathematics teaching anxiety score of prospective mathematics teachers who continued Pedagogical Formation Program are close to each other show that prospective math teachers in two groups have the same anxiety.

### **Comparison Prospective Mathematics Teachers’ Mathematics Teaching Anxiety Levels According to the Teacher Education Program**

The second sub-problem of the study is addressed with the following question: “Do the mathematics teaching anxiety levels of the prospective math teachers who study at Faculty of Education and who continue Pedagogical Formation Program show a significant difference in accordance with the program from which teacher education is received?”

In order to test our hypothesis, the data, which show non-normal distribution and were obtained Mann-Whitney U test, and which belong to mathematics teaching anxiety scores of the prospective math teachers in accordance with the program from which teacher education is received variable, are given in Table 3.

These differences which were revealed in accordance with the variable of the program from which teacher education is received are not significant ( $p>.05$ ). According to the variable of the program from which teacher education is received, the prospective math teachers’ mathematics teaching anxiety scores of the who studied at the Faculty of Education were found lower than the mean scores of prospective math teachers who continued Pedagogical Formation Program in the sub-dimensions of “anxiety due to content knowledge”, “anxiety due to self-confidence” and “anxiety due to attitude towards mathematics teaching”. For these sub-dimensions, it can be said that the prospective math teachers who studied at the Faculty of Education have less anxiety regarding mathematics teaching. The anxiety scores of the prospective math teachers who continued Pedagogical Formation program were found lower than the mean scores of prospective mathematics teachers who studied at the Faculty of Education in the sub-dimensions of “anxiety due to teaching knowledge” and “anxiety towards math teaching”. For these, it can be stated that the prospective math teachers who studied at the Faculty of Education have much more anxiety regarding mathematics teaching.

Table 3

*Mathematics Teaching Anxiety Scores According to the Teacher Education Program Variable, Mann-Whitney U Test Results*

Factor	Program	N	Mean Rank	Rank Sum	Mann-Whitney U	p
Anxiety due to content knowledge	Faculty of Education	211	150.52	31759.00	9393.000	.882
	Pedagogical For. Program	90	152.13	13692.00		
Anxiety due to self-confidence	Faculty of Education	211	147.57	31138.00	8772.000	.293
	Pedagogical For. Program	90	159.03	14313.00		
Anxiety due to attitude towards mathematics teaching	Faculty of Education	211	149.53	31550.00	9184.000	.648
	Pedagogical For. Program	90	154.46	13901.00		
Anxiety due to teaching knowledge	Faculty of Education	211	156.28	32975.00	8381.000	.097
	Pedagogical For. Program	90	138.62	12476.00		
Anxiety towards math teaching	Faculty of Education	211	152.81	32242.00	9114.000	.581
	Pedagogical For. Program	90	146.77	13209.00		

### **Comparison Prospective Mathematics Teachers' Mathematics Teaching Anxiety Levels According to the Gender**

The third sub-problem of the study is addressed with the following question: "Do the mathematics teaching anxiety levels of the prospective math teachers who study in Math Education Department and who continue Pedagogical Formation Program show a significant difference in accordance with their genders?"

In order to test our hypothesis, the data, which show non-normal distribution and were obtained Mann-Whitney U test, and which belong to mathematics teaching anxiety scores of the prospective math teachers in accordance with gender variable, are given in Tables 4 and 5.

Table 4

*Math. Teaching Anxiety Scores of Mathematics Education Department According to the Gender Variable, Mann-Whitney U Test Results*

Factor	Gender	N	Mean Rank	Rank Sum	Mann-Whitney U	p
Anxiety due to motivational content knowledge	Female	176	108.72	19135.00	2601.000	.146
	Male	35	92.31	3231.00		
Anxiety due to self-confidence	Female	176	109.32	19241.00	2495.000	.075
	Male	35	89.29	3125.00		
Anxiety due to attitude towards mathematics teaching	Female	176	105.30	18532.00	2956.000	.702
	Male	35	109.54	3834.00		
Anxiety due to teaching knowledge	Female	176	106.87	18809.00	2927.000	.632
	Male	35	101.63	3557.00		
Total anxiety towards math teaching	Female	176	109.86	19336.00	2400.000	.039
	Male	35	86.57	3030.00		

According to the gender variable, there is a significant difference only in sub-dimension of “total anxiety towards math teaching” between mean mathematics teaching anxiety scores of prospective math teachers who studied in the Mathematics Education Department. This difference is in favor of female prospective mathematics teachers.

Table 5

*Math. Teaching Anxiety Scores of Pedagogical Formation Program According to the Gender Variable, Mann-Whitney U Test Results*

Factor	Gender	N	Mean Rank	Rank Sum	Mann-Whitney U	p
Anxiety due to motivational content knowledge	Female	62	45.25	2805.50	852.500	.892
	Male	28	46.05	1289.50		
Anxiety due to self-confidence	Female	62	48.74	3022.00	667.000	.078
	Male	28	38.32	1073.00		
Anxiety due to attitude towards teaching mathematics	Female	62	49.95	3097.00	592.000	.015
	Male	28	35.64	998.00		
Anxiety due to teaching knowledge	Female	62	50.21	3113.00	576.000	.009
	Male	28	35.07	982.00		
Total anxiety towards math teaching	Female	62	49.31	3057.50	631.500	.039
	Male	28	37.05	1037.50		

According to the gender variable, there is a significant difference in sub-dimensions of “anxiety due to attitude towards teaching mathematics” and “anxiety due to teaching knowledge” and “total anxiety towards math teaching” between mean anxiety scores towards mathematics teaching of prospective math teachers who continued the Pedagogical Formation Program. These differences are in favor of female prospective math teacher can in all three groups. It can be said that female prospective math teachers have much more anxiety regarding teaching mathematics in three groups.

### **Conclusion and Discussion**

In this research, the mathematics teaching anxiety levels of the prospective math teachers who studied in Mathematics Education Department at the Faculty of Education and the mathematics teaching anxiety levels of prospective math teachers who continued Pedagogical Formation Program were examined, and the sub-dimensions of the teaching anxiety arising from the teaching knowledge, self-confidence, content knowledge and attitude towards mathematics teaching were also described in detail.

The mean score belonging to mathematics teaching anxiety level of prospective math teachers who studied in Mathematics Education Department was found as 2.94 and we can say that their mathematics teaching anxiety level is moderate. The mean score belonging to mathematics teaching anxiety level of prospective mathematics teachers who continued the Pedagogical Formation program was found as 2.95 and we can say that their mathematics teaching anxiety level is moderate too. In this context, since the mean mathematics teaching anxiety score of prospective mathematics teachers both of them are close to each other, this say that prospective mathematics teachers in two groups have the same mathematics teaching anxiety level. As a reason for this, it can be said that mathematics prospective math teachers found themselves sufficient at moderate level in teaching mathematics. According to the findings of Tatar et al. (2016), since the general mathematics teaching anxiety levels of prospective math teachers were below the mean score value, it was determined that their general mathematics teaching anxiety were at low level. It was determined that anxiety of prospective math teachers towards mathematics teaching were at a low level in the study of Hacıömeroğlu (2014) in which the relationship between mathematics anxiety and mathematics teaching anxiety of elementary prospective math teachers were investigated. It is seen that the results of our study do not coincide with these mentioned studies.

From the perspective of sub-dimensions, at the levels of mathematics teaching anxiety, the mean scores belonging to the sub-dimension of “anxiety due to content knowledge” of prospective mathematics teachers who studied in Mathematics Education Department and continued the Pedagogical Formation Program, are the highest with (4.05) and (4.07), respectively. This shows that prospective math teachers have high level of anxiety. The mean scores belonging to sub-dimension of “anxiety due to attitude towards teaching mathematics” were found to be lowest with (1.27) and (1.79), respectively. This says that the prospective math teachers’ math teaching anxiety levels are low. In general, it is obtained that the score levels of “anxiety towards teaching mathematics, anxiety due to teaching knowledge and self-confidence” were below the mean score. When the study of Tatar et al. (2016) is examined in terms of the sub-dimension of “anxiety towards teaching mathematics”; it was observed that the

score levels of the prospective mathematics teachers were lower than the mean score in sub-dimension of “anxiety due to teaching knowledge, attitude towards teaching mathematics, content knowledge and self-confidence.” The results of our research coincide with the research of Tatar et al. (2016) except for the sub-dimension of “teaching knowledge.” It is possible to say that the high anxiety level of the prospective math teachers in the sub-dimension of “motivational teaching knowledge” is due to lack of practice and experience and not having motivation in this direction.

According to the program from which teacher education is received variable, when considering the sub-dimensions of “anxiety due to attitude towards teaching mathematics, anxiety due to self-confidence, anxiety due to teaching knowledge”; the mathematics teaching anxiety mean scores of the prospective math teachers who studied at the Faculty of Education were found to be lower than the mean scores of the prospective math teachers who continued Pedagogical Formation Program. According to these sub-dimensions, it can be stated that the prospective math teachers who studied at the Faculty of Education have less mathematics teaching anxiety. In the sub-dimension of “anxiety due to teaching knowledge”; the mean scores of anxiety towards teaching mathematics of the prospective math teachers who continued Pedagogical Formation Program were found to be lower than prospective math teachers who studied at the Faculty of Education. According to this sub-dimension, it can be stated that the prospective math teachers who studied at the Faculty of Education have much more mathematics teaching anxiety. In general, these differences which were revealed in accordance to the program from which teacher education is received variable are not significant ( $p > .05$ ).

According to the gender variable, it can be stated that female prospective math teachers in both groups have much more teaching anxiety for mathematics. There is a significant difference in favor of female students only in sub-dimension of “total anxiety towards math teaching” between the mean scores of prospective math teachers who studied in the Department of Mathematics Education. In the study conducted by Akgün, Gönen, and Aydın (2007), it was also determined that female prospective mathematics teachers in both branches (science and mathematics) have high anxiety levels than male prospective math teachers. In the study conducted by Elmas (2010), it was found significant difference at the anxiety towards teaching mathematics of the classroom prospective math teachers, according to the gender generally. In this study, it was concluded that female prospective math teachers had higher levels of anxiety regarding teaching mathematics than male prospective math teachers. However, our study does not coincide with studies of Peker and Halat (2008), Peker, Halat, and Mirasyedioğlu (2010).

There is a significant difference between the mean scores of Pedagogical Formation program prospective math teachers belonging to the sub-dimension of the “anxiety due to the knowledge about content education” and “anxiety due to attitude towards teaching mathematics” in accordance with gender. These differences are in favor of female students in all three groups. In the study of Tatar et al. (2016), there was no significant difference between prospective math teachers’ the mathematics teaching anxiety levels belonging to the sub-dimensions of “total anxiety towards teaching mathematics”, “anxiety due to attitude toward teaching mathematics”, “anxiety due to content knowledge”, “anxiety due to the teaching knowledge” and “anxiety due to self-

confidence” in accordance with gender. Our study overlaps with the study of Tatar et al. (2016) in terms of the sub-dimensions of “anxiety due to content knowledge” and “anxiety due to self-confidence.”

### **Implications**

According to the results obtained in this research, the followings can be suggested: The duration of teaching practice courses can be increased in the teacher education at undergraduate level and the pedagogical formation programs. Research aiming to reveal sources of anxiety and in particular anxiety towards math teaching can be done. New research on the anxiety towards mathematics teaching can be done by using samples selected from different levels of education and universities.

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