

# Do Prospective Teachers have Anxieties about Teaching Mathematics?

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## Abstract

The purpose of this study is to analyse the level of prospective classroom and mathematics teachers' anxieties about teaching mathematics. Freshman and junior prospective teachers from educational faculties of two different universities participated in this study. "Anxieties About Teaching Mathematics Scale" which was developed by Peker (2006) and "Personal Information Form" which was developed by the researchers were adapted to determine prospective teachers' anxiety levels about teaching mathematics. After collecting data, correlations between anxiety levels of prospective teachers and different variables such as their majors at university, their grade levels, the type of high school that they were graduated, gender and attitudes of their family were examined. Average scores, t-test and variance analyses were used in data analyses and scheffe test was employed when necessary.

**Keywords:** teacher training, anxieties about teaching mathematics, prospective teachers

## 1. Introduction

Mathematics have become an inseparable part of teaching with its systematic and peculiar structure which contributes to all disciplines and which has a place in all the parts and time of our lives. When we do not realize the diversity, flexibility and excellence in thinking which people acquires through mathematics or when false prejudices that we obtained from our environment is combined with the problems in our learning experiences, we encounter with individuals rejecting to learn mathematics. This situation causes to appear a number of negative feelings, thoughts and behaviours about mathematics like stress, avoiding mathematics, changes in career preferences. Mathematics anxiety which is a kind of display for these negative behaviours has been an outstanding topic for mathematicians and mathematics teachers. Mathematics anxiety was defined by Miller and Mitchell (1994) as; "an illogical state of fear which worries students when they think about mathematics, which hinders their performance and accordingly prevents them from learning".

The mathematics course is perceived as a difficult lesson to be taught by many students, even though it is a lesson that students face at almost every level from elementary school to university. This causes students to develop negative attitudes toward mathematics lessons and thus to failures (Kurbanoglu & Takunyacı, 2012). Dreger and Aiken were the first to analyse mathematics and anxiety topics together. Although first studies carried out about mathematics anxiety which was defined initially as "emotional reactions syndrome towards mathematics and arithmetic" (Dreger and Aiken, 1957) had started with the personal observations of mathematics teachers in 1950s, mathematics anxiety did not attract educational researchers attention until 1970s (Baloglu, 2001). It seems that student and teacher candidates, even teachers, have a negative attitude towards mathematics and that mathematics is perceived as a difficult field to learn and learn by many individuals (Delice, Ertekin, Aydın & Dilmac, 2009). There is an important role for the students to develop positive attitudes toward mathematics lessons and to increase their success (Peker & Mirasyedioglu, 2003).

Teaching mathematics and acquiring mathematical skills have become important. Because mathematics is the strongest tool which we must learn for the order and organization of the developing world. On the contrary, one of the critical factors which can be effective on the students' preferences about their professional careers and learning experiences is mathematics anxiety (Betz, 1978).

Peker (2006) stated that several factors, such as field knowledge, attitude towards mathematics, and self-confidence, are related to mathematics anxiety and mathematics teaching anxiety. It is very important to reduce the worries of teacher candidates before they become teachers (Liu, 2008). Considering these reasons, it is important to analyse the thoughts and beliefs of the prospective teachers, the role of the teacher and the teaching of mathematics in order to show how they should not behave in the classes they will study (Baki & Gokcek, 2007).

Teachers have important roles to reduce mathematics anxiety. Vinson (2001) stated about this topic that teachers first need to display their students that they truly love mathematics and also they need to teach mathematics in an enjoyable way, they should inform students about the importance of using mathematics on their future professions and daily lives, they should be attentive to choose teaching methods which are suitable to their students' interests, they should help their students to achieve their accessible objectives in a short time, they should use activities which students can be successful and they should use suitable teaching methods to make mathematics meaningful. In addition to students' individual efforts, it is always needed to have a well-equipped teacher to reduce students' mathematics anxieties and to make them successful in learning mathematics. For this reason, first of all searching mathematics teachers' anxiety levels is getting more important.

Therefore, it is thought that having mathematics teachers who have lower anxiety levels about teaching and their knowledge about methods to cope with their feelings can help to reduce their students' mathematics anxiety levels. In this study, together with the importance of the teachers in education, our young people who have the same potential, in other words, prospective teachers to whom we will entrust our own future are highlighted and the importance of raising awareness on this topic among prospective teachers is emphasized. It should be started because of this importance first by determining the anxiety levels of prospective teachers about teaching mathematics.

### *1.1 Problem*

Mathematics is appeared as a discipline which everybody needs to learn in our changing and developing societies. Mathematics is really important for our society, so teaching and learning mathematics is also extremely important. However, having problems in mathematics is inevitable. The attitudes created by students and teachers towards mathematics affect learning mathematics directly. Besides, it was ascertained in many studies that teachers' anxieties about teaching mathematics is transferred to students as mathematics anxieties (Keklikci, 2011). In this sense, presenting the level of prospective mathematics teachers' anxieties about teaching mathematics according to some variables is necessary.

### *1.2 Purpose*

The purpose of this study is to analyse the level of prospective class and mathematics teachers' anxieties about teaching mathematics. In this sense, sub-problems were specified as in the following:

- 1 - What levels do prospective teachers have anxieties about teaching mathematics?
- 2 - Do the anxiety levels of prospective teachers about teaching mathematics differ
  - a) By their universities?
  - b) By their majors?
  - c) By their grade levels?
- 3 -Do the anxiety levels of prospective teachers about teaching mathematics differ
  - a) By their gender?
  - b) By the attitudes of their families?
  - c) By the type of schools that they were graduated?

## **2. Method**

General survey method which is frequently used in quantitative studies was utilized to determine prospective teachers' anxiety levels about teaching mathematics. The aim of survey method is to describe a current situation as it is or a situation from past as it was (Karasar, 1999).

### *2.1 Study Group*

The study consists of freshman and junior prospective teachers from two different cities in Marmara region and from classroom teaching and mathematics teaching programs in educational faculties of two different universities. The descriptive statistics are displayed in Table 1.

Table 1. Gender and Major Distribution of the Study Group

	Major	Freshman	Junior	F	M	Total
A Unv.	Mathematics	57	41	71	27	98
	Classroom Teachers	49	41	61	29	90
B Unv.	Mathematics	41	33	52	22	74
	Classroom Teachers	41	56	72	25	97
Total		188	171	256	103	359

### 2.2 Data Collection Instruments

In the study, A 5 point Likert scale called as “Anxieties about Teaching Mathematics Scale” which was developed by Peker (2006) and consists of 23 items and “Personal Information Form” which was developed by the researchers was used. The reliability coefficient of the scale is 0.91 and for this study it was found as 0.89.

### 2.3 Data Collection and Analyses

The data collected through data collection instruments were scored and coded according to the features of the survey and then computerised. “SPSS” software was used to analyse the data in this study. The data was analysed by using techniques such as independent samples t-test and analyses of variance.

## 3. Results

The findings part was indicated for each research question separately.

### 3.1 Findings and Comments about the First Sub-Problem

The average anxiety scores of prospective teachers about teaching mathematics were calculated and presented in Table 2 to find an answer for the first sub-problem of the study.

Table 2. Average Scores for Prospective Teachers’ Anxieties about Teaching Mathematics

N	Average	SS
359	48.64	12.26

The anxiety scores of prospective teachers about teaching mathematics were collected by using a likert type form scored between 1-5 interval and consists of 23 items. The total score differs between 23-115. The findings obtained show us that anxiety levels of prospective teachers about teaching mathematics are at the mid-level ( $X=48.64$ ).

### 3.2 Findings and Comments about the Second Sub-Problem

T-test was conducted and the results of the test were presented in Table 3 to find an answer for the first item of the second sub-problem stated as whether anxiety scores of prospective teachers about teaching mathematics differ by their universities that they receive training.

Table 3. T-test Results According to University Variable

University	N	Average	SS	t	p
A UNV.	188	47.19	12.32	2.36	0.01
B UNV	171	50.24	12.02		

As it is seen in Table 3, there is a statistically significant difference between prospective teachers’ anxiety levels about teaching mathematics and their universities ( $p<0.05$ ). This is because of the fact that anxiety average scores of students who are studying at a university in B city are higher. This finding shows us that the anxiety of prospective teachers about teaching mathematics is also affected by their universities.

The average scores were examined in order to see whether anxiety levels of prospective teachers about teaching mathematics differ by their majors and findings obtained were presented in Table 4.

Table 4. T-Test Results about University Major Variable

University	Major	N	$\bar{X}$	SS	t	p
A UNV.	Mathematics	98	45,88	11,73		
	Classroom	90	48,62	12,85	1,52	0,12
B UNV	Mathematics	74	47,51	10,67		
	Classroom	97	52,32	12,61	2,64	0,00

As it is seen in Table 4, Although anxiety levels of classroom prospective teachers about teaching mathematics who are studying at University A are higher than mathematics prospective teachers who are studying at the same university, there is not a statistically significant by students' majors ( $p > .05$ ). However, there is a significant difference between the prospective teachers' anxiety scores about teaching mathematics who are studying at University B. This finding is appeared because classroom prospective teachers have higher average anxiety scores about teaching mathematics. Under the light of this finding, when we look at the anxiety average scores of all the prospective teachers, it is seen that average anxiety scores of classroom prospective teachers are higher than mathematics prospective teachers. This finding is given in Table 5.

Table 5. T-Test Results By All Prospective Teachers' Major

Majors	N	$\bar{X}$	SS	t	p
Mathematics	172	46.58	11.29	3.09	0.00
Classroom	187	50.54	12.82		

$p < 0.05$

As it is seen in Table 5, there is a statistically significant difference by prospective teachers' majors as classroom prospective teachers' average anxiety scores about teaching mathematics are higher than mathematics prospective teachers ( $p < 0.05$ ). The anxiety levels of classroom prospective teachers about teaching mathematics are at high levels. It can be said for the reason of this finding that classroom prospective teachers have to be specialised in more than one subject.

Findings about the question stated as "Do the average anxiety levels of prospective teachers about teaching mathematics differ by their grades?" were presented in Table 6.

Table 6. T-Test Results by Grade Levels

University	Majors	Grade Level	N	$\bar{X}$	SS	t	p
A UNV.	Mathematics	Freshman	57	46.71	10.84		
		Junior	41	44.73	12.93	0.82	0.41
	Classroom	Freshman	49	45.95	12.02		
		Junior	41	51.80	13.21	2.19	0.03*
B UNV.	Mathematics	Freshman	41	46.26	9.15		
		Junior	33	49.06	12.27	1.12	0.26
	Classroom	Freshman	41	54.48	13.27		
		Junior	56	50.75	11.98	1.45	0.15

When we look at Table 6, a significant could not be found between anxiety levels of prospective teachers about teaching mathematics who are studying in two different majors at two different universities by their grade levels. Only the fact that the grade levels of prospective teachers who are studying at University A classroom teaching department are increased, their anxiety levels are also increased revealed a significant difference.

### 3.3 Findings and Comments about the Third Sub-Problem

T-Test and F-Test results were examined in order to find an answer for the following question stated as Do average anxiety scores of prospective teachers about teaching mathematics differ by their gender, attitudes of their families

and schools that they were graduated. T-Test results about the average anxiety scores of prospective teachers about teaching mathematics by their gender are given in Table 7.

Table 7. T-Test Results by Gender Variable

Gender	N	$\bar{X}$	SS	t	p
Female	256	48.15	12.09		
Male	103	49.88	12.63	1.21	0.22

(p>0.05)

According to Table 7, average anxiety scores of prospective teachers about teaching mathematics do not display a significant difference by their gender. F-Test results about the average anxiety scores of prospective teachers about teaching mathematics by the attitudes of their families are presented in Table 8.

Table 8. The Results of F-Test (One-Way Analysis of Variance) by the Attitudes of Families

	Sum of Squares	Degrees of Freedom	Mean of Squares	F	p
Between Groups	150.10	3	50.03	.331	.803
Within Groups	53661.67	355	151.16		
Total	53811.77	358			

As it is seen in Table 8, average anxiety scores of prospective teachers about teaching mathematics do not display a significant difference by the attitudes of their families.

The last sub-problem is stated as “do the average anxiety scores of prospective teachers about teaching mathematics differ by the schools the type of schools that they were graduated?” The findings obtained for this sub-problem are presented in Table 9.

Table 9. T-Test Results by the Type of Schools that They Were Graduated

The Type of Schools	N	$\bar{X}$	SS	t	p
Public	345	48.15	12.24		
Private	13	51.38	13.27	0.81	0.41

When we look at Table 9, average anxiety scores of prospective teachers about teaching mathematics do not display a significant difference by the type of schools that they were graduated (p>0.05).

#### 4. Discussion

The main purpose of this study is to determine the anxieties of prospective teachers about teaching mathematics in terms of different variables. The followings were found within the scope of this main purpose.

The average scores of prospective teachers about teaching mathematics differ by their universities. This is because of the environment and the attitudes of the teaching staff in their universities. The purpose of the study carried out by Aydın Yenihayat (2007) is to evaluate the correlation between mathematics anxiety levels of primary school students and teachers' attitudes and to try to explain the correlation between the mathematics anxiety and behaviours of teachers which caused or increased mathematics anxiety by defining mathematics anxiety and its reasons. At the end of the study, a negative low-level correlation was found when the correlation between the level of teachers' attitudes and “Mathematics test and evaluation” sub-dimension was examined. In other words, an increase in the level of teachers' attitudes shows us that the sub-dimension stated as “Mathematics test and evaluation” of students' mathematics anxiety decreased. Besides, when we examined the correlation between the sub-dimension stated as “Anxiety about mathematics lesson” and the level of teachers' attitudes, a negative low-level correlation was determined. According to this result, when the level of teacher attitudes decreased, the sub-dimension of mathematics anxiety of students stated as “Anxiety about mathematics lesson” also decreased. In addition to this, it was stated that the main reasons of mathematics anxiety were related to student, teacher and teaching methods and students, teachers and school management have distinct roles and responsibilities to cope with this anxiety. On the other hand, Peker & Ertekin (2011) showed that math anxiety and math teaching anxiety are related. It was asserted

that the negative attitudes, manners and beliefs increase mathematics anxiety. Uusimaki & Nason (2004) stated that previous learning experiences of prospective teachers as a mathematics student, their previous teachers and education programs that they are attending for being a teacher have an effect on mathematics anxiety of prospective teachers.

Following the results of the study, the average anxiety scores of prospective teachers about teaching mathematics differ by their majors. The average anxiety scores of classroom prospective teachers were found higher than mathematics prospective teachers. It can be said that when classroom teachers started to have a university education, their anxieties about teaching mathematics were higher but after having lessons about how to teach, these anxieties are getting increased and decreased. When the math teaching anxiety levels of classroom teacher candidates were examined according to the class level in Kucuk Demir et al. (2016) studies, it was determined that the average score of 3rd grade students is higher than that of 4th grade students.

Knowing the obstacles in front of the mathematics achievement and getting rid of them has a prominent place to have a successful learning experience and to have a good career. There is no doubt that mathematics anxiety is one of the main obstacles that mentioned above (Betz, 1978). These negative attitudes created against mathematics because of anxiety are key factors affecting to appear mathematics skills. Students who are under the influence of such anxiety cannot acquire mathematical knowledge at desired level and they may prefer memorizing the mathematical knowledge without understanding, assimilating and comprehending (Isık, Ciltas & Bekdemir, 2008).

For this reason, it should not be forgotten that organizing mathematics education in a way that will not create anxieties for students in school terms especially when they are at primary school has great importance. In this sense, especially in the first stages of mathematics education, we should carefully detect factors which cause anxieties for students and we should pay attention to reduce their level of influences. For instance, some previous studies show that (Hembre, 1990; Jackson and Leffingwell, 1999; Wood, 1988) using tests which are restricted with time is seen as the factor which cause anxiety most by the students. Projects, researches, homework, group work, development files, self-evaluation and observation can be used instead of using such tests. If you need to use tests with time restriction, students should take these tests when they feel themselves ready and relaxed. We should provide sufficient time to our students to conduct these tests or we should prefer carrying out these tests with small groups as an alternative (Baloglu, 2001). Having the fear of making mistakes during mathematics classes was determined as the second biggest factor causing this anxiety (Zakaria & Nordin, 2008). The most crucial point to reduce anxieties about this topic is the management of teacher and the atmosphere that s/he created in the classroom. Thus, it was seen in the studies carried out about the people who have mathematics anxiety that these people were associated their negative past experiences with their mathematics teachers (Frank, 1990; Perry, 2004). Teachers should create a democratic and supportive environment for their students to be able answer their questions bravely and to reduce their fears about making a mistake. In addition to this, we should not ignore the contribution of student who are making mistake during classes both for themselves and for other students. In this way mistake that made a mistake can see where and why he made a mistake easily and can correct his/her mistake fast. As these mistakes can inspire other students in the classroom and in this way, they can contribute to produce alternative solution methods; they will have profound influence on learning. Hence, a wrong answer has a crucial role at least to prevent other students from repeating the same mistake.

Another crucial factor causing anxiety is the negative attitudes and practices of teachers during lessons. Most of the students who have mathematics anxiety stated that they have anxieties because of their teachers' strict, rude and insulting behaviours (Baydar & Bulut, 2002). This data coincides with the data presented Harper and Daane (1998) as; "generally the anxieties of the students were started by their classroom teachers". Students become distant first from their teacher then from the lesson and finally from their school (Baloglu & Kocak, 2006). Teachers should always be patient, understanding, kind to their students either in the classroom or outside the classroom and should behave by considering the fact that each of their behaviours can have important effects on the later processes. Another attitude of teachers which causes anxiety is when teachers focus all their attention on to one student or a group of students (Baydar & Bulut, 2002). Students who stay out of their teacher's attention think that they could not understand mathematics and they cannot be successful. This is followed by indifference to the lesson and failure. In order to prevent such situations, teachers should try to allocate equal amount of time for their students to express themselves and responsibilities both in and outside of the classroom.

In addition to known effects of mathematics anxiety, there can be feelings such as shyness, loss of self-confidence, inferiority complex in the long term. For this reason, the sooner we diagnose and start to cure this mathematics behaviour the better the chance for the success will increase. In the long term, overanxious students should be

directed to the guidance counsellors and they should be treated by the experts by using advanced techniques such as cognitive restructuring.

- The anxieties of classroom teachers about teaching should be decreased by using micro teaching methods.
- While teaching mathematics courses, lecturers of the courses should have opportunities to study on primary school students by bringing them to the classroom.
- The content of the teaching mathematics courses should be enriched and their credits should be increased.

## References

- Aydın Yenihayat, S. (2007). The relationship between mathematical concern and teacher attitudes of primary school students. Master Thesis, Yeditepe University Social Sciences Institute.
- Baki, A. ve Gökçek, T. (2007). Some clues regarding to teacher model adopted by preservice mathematics teachers. *Hacettepe University Journal of Education*, 32, 22-31.
- Baloglu, M. (2001). How do Previous Mathematics Courses Affect Mathematics Anxiety. *The 8th Annual Research forum of the Sigma Xi*, 19 April 2001, Commerce.
- Baloglu, M. & Kocak, R. (2006). A multivariate investigation of the differences in mathematics anxiety. *Personality and Individual Differences*, 40, 1325-1335. <https://doi.org/10.1016/j.paid.2005.10.009>
- Baydar, S. C. & Bulut, S. (2002). Importance of teachers' beliefs about nature of mathematics and teaching of mathematics in mathematics, *Hacettepe University Journal of Education*, 23, 62-66.
- Betz, N. E. (1978). Prevalence, Distribution, and Correlates of Math Anxiety in College Students, *Journal of Consulting Psychology*, 25, 151-157. <https://doi.org/10.1037/0022-0167.25.5.441>
- Caplı, B. (2001). Media Policies in Turkey Since 1990. *Culture and Communication*, 4(2), 45-55.
- Delice, A., Ertekin, E., Aydın, 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.
- Dreger, R. M. & Aiken, L. R. (1957). The identification of number anxiety in a college population, *Journal of Educational Psychology*, 48, 344-351. <https://doi.org/10.1037/h0045894>
- Frank, M. L. (1990). What myths about mathematics are held and conveyed by teachers?. *Arithmetic Teacher*, 37(5), 10-12.
- Harper, N. W., & Daane, C. J. (1998). Causes and reduction of math anxiety in preservice elementary teachers. *Action in Teacher Education*, 19(4), 29-38. <https://doi.org/10.1080/01626620.1998.10462889>
- Hembree, R. (1990). The nature, effects and relief of mathematics anxiety. *Journal for Research in Mathematics Education*, 21, 33-46. <https://doi.org/10.2307/749455>
- Isık, A., Ciltas, A., & Bekdemir, M. (2008). The importance and necessity of mathematics education. *Kazım Karabekir Journal of Education Faculty*, 17, 174-184.
- Jackson, C. D., & Leffingwell, R. J. (1999). The role of instructors in creating mathematics anxiety in students from kindergarten through college. *Mathematics Teacher*, 92, 583-586.
- Karasar, N. (1999). Bilimsel Araştırma Yöntemleri, Ankara: Nobel Yayınevi.
- Keklikci, H. (2011). İlköğretim Öğrencilerinin Matematik Korkuları Üzerine bir Araştırma. Unpublished master's thesis. Gaziosmanpaşa University, *Social Sciences Institute*, Tokat.
- Kucuk Demir, B., Cansız, S., Deniz, D., Cevik Kansu, C., & Isleyen, T. (2016). The Investigation of Primary School Teacher Candidates' Anxiety Levels for Teaching Mathematics in Terms of Different Variables, *Bayburt Eğitim Fakültesi Dergisi*, 11(2), 379-390.
- Kurbanoglu, N.I. & Takunyacı, M. (2012). An investigation of the attitudes, anxieties and self-efficacy beliefs towards mathematics lessons high school students' in terms of gender, types of school, and students' grades. *International Journal of Human Sciences*, 9(1), 110-130.
- Liu, F. (2008). Impact of online discussion on elementary teacher candidates' anxiety towards teaching mathematics. *Education*, 128(4), 614-629.
- Miller, L.D. & Mitchell, C.E. (1994). Mathematics anxiety and alternative methods of evaluation, *Journal of Instructional Psychology*, 21 (4), 353-358.

- Peker, M. (2006). Matematik Öğretimine Yönelik Kaygı Ölçeğinin Gelistirilmesi. *Journal of Educational Sciences & Practices*, 5(9), 73-92.
- Peker, M. & Ertekin, E. (2011). The relationship between mathematics teaching anxiety and mathematics anxiety. *The New Educational Review*, 23(1), 213-226.
- Peker, M. & Mirasyedioglu, S. (2003). Lise 2. sınıf öğrencilerinin matematik dersine yönelik tutumları ve başarıları arasındaki ilişki. *Pamukkale University Journal of Education*, 2(14), 157-166.
- Perry, A. B. (2004). Decreasing math anxiety in college students. *College Student Journal*, 38(2), 321-324.
- Wood, E. F. (1988) Math anxiety and elementary teachers: what does research tell us? *For the Learning of Mathematics* 8(1): 8-13.
- Vinson, B. (2001). A comparison of preservice teachers' mathematics anxiety before and after a methods class emphasizing manipulatives. *Early Childhood Education Journal*, 29(2), 89-94. <https://doi.org/10.1023/A:1012568711257>
- Zakaria, E., & Nordin, N. M. (2008). The effects of mathematics anxiety on matriculation students as related to motivation and achievement. *Eurasia Journal of Mathematics, Science and Technology Education*, 4(1), 27-30. <https://doi.org/10.12973/ejmste/75303>