An Investigation of Mathematics Anxiety of Primary School Teachers

Ramazan Gürbüz[1] and Kenan Yıldırım[2]

Abstract: The purpose of this study is to determine the level of mathematics anxiety in primary school teachers in Turkey and to investigate the influence of a number of variables over the anxiety level. 559 teachers were participated in the study. In this study, mathematics Anxiety Scale Intended for Teachers and Candidate Teachers (MKÖ-Ö) was used as the data collection tool. For data analysis, "t" test, analysis of variance (ANOVA), and Tukey test were applied. According to the research results, we have found that total anxiety scores for teachers were at the "I am anxious a little" level. Also, there was a significant difference between teachers' anxiety level and gender variable, and female teachers' anxiety levels were found to be higher than male teachers. Additionally, teachers' anxiety levels decreased as their age and tenure increased. According to the variable of the program of study, the anxiety levels of teachers who graduated from primary school teaching program were lower than the graduated teachers from other programs. Moreover, it is found that the anxiety levels of mathematics teachers who like their job were lower than those who do not like their job.

Keywords: Primary school teachers, level of anxiety, mathematics anxiety, job satisfaction, program of study

DOI: 10.16949/turkbilmat.277870

1. Introduction

Mathematics, which is taught at all levels of education life and is one of the basic disciplines, is a subject that students are afraid of most and fail the most. These negative responses cause development of mathematics anxiety in time. Richardson and Suinn (1972) stated of mathematics anxiety that it involved "feelings of tension and anxiety that interfere with the manipulation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situations". Similarly, Levine (1993) defined the mathematics anxiety as the anxiety felt at the solution of mathematical problems and at the manipulation of numbers during the daily and academic life.

The factors such as the nature of mathematics, quality of teaching, motivation, peer group, the method used by the teacher, not being able to associate with the daily life, unsuitability of topics with the cognitive level of students, students' negative attitude against mathematics, inadequate level of their mathematical pre-knowledge, teacher-student relationship may be counted among the reasons for development of mathematics anxiety. Several researches have stated that there is a reciprocal relationship between these factors (Baloğlu, 2001; Birgin, Baloğlu, Çatlıoğlu & Gürbüz, 2010; He, 2007; Ma & Xu, 2004; Shields, 2006).

According to some studies that investigated the mathematics anxiety of teachers, mathematics anxiety is also common among teachers and teacher candidates as much as the students and teachers even transfer this anxiety to the students in conscious or

[1] Prof. Dr., Adıyaman Üniversitesi, Eğitim Fakültesi, Matematik Eğitimi Programı, Turkiye, *rgurbuz@outlook.com*
[2] Matematik Öğretmeni, Milli Eğitim Bakanlığı, Şehit Mehmet Cücük Ortaokulu, Gaziantep, Turkiye, *frekanskenan@hotmail.com*

unconscious ways (Baloğlu, 2001; Lazarus, 1974; Norwood, 1994; Pantic & Wubbels, 2010). Considering these reasons, analyzing in-service teachers and pre-service teachers' thoughts and beliefs on the role of teacher and mathematics education is important in terms of showing teachers how they should and should not behave in their own classes (Baki & Gökçek, 2007).

When literature was analyzed, it was seen that the mathematics anxiety studies are focused on factors that affects this anxiety. It is seen that the most researched variable is gender. Nevertheless, there is not an exact consensus in research results. While some researchers found that women have higher mathematics anxiety compared to men (Meehan, 2007; Tapia & Marsh, 2004), some researchers could not determine a meaningful difference (Dreger & Aiken, 1957; Fee-Fulkerson, 1983). Considering the studies conducted about teachers, age and tenure are seen as the variables that affect on mathematics anxiety is searched. These studies showed parallel results (Garrosa, Moreno-Jimenez, Liang & González, 2008; Martinussen, Richardsen & Burke, 2007; Suran & Sheridan, 1984). Although some researchers determined that older teachers have higher mathematics anxiety levels than younger teachers (Betz, 1978; Dew, Galassi & Galassi, 1984), some researchers stated that there was a reverse relationship between mathematics anxiety and age and tenure variables (Byrne, 1994; Gold, 1985). In some studies, it is determined that age and tenure variables are not effective in mathematics anxiety (Wiggins, 1984). Not many studies are conducted in the literature in terms of considering the program of study variable. In some studies, it was determined that primary school teachers who were graduated from education faculties were less anxious while comparing to primary school teachers who were graduated from other programs (Gündüz, 2005). Some studies did not find a meaningful difference between graduated program and anxiety (Kilmen & Demirtaşlı, 2009). It was also determined in the literature that teachers who like their profession have less anxiety than the ones who do not like it (Lovett & Cameron, 2011; Scheopner, 2010; Wigfield & Eccles, 2000). Almost all of the studies on this variable have come up with same results.

It is also obvious that the teachers who have mathematics anxiety will create negative opinions and behaviors among students rather than educating students who are innovative, investigative, knowledge producer and user. Considering the potential effect of primary school teachers on their students' attitudes toward math, who have mathematics anxiety, primary school teachers can make a significant positive attitudinal impact on their students.

1.1. Aim of the study

When related resources are researched, it can be seen that very few studies have analyzed to the teachers' mathematics anxiety. This shows that current research is an original study. Starting from this point, the study aimed to determine the mathematics anxiety level of teachers and whether their mathematics anxiety differs depending on some variables. For this purpose, the answers to following questions were sought:

1-   What is the level of teachers' mathematics anxiety?

2-   Does teachers' mathematics anxiety differ depending on gender, age, tenure and the program of study?

3-   Does teachers' mathematics anxiety vary by the level of their job satisfaction?

2. Method

2.1. Research model

In this study, survey model, which is among the quantitative data collection methods, was used. Survey models are research approaches which aim to depict situations occurred in the past or existing now as they are. The event, individual, or the object of the research is tried to be defined in its own circumstances and as it is. No effort to change and affect them is shown (Karasar, 2002).

2.2. Research group

The study group of this research was composed of 559 randomly selected primary school teachers who working in the primary schools in Turkey. Criterion sampling method, which is a part of the purpose sampling methods, was used for determining the sample. When selecting primary school teachers' different criteria such as age, tenure and gender etc. have been taken into consideration. The observation units in criterion sampling can be composed persons, events, objects and situations from particular qualities (Yıldırım & Şimşek, 2005). The participants in the study were 289 female, 270 male teachers.

2.3. Data collection tool

Mathematics Anxiety Scale 'Intended for Teachers and Candidate Teachers' (MKÖ-Ö) was used as the data collection tool in this study. The first part of the questionnaire consists of demographics questions while the second part includes mathematics anxiety scale about the anxiety towards mathematics lesson developed by Üldaş (2005).

MKÖ-Ö is a scale to measure the mathematics anxiety which is composed of 39 items and 7 subscales. Scale and subscales were found to be a valid and reliable scale (Üldaş, 2005). These subscales expresses the anxiety emerging from mathematics, regarding mathematics teaching, learning, solving problems (problem solving, arithmetic operation), doing mathematical interpretations, making mathematical mistakes, and mathematical self-adequacy. The mathematics understanding anxiety subscale is concerned with understanding and learning mathematical concepts and problems. The mathematics description anxiety subscale is concerned with the anxiety that arises when teaching or expressing mathematics. The problem solving anxiety subscale reflects the anxiety that arises when dealing with a mathematical problem. The arithmetical operation anxiety subscale indicates anxiety arising in mathematics-related situations where four processes are involved or where numbers are involved. The self-adequacy anxiety subscale is anxiety about mathematical competence. The interpretation anxiety subscale is concerned with

analyzing and synthesizing mathematical data. The making mistake anxiety subscale contains anxiety about making mistakes while doing mathematical operations. MKÖ-Ö is a four-point likert-scale questionnaire graded from 1 to 4. The Cronbach's alpha for the reliability of MKÖ-Ö was .90. The Cronbach alpha values of the subscales were found as follows: mathematics understanding .87, mathematics description .81, problem solving .80, arithmetical operation .83, self-adequacy .78, interpretation .85, making mistake .81.

2.4. Data analysis

During data analysis, frequency (f) and percentage (%) techniques were used for descriptive statistics analysis about personal information. The questionnaire items were scaled and rated as "I am not anxious (1)", "I am anxious a little (2)", "I am anxious (3)", "I am very anxious (4)". The limits of these values are as follows:

Table 1. Questionnaire choices gravity and limits

Choice	Weight	Limits
I am not anxious	1	1.00 - 1.74
I am anxious a little	2	1.75 - 2.49
I am anxious	3	2.50 - 3.24
I am very anxious	4	3.25 - 4.00

The data collected from the questionnaire that was administered to teachers are analyzed by the help of a statistical software using "t" test, analysis of variance (ANOVA) and Tukey test.

3. Findings

3.1. Findings and comments related to anxiety levels of teachers of mathematics

Arithmetic mean and standard deviation scores that were computed from the whole scale and subscales are presented in Table 2.

Table 2. Mathematics anxiety scores of the teachers (n=559)

Sub-Scale	M	Sd
Understanding	1.42	.20
Description	2.41	.81
Problem Solving	2.63	.70
Arithmetical Operation	2.19	.75
Self-Adequacy	2.50	.71
Interpretation	1.91	.64
Making Mistake	2.42	.83
Total	2.13	.39

When the teachers' mathematics anxiety scores were analyzed, it was seen that the total of their anxiety scores is 2.13, which means their overall anxiety level was at the level of "I am anxious a little". When anxiety scores at the subscales were analyzed, it was seen that understanding mathematics anxiety (1.42) was at "I am not anxious" level, description mathematics anxiety (2.41), arithmetic operation anxiety (2.19), mathematical interpretation anxiety (1.91) and making mistakes anxiety (2.13) was at "I am anxious a little" level. Teachers' solving problems anxiety (2.63) and teachers' self-adequacy anxiety (2.50) was at "I am anxious" level.

3.2. Findings and comments related to the analysis of teachers' mathematics anxiety levels based on various variables

This part includes the findings and comments on whether the teachers' mathematics anxiety levels is statistically significant based on gender, age, tenure variables, program of study and job satisfaction. On Table 3, data regarding teachers' total scores from the total scale and subscales based on their gender with independent group t-test are presented.

Table 3. T-Test Based on Gender

Sub-Scale	Gender	N	M	Sd	p
Understanding	Female	289	1.42	.21	.62
	Male	270	1.41	.20	
Description	Female	289	2.54	.74	.00
	Male	270	2.27	.85	
Problem Solving	Female	289	2.64	.72	.70
	Male	270	2.61	.69	
Arithmetical Operation	Female	289	2.16	.76	.37
	Male	270	2.22	.74	
Self-Adequacy	Female	289	2.62	.66	.00
	Male	270	2.37	.74	
Interpretation	Female	289	1.92	.65	.96
	Male	270	1.91	.64	
Making Mistake	Female	289	2.56	.80	.00
	Male	270	2.28	.85	
Total	Female	289	2.20	.37	.00
	Male	270	2.08	.40	

In the independent group t-test carried out for mathematics anxiety averages based on gender variable, a statistically significant difference at the level of $p<0.05$ was found at the subscales of Description Mathematics, Self-Adequacy, Making Mistakes. This difference was in favor of male teachers in all three subscales. Thus, mathematics anxiety levels of female teachers were higher than those of male teachers in these subscales. Again in the

total scale, a significant difference at the level of p<0.05 was found and this difference also was in favor of male teachers.

Further, no significant difference was observed between male and female teachers at the subscales of Understanding Mathematics, Problem Solving, Arithmetic Operations and Mathematical Interpretation. But, the anxiety scores of male teachers were lower than the female teachers at the subscales except for the Arithmetic Operations.

On Table 4, data regarding teachers' total scores from the total scale and subscales according to their age gathered with one-way analysis of variance and Tukey test are presented.

Tablo 4. ANOVA and Tukey test based on age

		20-29	30-39	40-49	50 and above	F	p
Understanding	**M**	1.41	1.43	1.40	1.46	1.81	.15
	Sd	.18	.19	.23	.21		
Description	**M**	2.67[b]	2.53[b]	2.20[a]	2.17[a]	13.23	.00
	Sd	.73	.80	.82	.77		
Problem Solving	**M**	2.71	2.65	2.57	2.52	2.81	.06
	Sd	.75	.73	.66	.61		
Arithmetical Operation	**M**	2.13	2.18	2.25	2.22	.69	.56
	Sd	.75	.73	.77	.79		
Self-Adequacy	**M**	2.75[b]	2.62[b]	2.26[a]	2.33[a]	16.86	.00
	Sd	.60	.66	.75	.72		
Interpretation	**M**	1.97[b,c]	2.05[c]	1.83[a,b]	1.75[a]	5.39	.00
	Sd	.69	.67	.63	.51		
Making Mistake	**M**	2.66[b]	2.57[b]	2.18[a]	2.19[a]	13.20	.00
	Sd	.77	.83	.84	.77		
Total	**M**	2.26[b]	2.21[b]	2.03[a]	2.02[a]	13.45	.00
	Sd	**.35**	**.39**	**.40**	**.37**		

Note. The letters a, b and c show group differences for the same subscale (p<0.05).

In the ANOVA test carried out for the mathematics anxiety averages based on age variable, a statistically significant difference at the level of p<0.05 was found for the subscales of Description Mathematics, Self-Adequacy, Interpretation and Making Mistakes. Also in the total scale, a significant difference at the level of p<0.05 was found. There were no significant differences in the other subscales.

In the total mathematics anxiety scores on age variable, teachers aged between 20-29 had the highest anxiety scores (M=2.26), whereas, teachers aged 50 and more had the

lowest anxiety scores (M=2.02). The total mathematics anxiety of teachers declines as they get older.

According to the data obtained from the Tukey test, the scores of the total mathematics anxiety do not have any statistically significant difference between teachers who aged 20-29 and 30-39. Also, the scores of the total mathematics anxiety do not have any statistically significant difference between teachers who aged 40-49 and 50 and over. But, there was a significant difference between teachers aged 20-39 and 40 and over.

On Table 5, the data are presented regarding to teachers' total scores that from the total scale and subscales based on their tenure gathered with one-way analysis of variance and Tukey test.

Tablo 5. ANOVA and Tukey Test Based on Tenure

		1-5	6-10	11-15	16-20	21 and above	F	p
Understanding	M	1.41	1.44	1.39	1.42	1.46	1.70	.15
	Sd	.18	.20	.23	.19	.24		
Description	M	2.65^c	2.59^{b,c}	2.30^{a,b}	2.21^a	2.17^a	8.68	.00
	Sd	.73	.78	.83	.82	.79		
Problem Solving	M	2.74	2.67	2.56	2.61	2.50	1.93	.10
	Sd	.74	.74	.73	.65	.58		
Arithmetical Operation	M	2.16	2.14	2.27	2.21	2.21	.51	.73
	Sd	.76	.67	.80	.75	.82		
Self-Adequacy	M	2.75^b	2.68^b	2.34^a	2.30^a	2.31^a	12.13	.00
	Sd	.58	.62	.79	.73	.71		
Interpretation	M	1.93	2.00	2.00	1.81	1.78	2.73	.08
	Sd	.65	.67	.71	.58	.56		
Making Mistake	M	2.62^b	2.63^b	2.31^a	2.23^a	2.16^a	8.34	.00
	Sd	.77	.78	.90	.81	.79		
Total	M	2.24^c	2.23^{b,c}	2.09^{a,b}	2.04^a	2.02^a	8.41	.00
	Sd	**.33**	**.39**	**.44**	**.39**	**.38**		

Note. The letters a, b and c show group differences for the same subscale (p<0.05).

In the ANOVA test carried out for mathematics anxiety averages based on tenure variable, a statistically significant difference at the level of p<0.05 was found for the subscales of Description Mathematics, Self-Adequacy and Making Mistakes. Also in the total scale, a significant difference at the level of p<0.05 was found. There were no significant differences in the other subscales.

While the teachers with a tenure of 1-5 years had the highest (M=2.24) anxiety scores among the total mathematics anxiety scores regarding their tenure, the teachers with a tenure of 21 years and more had the lowest (M=2.02) anxiety scores. When teachers get older, their total mathematics anxiety levels decline. Thus, it can be said that when experience increases, mathematics anxiety reduces.

According to the data obtained from the Tukey test, the total teachers' mathematics anxiety scores with tenure of 1-5 years and 6-10 years do not have any statistically significant difference. Also, teachers' total mathematics anxiety scores with tenure of 11-15 years, 16-20 years and 21 and more years do not have any statistically significant difference. However, there is a significant difference between teachers with tenure of 1-10 years and teachers with tenure of 11 and more years. Based on these findings and teachers' total anxiety scores, it can be said that experienced teachers have less mathematics anxiety.

Data gathered by the independent group t-test applied to average scores teachers had from the whole scale and the subscales regarding the program of study are presented on Table 6.

Table 6. T-Test based on the program of study

Sub-Scale	Graduated Program	N	M	Sd	p
Understanding	Primary School Teaching	341	1.41	.21	.03
	Others	218	1.45	.21	
Description	Primary School Teaching	341	2.10	.81	.00
	Others	218	2.90	.52	
Problem Solving	Primary School Teaching	341	2.60	.66	.19
	Others	218	2.68	.76	
Arithmetical Operation	Primary School Teaching	341	2.23	.78	.20
	Others	218	2.14	.70	
Self-Adequacy	Primary School Teaching	341	2.26	.72	.00
	Others	218	2.89	.49	
Interpretation	Primary School Teaching	341	1.80	.59	.00
	Others	218	2.09	.69	
Making Mistake	Primary School Teaching	341	2.12	.81	.00
	Others	218	2.89	.63	
Total	Primary School Teaching	341	1.99	.40	.00
	Others	218	2.36	.27	

In the independent group t-test carried out for mathematics anxiety scores based on program of study variable, a statistically significant difference at the level of $p<0.05$ was found for the subscales of Understanding Mathematics, Description Mathematics, Self-Adequacy, Mathematical Interpretation and Making Mistakes. This difference was in favor of teachers who were graduates of primary school teaching program for all five subscales. Thus, the anxiety levels of primary school teaching graduates in these subscales were less than those of teachers who were graduates of other programs. Again, a significant difference at the level of $p<0.05$ was found in the whole scale and this difference was also in favor of primary school teaching graduates. In the other subscales, no significant difference between the primary school teaching graduates and teachers who graduated from other programs was found.

Besides, when anxiety scores in all the subscales were analyzed, it was seen that the primary school teaching graduates have lower mathematics anxiety scores than the graduates of other programs. Only in the Arithmetic Operations subscale, the anxiety scores of primary school teaching graduates are higher than other programs. However, this difference was statistically not different. Data gathered by the one-way variant analysis and Tukey test applied to average scores teachers got from the whole scale and the subscales regarding the job satisfaction are presented on Table 7.

Tablo 7. ANOVA and Tukey test based on job satisfaction

		Satisfied	Partially Satisfied	Not Satisfied	F	p
Understanding	M	1.39[a]	1.41[a,b]	1.45[b]	5.73	.00
	Sd	.22	.21	.19		
Description	M	1.80[a]	2.17[b]	2.97[c]	181.19	.00
	Sd	.69	.79	.45		
Problem Solving	M	2.48[a]	2.47[a]	2.82[b]	18.10	.00
	Sd	.56	.70	.74		
Arithmetical Operation	M	2.21	2.15	2.21	.36	.70
	Sd	.82	.69	.74		
Self-Adequacy	M	2.02[a]	2.30[b]	2.95[c]	133.20	.00
	Sd	.60	.66	.75		
Interpretation	M	1.76[a]	1.88[a,b]	2.03[b]	9.21	.00
	Sd	.63	.59	.67		
Making Mistake	M	1.86[a]	2.17[b]	2.95[c]	136.77	.00
	Sd	.72	.80	.56		
Total	M	1.86[a]	2.01[b]	2.41[c]	169.04	.00
	Sd	**.35**	**.37**	**.23**		

Note. The letters a, b and c show group differences for the same subscale ($p<0.05$).

In the ANOVA test carried out for mathematics anxiety averages based on job satisfaction variable, a statistically significant difference at the level of $p<0.05$ was found in all subscales except Arithmetical Operation. Again in the total scale, a significant difference at the level of $p<0.05$ was found.

While teachers who were not satisfied with their job had the highest anxiety scores (M=2.41) in total mathematics anxiety scores regarding job satisfaction, the teachers who were satisfied with their job had the lowest anxiety scores (M=1.86). When the teachers' job satisfaction reduces, their total mathematics anxiety increases. According to the data obtained from the Tukey test, there was a statistically significant difference between the total mathematics anxiety scores of teachers who were satisfied, were partially satisfied, and were not satisfied with their job.

4. Discussion and Conclusion

When the mathematics anxiety scores of teachers were analyzed, it was seen that teachers' total anxiety score is 2.13, meaning of that is the level of "I am anxious a little". In similar studies, the mathematics anxiety scores of teachers were found to be low (Fennema, Peterson, Carpenter & Lubinski, 1990; McAnallen, 2010; Perkkila, 2003; Uusimaki & Nason, 2004; Üldaş, 2005). In a study conducted by Norwood (1994), the researcher reached to the result that the majority of teachers who are responsible for mathematics education have mathematics anxiety and they could transfer their anxiety to their students. In this context, as a positive result, it can be stated that the total anxiety results of teachers are low in our research.

When the anxiety scores in the subscales were analyzed, it was found out that understanding mathematics anxiety (1.42) was at "I am not anxious" level, while description mathematics anxiety (2.41), arithmetic operation anxiety (2.19), mathematical interpretation anxiety (1.91) and making mistakes anxiety (2.13) were at "I am anxious a little" level. Teachers' Problem solving anxiety level (2.63) and self- adequacy anxiety level (2.50) were found to be at "I am anxious" level.

A significant difference at the level of $p<0.05$ was found between the mathematics anxiety of teachers and the gender variable, and this difference was in favor of male teachers. Thus, the anxiety levels of female teachers are higher than male teachers. When related literature was reviewed, it was seen that gender was the most researched variable. Nevertheless, there is not still an exact reconciliation in the research results. For example, many researchers (Alexander & Martray, 1989; Bander & Betz, 1981; Benson, 1989; Brush, 1980; Frost, Hyde & Fennema, 1994; Haynes, Mullins & Stein, 2004; Meece, 1981; Meehan, 2007; Şahin, 2008; Tapia & Marsh, 2004; Tobias, 1978, 1986, 1990; Zettle & Raines, 2000) identified that women have higher mathematics anxiety than men. These results were consistent with the results of our research.

However, some research results identified that there was not a significant difference between mathematics anxiety and gender variable (Akın, 2002; Bindak, 2005; Brush, 1978;

Cooper & Robinson, 1991; Dreger & Aiken, 1957; Fee-Fulkerson, 1983; Ling, 1982; Oropesa, 1993). Also, in a study conducted by Linn and Kessel (1996), a significant difference favoring the girls was found between the gender variable and mathematics anxiety. When the mathematics anxiety scores in the subscales regarding the gender were analyzed, a statistically significant difference at the level of $p<0.05$ was found in the subscales of Description Mathematics, Self-Adequacy, Making Mistakes. This difference was in favor of male teachers in all three subscales. Thus, the anxiety levels of female teachers in these subscales were higher compared to male teachers. Again in the whole scale, a significant difference at the level of $p<0.05$ was found and this difference was also in favor of male teachers.

No significant difference was found between male and female teachers in the subscales of Understanding Mathematics, Solving Problems, Arithmetic Operations and Mathematical Interpretation. Still, in all subscales except for the Arithmetic Operations, anxiety scores of male teachers were lower than anxiety scores of female teachers. The reason for this may be the self-confidence which exists in the nature of men more than women. Or, it can be thought that men take pleasure from the mathematical activities more than women.

It was determined that there was a significant difference at the level of $p<0.05$ between the mathematics anxiety of teachers and their age and tenure. When teachers get older and their tenure increases, their total mathematics anxiety reduces. Among the reasons why young teachers have more anxiety are that they cannot cope with problems, may not engage in their job, and have lack of experience. However, it can be said that the increase in professional experience and maturity of teachers, the improvement in their ability to decide, the increase in their personal success and being more resistant to anxiety are effective in the reduction of anxiety while getting older. In parallel, Üldaş (2005) found out in his research that there is a statistically significant and inversely proportional relation between the mathematics anxiety scores of teachers and age variable. Again in parallel, Girgin (1995) reached the same result on primary teachers that anxiety decreases when age increases. Similar to these two studies, it is possible to encounter many studies which determine the result that anxiety decreases when age and tenure increases (Aslan et al., 1997; Byrne, 1994; Garrosa et al., 2008; Gold, 1985; Martinussen et al., 2007; Suran & Sheridan, 1984). The reason for this may be that people are more realistic when they are young but when they get older, they are more likely to speak as they are supposed to speak and answer as they are supposed to answer. In the contrary, some studies reached to the result that anxiety will increase with the increase of age and tenure (Betz, 1978; Dew, Galassi & Galassi, 1984; Richardson & Suinn, 1972). Also, some studies cannot find a meaningful relation between these variables and anxiety (Wiggins, 1984).

Also, based on the tenure variable, when the mathematics anxiety score averages in the subscales were analyzed, no statistically significant difference at the level of $p<0.05$ was found in Understanding Mathematics, Solving Problems, Arithmetic Operations and Mathematical Interpretation subscales. Whereas in Description Mathematics, Self-

Adequacy and Making Mistakes subscales, a significant difference at the level of $p<0.05$ was found in parallel with the age variable results. Thus, when the teachers get older, their mathematics anxiety scores in these subscales decrease.

Based on program of study variable, a significant difference at the level of $p<0.05$ was found. Thus, a significant difference in favor of primary school teaching graduates was found between the primary school teaching graduates and the graduates of other programs. It can be argued that primary school teachers' beliefs on the education policies and qualifications may differ based on what program they graduated. It can also be said that the mathematics anxiety of primary school teachers have decreased with the lesson of mathematics teaching. Not many studies were carried out in the literature on program of study variable. In his study, Gündüz (2005) determined that the primary school teachers graduated from education faculties are less anxious compared to primary school teachers graduated from other programs. This study supports the results of that research. Some studies did not find a significant difference between program variable and anxiety (Kilmen & Demirtaşlı, 2009; Kırılmaz, Çelen & Sarp, 2003). Some researchers reached the result that primary school teaching graduates were more anxious than the primary school teachers who graduated from other faculties (Ertürk & Keçecioğlu, 2012).

Furthermore, when the mathematics anxiety score averages regarding the program of study variable were analyzed, a statistically significant difference at the level of $p<0.05$ was found in the subscales of Understanding Mathematics, Description Mathematics, Self-Adequacy, Mathematical Interpretation and Making Mistake. This difference was in favor of primary school teaching graduate teachers in all five subscales. Thus, the anxiety levels of primary school teaching graduates in these subscales were less than teachers who graduated from other programs. No significant difference was found between primary school teaching graduate teachers and teachers who graduated from other programs in the subscales of Problem Solving and Arithmetic Operations.

Based on the job satisfaction variable, a statistically significant difference at the level of $p<0.05$ was found in mathematics anxiety. It was seen that the anxiety levels of the teachers who like their job are lower than those who do not like it. The results of our study are consistent with the findings of previous research. The negative attitudes developed against the profession emerge as anxiety. It was observed that the anxiety levels of the teachers who like their job were much lower than the teachers who like profession less or do not like their profession (Bruinsma & Jansen, 2010; Eren, 2012; Gündüz, 2005; Lovett & Cameron, 2011; Scheopner, 2010; Tuğrul & Çelik, 2002; Wigfield & Eccles, 2000).

Also regarding the job satisfaction variable, when the mathematics anxiety score averages in the subscales were analyzed, a statistically significant difference at the level of $p<0.05$ was found in the subscales of Understanding Mathematics, Solving Problems, Description Mathematics, Self-Adequacy, Mathematical Interpretation and Making Mistakes. This difference was in favor of teachers who were satisfied with their job in all six subscales as expected. Namely, when the job satisfaction of teachers increases, their

anxiety decreases. On the other hand, when the arithmetic problems anxiety scores regarding the job satisfaction were analyzed, no statistically significant difference at the level of $p<0.05$ was observed. Based on all these results, starting from the point that the young teachers with a less tenure of office have more mathematics anxiety, these teachers may be supported to decrease their anxiety. It was seen that classroom teachers who graduated from classroom teaching programs have less anxiety than classroom teachers who graduated from other programs. Because of this, it may be afforded that classroom teacher assignments are not made from the programs out of the field. It was determined that the professional satisfaction of teachers directly affect the educational studies. Because of this, necessary amendments about economic, social, physical and employee rights issues to increase the professional satisfaction of teachers may be made. A relation was found between the program a classroom teacher graduates from and their anxiety level. The effects of teachers being graduated from different programs on their anxiety can be researched by using qualitative research methods. It was seen that most of the mathematics anxiety studies were made on students and candidate teachers. Because of this, mathematics anxiety studies especially on teachers may be made.

References

Akın, F. (2002). *İlköğretim 4, 5, 6, 7 ve 8. sınıf öğrencilerinin matematik dersine yönelik tutumlarının çeşitli değişkenlere göre incelenmesi* (Yayınlanmamış yüksek lisans tezi). Pamukkale Üniversitesi, Denizli.

Alexander, L., & Martray, C. (1989). The development of an abbreviated version of the Mathematics Anxiety Rating Scale. *Measurement and Evaluation in Counseling and Development, 22*, 143–150.

Aslan, S. H., Aslan, R .O., Kesepara, C., Alparslan, Z. N., & Ünal, M. (1997). Kocaeli'nde bir grup sağlık çalışanında işe bağlı gerginlik, tükenme ve iş doyumu. *Toplum ve Hekim 1997, 12*, 24-9.

Baki, A., & Gökçek, T. (2007). Matematik öğretmeni adaylarının benimsedikleri öğretmen modeline ilişkin bazı ipuçları. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 32*, 22-31.

Baloğlu, M. (2001). Matematik korkusunu yenmek. *Educational Sciences: Theory and Practice, 1*(1), 59-76.

Bander, R. S., & Betz, N. E. (1981). The relationship of sex and sex role to trait and situationally specific anxiety types. *Journal of Research in Personality, 15*(3), 312-322.

Benson, J. (1989). Structural components of statistical test anxiety in adults: An exploratory model. *The Journal of Experimental Education, 57*(3), 247-261

Betz, N. E. (1978). Prevalence, distribution, and correlates of math anxiety in college students. *Journal of Counseling Psychology, 25*(5), 441-448.

Bindak, R. (2005). İlköğretim öğrencileri için matematik kaygı ölçeği. *Fırat Üniversitesi Fen ve Mühendislik Bilimleri Dergisi, 17*(2), 442-448.

Birgin, O., Baloğlu, M., Çatlıoğlu, H., & Gürbüz, R. (2010). An investigation of mathematics anxiety among sixth through eighth grade students in Turkey. *Learning and Individual Differences, 20*(6), 654-658.

Bruinsma, M., & Jansen, E. P. (2010). Is the motivation to become a teacher related to pre-service teachers' intentions to remain in the profession? *European Journal of Teacher Education, 33*(2), 185-200.

Brush, L. R. (1978). A validation study of the mathematics anxiety rating scale (MARS). *Educational and Psychological Measurement, 38*(2), 485-499.

Brush, L. R. (1980). *Encouraging girls in mathematics: The problem and the solution.* Cambridge, MA: Abt Books.

Byrne, B. M. (1994). Burnout: Testing for the validity, replication, and invariance of causal structure across elementary, intermediate, and secondary teachers. *American Educational Research Journal, 31*(3), 645-673.

Cooper, S., & Robinson, D. (1991). The relationship of mathematics self-efficacy beliefs to mathematics anxiety and performance. *Measurement and Evaluation in Counseling and Development, 24*, 5-11.

Dew, K. M. H., Galassi, J. P., & Galassi, M. D. (1984). Math anxiety: Relation with situational test anxiety, performance, physiological arousal, and math avoidance behavior. *Journal of Counseling Psychology, 31*(4), 580.

Dreger, R. M., & Aiken, L. R. (1957). The identification of number anxiety in a college population. *Journal of Educational Psychology, 48*, 344−351.

Eren, A. (2012). Prospective teachers' future time perspective and professional plans about teaching: The mediating role of academic optimism. Teaching and Teacher Education, 28(1), 111-123.

Ertürk, E., & Keçecioğlu, T. (2012). Relations between the levels of employees job satisfaction and burnout: A sample application on the teachers. *Ege Academıc Revıew, 12*(1), 41-54.

Fee-Fulkerson, K. C. (1983). Cognitions and performance of high and low math anxious college men and women. *Dissertation Abstracts International, 43*(11-B), 3729-3730.

Fennema, E., Peterson, P. L., Carpenter, T. P., & Lubinski, C.A. (1990). Teachers' attributions and beliefs about girls, boys, and mathematics. *Educational Studies in Mathematics, 21*(1), 55-69.

Frost, A. L., Hyde, J. S., & Fennema, E. (1994). Gender, mathematics performance, and mathematics-related attitudes and affect: A meta-analytic synthesis. *International Journal of Educational Research, 21*(4), 373-385.

Garrosa, E., Moreno-Jimenez, B., Liang, Y., & González, J. L. (2008). The relationship between socio-demographic variables, job stressors, burnout, and hardy personality in nurses: An exploratory study. *International Journal of Nursing Studies, 45*(3), 418-427.

Girgin, G. (1995). *İlkokul öğretmenlerinde meslekten tükenmişliğin gelişimini etkileyen değişkenlerin analizi ve bir model önerisi* (Yayınlanmamış doktora tezi). Dokuz Eylül Üniversitesi, İzmir.

Gold, Y. (1985). The relationship of six personal and life history variables to standing on three dimensions of the Maslach Burnout Inventory in a sample of elementary and junior high school teachers. *Educational and Psychological Measurement, 45*(2), 377-387.

Gündüz, B. (2005). İlköğretim öğretmenlerinde tükenmişlik. *Mersin Üniversitesi Eğitim Fakültesi Dergisi, 1*(1), 152-166.

Haynes, A., Mullins, A., & Stein, B. (2004). Differential models for math anxiety in male and female college students. *Sociological Spectrum, 24*(3), 295-318.

He, H. (2007). *Adolescents percepeption of parental and peer mathematics anxiety and attitude toward mathematics: A comparative study of European-American and Mainland Chinese student* (Doctoral dissertation). Washington State University America.

Karasar, N. (2002). *Bilimsel araştırma yöntemleri.* Ankara: Nobel Yayıncılık.

Kırılmaz, A., Çelen, Y., & Sarp, N. (2003). A study on teacher burnout with a group of primary school teachers. *Primary Education-Online, 2*(1), 2-9.

Kilmen, S., & Çıkrıkçı-Demirtaşlı, N. (2009). Sınıf öğretmenlerinin ölçme ve değerlendirme ilkelerini uygulama düzeylerine ilişkin görüşleri. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Dergisi, 42*(2), 27-55.

Lazarus, M. (1974). Mathophobia: Some personal speculations. *Natuonal Elementary Principal, 53*, 16-22.

Levine, G. (1993). *Mathematics history, teaching style and anxiety.* (ERIC Document Reproduction Service No. Ed 373 972).

Ling, J. L. (1982). *A factor analytic study of mathematics anxiety* (Unpublished doctoral dissertation). Virginia Polytechnic Institute and State University, Virginia.

Linn, M. C., & Kessel, C. (1996). Success in mathematics: Increasing talent and gender diversity among college majors. CBMS Issues in Mathematics Education, 6, 101-144.

Lovett, S., & Cameron, M. (2011). Schools as professional learning communities for early-career teachers: How do early-career teachers rate them? *Teacher Development, 15*(1), 87-104.

Ma, X., & Xu, J. (2004). The causal ordering of mathematics anxiety and mathematics achievement: A longitudinal panel analysis. *Journal of Adolescence, 27*(2), 165- 179.

Martinussen M, Richardsen A., & Burke R. (2007). Job demands, job resources, and burnout among police officers. *Journal of Criminal Justice, 35*(3), 239-249.

McAnallen, R. R. (2010). *Examining maths anxiety in elementary classroom teachers* (Doctoral dissertation) University of Connecticut, Storrs, CT, United States.

Meece, J. (1981). *Individual differences in the affective reactions of middle and high school students to mathematics: A social cognitive perspective* (Doctoral dissertation). University of Michigan, Ann Arbor.

Meehan, J. M. (2007). *The role of gifted third, fourth, and fifth grade students' gender on mathematics achievement, self-efficacy, and attitude* (Doctoral dissertation). Walden University, Maryland.

Norwood, K. S. (1994). The effect of instructional approach on mathematics anxiety and achievement. *School Science and mathematics, 94*(5), 248-254.

Oropesa, L. M. (1993). *Mathematics anxiety and course content: In search of a discrete correlation* (Unpublished doctoral dissertation). the University of Miami, Florida.

Pantić, N., & Wubbels, T. (2010). Teacher competencies as a basis for teacher education–Views of Serbian teachers and teacher educators. *Teaching and Teacher Education, 26*(3), 694-703.

Perkkila, P. (2003, March). *Primary school teachers' mathematics beliefs and teaching practices.* Paper presented at Third Conference of the European Society for Research in Mathematics Education, Bellaria, Italy.

Richardson, F. C., & Suinn, R. M. (1972). The mathematics anxiety rating scale: Psychometric data. *Journal of Counseling Psychology, 19*(6), 551.

Scheopner, A. J. (2010). Irreconcilable differences: Teacher attrition in public and catholic schools. *Educational Research Review, 5*(3), 261-277.

Shields, D. J. (2006). *Causes of math anxiety: The student perspective* (Doctoral dissertation). Indiana University of Pennyslvania, Pennsylvania.

Suran, B. G., & Sheridan, E. P. (1984). Management of burnout: Training psychologists in professional life span perspectives. *Professional Psychology: Research and Practice, 16*(6), 741.

Şahin, F. Y. (2008). Mathematics anxiety among 4th and 5th grade Turkish elementary school students. *International Electronic Journal of Mathematics Education, 2*(3), 180-189.

Tapia, M., & Marsh, G. E. (2004). The relationship of math anxiety and gender. *Academic Exchange Quarterly, 8*(2), 130−134.

Tobias, S. (1978). *Overcoming mathematics anxiety.* NewYork: Norton.

Tobias, S. (1986). Anxiety and cognitive processing of instruction. In R. Schwarzer (Ed.), *Self related cognition in anxiety and motivation* (pp. 35-54). Hillsdale, NJ: Erlbaum.

Tobias, S. (1990). Math anxiety: An update. *NACADA Journal, 10*(1), 47-50.

Tuğrul, B., & Çelik, E. (2002). Normal çocuklarla çalışan anaokulu öğretmenlerinde tükenmişlik. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi, 12*(12), 1-11.

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.

Üldaş, İ. (2005). *Öğretmen ve öğretmen adaylarına yönelik matematik kaygı ölçeği (MKÖ-Ö)'nin geliştirilmesi ve matematik kaygısına ilişkin bir değerlendirme* (Master's thesis). Marmara University, İstanbul.

Wigfield, A., & Eccles, J. S. (2000). Expectancy–value theory of achievement motivation. *Contemporary Educational Psychology, 25*(1), 68-81.

Wiggins, J. D. (1984). Personality-Environmental factors related to job satisfaction of school counselors. *Vocational Guidance Quarterly, 33*(2), 169-177.

Yıldırım, A., & Şimşek, H. (2005) *Sosyal bilimlerde nitel araştırma yöntemleri.* (2. baskı). Ankara: Seçkin Yayıncılık.

Zettle, R., & Raines, S. (2000). The relationship of trait and test anxiety with mathematics anxiety. *College Student Journal, 34*(2), 246-258.