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The Examination of the Attitudes of Students Enrolled from the 3rd to 8th Year towards Mathematics

(3. Sınıftan 8. Sınıfa Kadar Öğrenim Gören Öğrencilerin Matematiğe Karşı Tutumlarının İncelenmesi)

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Abstract: This study was carried out in order to determine how students' attitudes towards mathematics changed according to their school and grade levels, and to examine which factors affected students' attitudes from the views of students and teachers. This study was conducted with 698 primary third to eighth grade students, 367 of whom were male and 331 of whom were female and 6 mathematics teachers studying in those schools. Data of the study were collected by means of two instruments, Mathematics Attitudes Scale (MAS) and semi-structured interview. Obtained data were analyzed both statistically and descriptively. At the end of the study, it was observed that there is a meaningful difference in students' attitudes towards mathematics according to schools. In addition, it was observed that attitudes of students enrolled to primary schools which consist of 3rd, 4th and 5th grades are meaningfully more positive than the attitudes of students enrolled to secondary schools consisting of 6th, 7th and 8th grades. In spite of this, it was found that there has not occurred a meaningful difference among 3rd, 4th and 5th grade students' attitudes and 6th, 7th and 8th grade students' attitudes in the same way. Finally, according to students and teachers factors affecting attitudes towards mathematics are teacher, friend, individual characteristics, family, mathematics issues, achievement and perception of mathematics difficulty and its importance.

Keywords: Attitudes towards mathematics, mathematics education, mathematics achievement.

Öz: Bu çalışma; öğrencilerin matematiğe karşı tutumlarının okul ve sınıf düzeylerine göre nasıl değiştiğini ve öğrenci ile öğretmen algısına göre matematik tutumunu etkileyen faktörleri tespit etmek için yapılmıştır. Araştırma, ilköğretim okullarının 3. sınıftan 8. sınıfa kadar öğrenim gören 367 erkek, 331 kız olmak üzere toplam 698 öğrenci ve bu okullarda görev yapan 6 matematik öğretmeniyle yapılmıştır. Çalışmanın verileri, Matematik Tutum Ölçeği (MTÖ) ve yarı-yapılandırılmış mülakat olmak üzere iki araçla toplanmıştır. Edilen veriler hem istatistiksel hem de betimsel olarak analiz edilmiştir. Araştırma sonucunda; okullara göre öğrencilerin matematiğe karşı tutumlarında anlamlı bir farklılıkların olduğu tespit edilmiştir. Ayrıca 3, 4 ve 5. sınıflarından oluşan ilköğretim birinci kademe öğrencilerinin matematiğe karşı tutumlarının 6, 7 ve 8.

sınıflarından oluşan ikinci kademe öğrencilerinin tutumlarından anlamlı olarak daha olumludur. Buna rağmen 3, 4 ve 5. sınıf ve benzer olarak 6, 7 ve 8. sınıf öğrencilerinin tutumlarının kendi aralarında anlamlı olarak farklılaşmadığı belirlenmiştir. Son olarak, öğrenci ve öğretmen algılarına göre, matematiğe karşı tutumu etkileyen faktörler; öğretmen, arkadaş, kişisel özellikler, aile, matematik konuları, başarı, matematiğin zorluk ve önem algısıdır.

Anahtar kelimeler: Matematiğe karşı tutum, matematik eğitimi, matematik başarısı.

Introduction

Mathematics has always been important for human life during its history. Due to the development of modern mathematics and its implementation in all fields of science-technology after 1960 (Baki, 2006), the importance of mathematics has increased more in both daily life and science world. The celebration of 2000 year as "World Mathematics Year" in many countries of the world is an indicator of the importance given to the mathematics (Ersoy, 2003)

Moreover, as mathematics is a tool to perceive, interpret and analysis of the daily life (Baki, 2006) and a field that develops high level behaviors and acquisitions of the individuals such as communication, generalization, creative and independent thinking, it has become compulsory to learn in communities aiming at being an information community (Moralı, Köroğlu & Çelik, 2004). Therefore, the nature and teaching of mathematics has become one of the most researched fields. As a matter of fact, in many studies it has been stated that mathematics teaching has a crucial role for establishment, development and future of an information community (Aydın, 2003; Turanlı, Keçeli & Türker, 2007). In parallel with this fact, mathematics teaching is given high priority and some precautions are taken to improve the quality of teaching in all countries (Gür & Seyhan, 2006). The mathematics information and skills acquired in preschool and school periods will help to provide individuals that could use mathematics with the society (Akman, 2002).

Enjoying, understanding and learning mathematics start with knowing it properly (Yenilmez & Can, 2006). However, the nature and learning of mathematics perceived as "difficult" by the students and even individuals in many places in the world and difficulties appear in its teaching. Moreover, mathematics is seen as boring and abstract course by most of the students and it is not loved (Aksu, 1985; Dursun & Dede, 2004). Akdemir (2006) stated in his study that students did not place mathematics in the first row among the courses they loved and they did not deal with mathematics after school. The reasons for not loving and accordingly for failure can be classified as teacher factors (Alkan, Bukova Güzel & Elçi 2004; Bindak 2005; Harman & Akın 2006; Yıldırım 2006), personal factors (Dane, Doğar & Balkı 2004), environmental factors (Weissglass, 2002) the difficulty, hierarchical structure, prejudice and anxiety of mathematics (Baroody, 1987; Güven, 2001; Umay, 1996) and fear for making mistakes and mathematics (Aktümen & Kaçar, 2008, Başar, Ünal &

Yalçın, 2002; Kaban, 2006; Kennedy & Tipps, 1991). The concepts mentioned in these studies such as attitude, anxiety, fear and prejudice are related to the affective features and processes of the individual while learning. For example, Bloom (1998) stated that mathematics was one of the courses in which there was a high correlation between the affective features and success and affective features could explain 14% of the mathematics success variance. He also claimed that one fourth of the learning differences among the individuals caused by affective features (Bloom, 1998). In affective period, the feelings that affect what is learned or could be learned are exhibited as attitudes by the individual (Bekdemir, 2007).

Attitude is "the tendency and prior opinion of the individual contrary to the observed behavior that he created as a result of previous life and experiences" (Yıldız, 2006, p.10). Mathematics attitude which is a special form of the attitude is defined by Neale (1969) as "*enjoying or not enjoying mathematics, dealing with or escaping from mathematical activities, the individual's thinking for being good or bad at mathematics and a total measurement of the belief whether mathematics is beneficial or not"* (cited in Akgün, 2002). Attitude towards mathematics has an important place in education (Nazlıçiçek & Erktin, 2002). It is essential for a student to learn a topic well that the student should be open to the new topic and feel desire to learn that topic properly (Bloom, 1998). Moreover, in Primary School Mathematics Teaching Program (PSMTP), it was aimed at developing attitudes like self-confidence and mathematics anxiety besides developing students' mathematical concepts and skills (MEB, 2005). Many studies have been carried out on the attitudes towards mathematics due to its importance in education and important role in students' achievement (Harman & Akın, 2006; Peker & Mirasyedioğlu, 2007; Samuelsson & Granström, 2007; Ünlü, 2007).

The studies were primarily on the correlation between the attitude and achievement. In the studies carried out, it was found that there was a meaningful high correlation between the attitude towards mathematics and achievement. That is, positive attitudes affect students' achievement in a positive way and negative attitudes affect in a negative way (Ekizoğlu & Tezer 2007; Kandemir 2007; Reyes 1984 Samuelsson & Granström 2007; Serin 2004; Yenilmez & Kakmacı 2008; Yenilmez & Özabacı 2003).

In some studies, it was studied whether there was a change in the attitude towards mathematics while the grade levels change or not. While some of these studies revealed that the negative attitude towards mathematics increased when the grade levels increased (Altun, 1995; Baykul 1990; Norman, 1977; Taşdemir, 2009; Ünlü, 2007), some of them stated that there was no change or even there was a change it has no practical meaning (Melancon et al., 1993; Taşdemir, 2009).

In some other studies, the factors affecting the attitude towards mathematics were presented. While Bulut, Sezgin and Sazak (2002), Melancon et al. (1993), Norman (1977) and Telese (1997)

found the gender as a factor affecting the attitude, Cai, Moyer and Wang (1997) found the parents as the most important factor affecting the attitude. In other words, they found that the students that parents supported had more positive attitudes toward mathematics. Koca and Şen (2006) found the reasons for negative attitudes towards mathematics as the courses' being not understood, the difficulty of the topics and the teacher; Ünlü (2007) as presenting students with mathematics as a course to be learned hard in their families and environments and classroom teachers taught mathematics in different courses like Turkish courses and Taşdemir (2009) as the crowded classes. Finally (Samuelsson & Granström (2007) stated that certain targets, high expectations and encouragement for active participation for the students were effective in developing positive attitudes towards mathematics; however, the other students in the same condition suffered and developed negative attitudes.

Most of the studies on the attitudes towards mathematics were conducted either in the years before 2005 or in countries but Turkey. In other words, there are not enough scientific studies in Turkey on the effect of PSMTP which was modified in 2005 on the attitudes toward mathematics. Although the studies were carried out after 2005, they included only a few grades. In this context, this study will enable to evaluate the effects of PSMTP on the attitudes towards mathematics at the 6 levels of primary school from 3rd to 8th grades.

Furthermore, the studies on the attitudes towards mathematics included only one of the groups of teacher, pre-service teacher or students. This study will enable to present a holistic picture on the students attitudes towards mathematics and their reasons as it includes both teacher and student opinions. This picture will light the way in the evaluation of PSMTP and in educating the students who have positive attitudes towards mathematics, in other words the ones that loved and manage mathematics, removing the reasons for negative attitudes towards mathematics in primary schools.

The purpose of this study is to investigate how the attitudes of the students towards mathematics change according to the school and grade levels and what the factors that affect the students' attitudes are. In the light of this purpose, the answers to the following questions were sought:

1. Do the attitudes of the students towards mathematics change significantly according to the schools?
2. Do the attitudes of the students towards mathematics change significantly according to the grade levels?
3. How do the students' attitudes towards mathematics change according to the students' opinions?
4. How do the students' attitudes towards mathematics change according to the teachers' opinions?
5. What are the factors affecting students' attitudes towards mathematics according to the teachers and students' opinions?

Method

As there are many factors affecting the attitude towards mathematics, mixed-method explanatory approach (McMillan & Schumacher, 2006) which enables both qualitative and quantitative research was used in this study. This method gives a holistic picture of an incident or a phenomenon as it includes both qualitative and quantitative data. This kind of studies provides opportunities to examine the quantitatively presented incidents and phenomena in more detailed way through qualitative methods (Bogdan & Biklen, 1992).

Subjects

This study included 698 students 367 of which were males and 331 of them were females from 3^{rd} to 8^{th} grades of 5 state primary schools that were randomly selected from a medium-scale province of Eastern Anatolian Region in 2009-2010 educational year and 6 mathematics teachers working at those schools. In order that the schools represent the whole schools in the province, the schools were divided into three groups according to the Level Determination Exam in 2008-2009 as high primary schools (HPS), medium primary schools (MPS) and low primary schools (LPS). The place of the schools and the profile of the students were from high, medium and low level of socio-culture in parallel with their achievements. One school from the high group and two schools from the other two groups were randomly selected. The data was collected from two sections if there were three or more sections at the school, otherwise, from the students in all sections.

The Instrument

The data in this study was collected through Mathematics Attitudes Scale (MAS) and semi-structured interview. Mathematics attitudes scale which was developed by Erktin and Nazlıçiçek (2002) and composed of 5 point Likert type 20 items was applied to the students. While the lowest point to be taken was 20, the highest point was 100. While the lower points indicated negative attitude towards mathematics, the higher points indicated positive attitude towards mathematics. The final pilot study of MAS was conducted with 378 seventh and eighth grade students and the Cronbach Alpha coefficient was calculated as .841. In this study, the reliability coefficient was calculated as N: 697, α: .855. This attitude scale was implemented in the 5^{th} and 6^{th} weeks of the spring term in 2009-2010 educational year in order to determine how the attitudes of primary school students towards mathematics were. MAS was delivered in any class hour and 30 minutes were allocated. It was aimed at students' not affecting each other as much as possible while they were answering MAS and the

survey papers were collected if the students completed before the allocated time. The rest of them were collected after the allocated time.

Semi-structured interview was used in order to determine how the attitudes changed depending on the grade levels according to the student and teacher opinions and what the factors affecting the attitude were. The interviews were done with 30 students randomly selected among the ones MAS was given. During the interview, the questions "whether there was a change depending on the grade levels or not", if there was, how it was" and "what the factors affecting the attitudes towards mathematics were" were asked by three instructors. 10 teachers were asked to be interviewed in selected schools; but, only 6 of them accepted to be a participant. In semi-structured interview, the questions "whether there was a change depending on the grade levels or not", if there was, how it was" and "what the factors affecting the attitudes towards mathematics were" were asked to these 6 teachers. The interviews lasted 10-15 minutes approximately and they were recorded by means of a voice recorder. The recorded interviews were transformed into the text and after that the voice recordings were deleted.

Data Analysis

The obtained data was analyzed both statistically and descriptively. In order to determine whether there was a significant change in the attitudes of the students towards mathematics statistically, one-way ANOVA test was used with the points they got from MAS. In order to determine between which schools and grade levels there was a difference, Tamhane's T2 test (Kabaca & Erdoğan, 2007) was used as the variances were homogenous. The statistical significance level was taken as 0.5.

Content analysis of the qualitative data was done descriptively. The students' answers were read again and again, the similar words were highlighted in order to create categories and the similar statements were collected under the same category. In order to increase coding reliability, categories and the statements in the categories were evaluated once more by another researcher. These constructed categories were evaluated as the factors affecting the attitudes towards mathematics. The teachers' responses were analyzed through the same method.

Findings

Firstly, the statistical analysis of the collected data was presented in order to determine whether there was a significant difference according to the school and grade levels. The number of students based on the schools, the mathematics attitudes mean scores and standard deviations were presented in Table 1.

Table 1: The number of Students Based on Schools, Mathematics Attitude Mean Scores and Standard Deviations

Name of the Schools	N	$\overline{X}$	SD
HPS	181	81.91	13.45
MPS1	127	86.33	9.87
MPS2	125	81.62	13.97
LPS1	176	74.88	12.20
LPS2	89	80.48	15.38
Total	698	80.71	13.46

According to Table 1, while MPS1 and HPS students had the highest mathematics attitude mean scores, that is the most positive attitudes towards mathematics, the LPS1 and LPS2 had the lowest mathematics attitude mean scores, in other words the most negative attitudes.

One-way ANOVA test was used in order to determine whether there was a significant difference among the attitudes of the students towards mathematics depending on the schools and the results were presented in Table 2.

Table 2: ANOVA Results of the Mathematics Attitude Scores of the Students according to the Schools

The Source of the Variance	df	X2	F	p.
Between Schools	4	2877.13	16.31	.000*
Within Schools	693	176.38		
Total	697			

*p< .05

Table 2 indicated that there was a significant difference among the students' attitudes towards mathematics according to the schools ($F(4, 697)= 16.31$, $p< .05$). In other words, attitudes towards mathematics changed according to the schools. The results of Tamhane's T2 test which was used to determine between which schools there was a significant difference were presented in Table 3.

Table 3: The Results of Tamhane's T2Test of the Students Mathematics Attitude Scores according to the Schools

Name of the Schools	HPS	MPS1	MPS2	LPS1	LPS2
HPS	-	-6.30*	-1.70	5.43*	3.36
MPS1	6.30*	-	4.60*	11.73*	9.66*
MPS2	1.70	-4.60*	-	7.13*	5.05
LPS1	-5.43*	-11.73*	-7.13*	-	-2.07
LPS2	-3.36	-9.66*	-5.05	-2.07	-

*p< .05

According to Table 3, the attitudes of the students at LPS1 towards mathematics were more negative than those of the students at HPS, MPS1 and MPS2. The attitudes of the students at MPS1 towards mathematics were more positive than those of the students in other schools.

The number of students, the mean scores of mathematics attitudes and standard deviations according to the grade levels were presented in Table 4.

Table 4: The number of students, the mean scores of mathematics attitudes and standard deviations according to the grade levels

Grade Levels	N	$\overline{X}$	SD
3.	106	85.90	11.05
4.	135	85.99	10.20
5.	91	83.75	12.76
6.	124	75.00	14.47
7.	145	75.11	14.57
8.	97	73.28	12.63
Total	698	79.71	13.85

According to Table 4, while the 3rd and 4th year students had the highest mathematics attitudes mean scores, in other words, the most positive attitudes, 7th and 8th year students had the most negative attitudes. According to Table 5 again, while the grade levels increased mathematics attitudes mean scores, in other words, positive attitude levels decreased.

One-way ANOVA test was used in order to determine whether there was a significant difference among the attitudes of students towards mathematics according to the grade levels and the results were presented in Table 5.

Table 5: ANOVA Results of the Mathematics Attitudes of the Students According to the Grade Levels

Source of the Variance	df	X2	F	p.
Between Grades	5	4136.17	25.32	.000*
Within Grades	692	163.38		
Total	697			

*p< .05

Table 5 indicated that there was a significant difference among the attitudes of students towards mathematics according to the grade levels ($F(5, 697)= 25.32$, $p< .05$). In other words, attitudes of the students towards mathematics changed according to the grade levels. The results of Tamhane's T2 test which was used to determine between which grades there was a significant difference were presented in Table 6.

Table 6: The Results of Tamhane's T2 test of the Attitude Mean Scores of the Students According to the Grade Levels

Name of the Schools	3.	4.	5.	6.	7.	8.
3.	-	-0.96	2.15	10.89*	10.78*	12.62*
4.	0.96	-	2.24	10.98*	10.87*	12.71*
5.	-2.15	-2.24	-	8.74*	8.63*	10.47*
6.	-10.89*	-10.98*	-8.74*	-	-0.11	1.73
7.	-10.78*	-10.87*	-8.63*	0.11	-	1.84
8.	-12.62*	-12.71*	-10.47*	-1.73	-1.84	-

*p< .05

According to Table 6, the attitudes of the students at 3rd, 4th and 5th grades towards mathematics were more positive than those of 6th, 7th and 8th grades. However, there was no significant difference among the 3rd, 4th and 5th grades which were the first section of the primary school and 6th, 7th and 8th grades which were the second section.

Secondly, the qualitative analysis results of the data obtained were presented. In the interviews with the students, the data obtained on how the attitudes towards mathematics changed according to the grades divided into two groups.

Most of the students stated that their attitudes towards mathematics increased in a positive way while their grade levels increased. This was mentioned by the student with S-18 code as *"I could not understand mathematics from first to fifth years. I started to enjoy in the sixth and seventh years…"* and by the student with S-25 code as *"… I was not good at mathematics until the fifth year because of my teacher. I enjoyed the classes in the 6th and 7th years. … I enjoyed mathematics more when I succeeded…."*.

The other students, however, stated that their attitudes towards mathematics changes in a negative way. This was mentioned by the student with S-24 code as *"I was quite good at mathematics when I was in the 3rd and 4th years; because mathematics was easy then. Now, as I am at 7th grade, mathematics is more difficult… Mathematics is not one of the course I enjoy most because it is a difficult course…"* and similarly by the students with S-7 code as *"I enjoy less as it becomes more difficult. It was easier in the 2nd and 3rd years. Now, it is more difficult…."*

As shown in Figure 1, the factors causing changes in the attitudes towards mathematics according to students' opinions were grouped in six categories as parents, achievement, teacher, perception that mathematics is difficult, friend and the importance of mathematics.

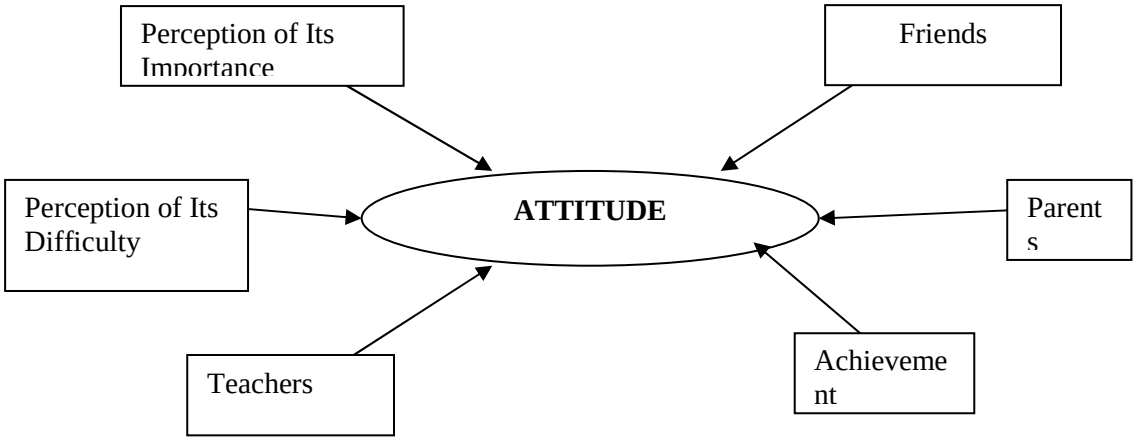

Figure 1. The Factors Affecting the Attitudes towards Mathematics According to Student Perception

As shown in Figure 1, the factor "parents" indicated that parents affected student's attitude towards mathematics to the extent that parents give importance to mathematics. This was mentioned by the students with S-5 code as *"… My parents would be happier if I get high grades from mathematics. … I enjoy mathematics and mathematics is more important course…"*

The factor "achievement" indicated that being successful or not at mathematics affected the student's attitude. This was mentioned by the student with S-27 code as *"… Achievement has also a role. The more questions he answers correctly and the more he is successful, the more he enjoys."*

The factor "teacher" indicated his personality, teaching method and classroom management that affect student's attitude. This was mentioned by the student with S-7 code as *"… Teachers should teach mathematics without being angry against students, helping them, and solving questions by showing them at the whiteboard…"* and by the student with S-19 code as *"… Mathematics can be difficult because of the teachers. It can be because of another teacher's instruction. I have some problems arising from the mathematics instruction…"* and by the student with S-20 code as *"… Teachers should teach his course within the framework of discipline. Teachers should remove students' prejudices. It should not be only the course, he should make the course more entertaining with jokes…"*

The factor "the perception of mathematics difficulty" indicated that students' perception that mathematics was difficult affected the attitude. This was mentioned by the student with S-3 code as *"I enjoy mathematics but I did not use to enjoy it; because it was difficult. Problems were difficult. I study now and it is easy. The ones at the higher grades do not enjoy mathematics."*

The factor "friend" indicated that student's attitude towards mathematics changed influenced by his friend. This was mentioned by the student with S-22 code as *"… Most of my students do not enjoy mathematics. My prejudice towards mathematics develops influenced by them."*

Finally, the factor "the perception of its importance" indicated that the student's attitude affected as he thought that mathematics is quite important in daily life. The statement of the student with S-16 code *"My love increased. Because we use mathematics in our daily life. Thus, my love increased…"* was a good sample for this factor.

In the interviews with the teachers, their opinions on how students' attitudes towards mathematics changed according to the years were divided into three groups as they never changed, they changed and increased positively.

Half of the interviewed teachers stated that students' attitudes did not change according to the years. This was mentioned by the teacher coded with T-1 as *"The attitude towards mathematics goes on how it starts. That is, if a student enjoys mathematics, there will be no change in this situation no matter how many years pass…"*

Most of the other teachers stated that students' attitudes towards mathematics were variable. A sample for this situation was the statement of the teacher with T-3 code as *"Actually, it is very clear. A student who is poor at primary school could improve at 6th, 7th and 8th grades although it is very rare. However, the opposite is also possible. For example, we can lose a student who is very successful at the 6th grade afterwards…"*

One of the teachers stated that students' attitudes changed in a positive way with his statement as *"… I think the attitude change positively in years. … Actually, the topics become harder in years, but I believe that they enjoyed more…"*

Teachers claimed that students' attitudes towards mathematics changed depending on the categories teacher, friend, personal characteristics of the student (psychology, intelligence style, and effort), parents, mathematics topics and achievement as shown in Figure 2.

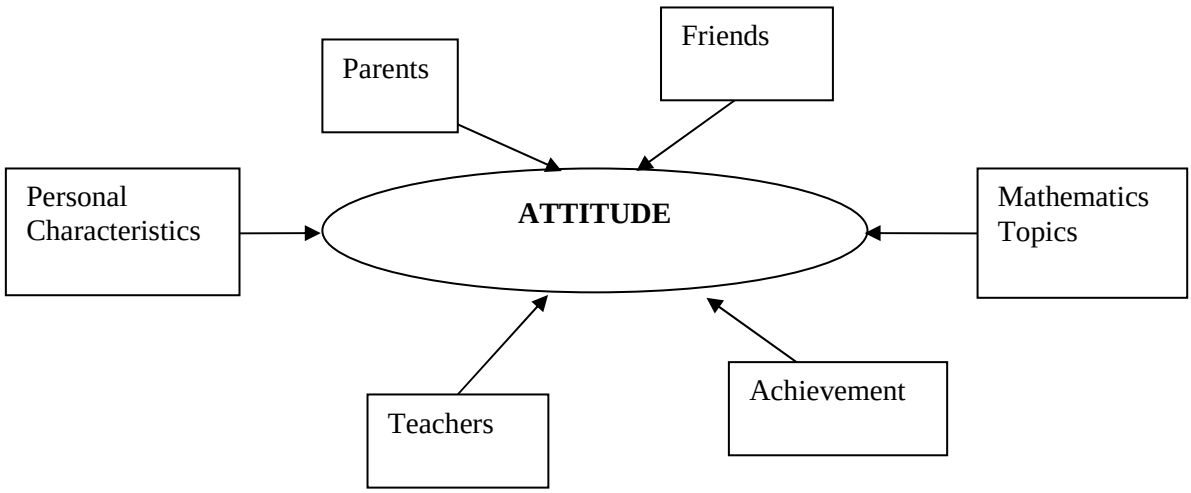

Figure 2. The Factors Affecting the Attitude towards Mathematics According to the Teachers' Opinions

All of the interviewed teachers claimed that the most important factor in establishing students' attitudes towards mathematics was "teacher". The most typical sample for this situation was the statement of the teacher with T-2 code as *"… The only factor affecting the attitude is the teacher. If the teacher establish a good relationship with the student, the attitude of the student towards mathematics is good as well. This attitude does not change in years; however, if the teacher of the same class changes, the attitudes of the students may change as well."*

Most of the teacher also stated that one of the important factors affecting the attitude was "friend". The statements of the teacher with T-3 code as *"… Their friends make fun of them and exclude them. This keeps them away from the course. This happens rarely but it does… Or, they believe that their friends will laugh at him when they say something. They do not come to the whiteboard. This anxiety has quite a lot of effect on this…"* and of the teacher with T-4 code as *"… If the closest friend of the student does not enjoy mathematics or listen to the course, he becomes unwilling as well. He may not enjoy while listening…"*

Most teachers also stated that student's "personal characteristics" were undeniably effective in changing the attitudes. The statements of the teacher with T-3 code as *"This depends on the student, their psychology and moreover their interest fields change as they are in adolescence. Numerical intelligence is also very important. For example, while a child could understand at one time, another needs more instruction. This makes the child tired"* and of the teacher with T-4 code as *"… Student. If the student is hard-working and enjoys studying, it also depends on this."*

The statements of the teachers claimed that "parents" changed the attitude and with T-4 and T-5 codes *"… Parents are important as well. Parents are already important not only for mathematics but also all other courses…"* and *"… Parents and the environments and even from where you come to that region are important…"* were the samples.

Again, two teachers claimed that "mathematics topics" affected the students' attitudes. The best sample for this situation was the statement of the teacher with T-2 code as *"… Of course mathematics topics, too. There are some topics that even I don't enjoy. This is same for the students; they enjoy some topics and study with love. They don't study for some topics, this is possible…"*

Finally, the other two teachers stated that "achievement" is a factor that affected the attitude. The statement of the teacher with T-6 code as *"Achievement is very important; when he succeeds, the attitudes change in a positive way"* is the sample for this.

Discussion and Conclusion

The first finding of the study was that there was a significant difference in the attitudes of the students towards mathematics. The attitudes of the students enrolled at in schools of which the achievement level is low, that is in lower socio-cultural environment, towards mathematics were more

negative than those of the students at other schools. This finding was in parallel with the statement of a teacher in the interview with the teachers as *"…Parents and the environments and even from where you come to that region are important…"*. Again, it was in accordance with the findings revealed in many studies (Samuelsson & Granström, 2007) as "the attitudes of the successful students were more positive" and "the achievements and the attitudes of the students who were from the families whose socio-cultural levels were higher were more positive". However, this finding contradicted with the finding that the attitudes of the students of the schools which had a high level of mathematics achievement (HPS) were significantly lower or not different from the attitudes of the students of the schools which had a medium level of mathematics achievement (MPS1 and MPS2). Since this study did not examine the correlation between the attitudes of the students and their achievements and socio-cultural environment, these concepts and the correlation between the related sub-dimensions like living with grandparents or the educational level of the parents and the attitude should be examined more closely and in a more detailed way.

The second finding of this study was that the attitudes of the students at 3rd, 4th and 5th grades towards mathematics were significantly more positive than the attitudes of the students at 6th, 7th and 8th grades. While this finding contradicted with the views of the most students and a teacher as "when the students or grade levels increased, their attitudes towards mathematics increased as well", it was in accordance with the view of some students as the attitudes changed in a negative way. This finding was also in accordance with the view that when the grade levels increased, the negative attitude towards mathematics increased as well which was presented in many studies in Turkey (Altun, 1995; Baykul, 1990; Taşdemir, 2009; Ünlü, 2007). However, it was surprising that none of the teachers stated this finding in the interviews carried out with teachers. This could be explained with the fact that as the teachers at 3rd, 4th and 5th grades did not teach the mathematics courses in 6th, 7th and 8th grades; and vice versa, the teachers at 6th, 7th and 8th grades did not teach mathematics courses in 3rd, 4th and 5th grades, they could not observe the negative change in the attitudes of the students towards mathematics. The increase in the negative attitudes of the students contradicted with the philosophy of PSMTP which was put into practice in 2005 that the targeted attitudes should developed. When the fact that all of the students participating into this study had been taught according to the PSMTP, the reasons for this contradiction should be studied in detail.

The third finding of the study was that the attitudes of the 3rd, 4th and 5th grade students and similarly the attitudes of the 6th, 7th and 8th grade students did not significantly differentiate within themselves. In other words, the attitudes of the students at the 3rd grade did not change significantly at the 5th grade and similarly the attitudes of the students at the 6th grade did not change significantly at the 8th grade. This finding contradicted with the second finding of this study that could be summarized as "the attitudes of the students changed in a negative way in years". However, it was in accordance

with the finding "how they start, they go on like that". Again, this finding overlapped with the finding of Melancon et al. (1993) that "while the grade levels increased, the difference in the attitudes of the students was not remarkable" and the finding of Taşdemir (2009) that "there was no significant difference between the attitudes of the students at the 6th and 7th grades. This could be explained with the facts that as the students were in the same classroom environments, with the same friends and teacher for long years and the mathematics topics did not change too much between the 3rd and 5th years, it was normal that their attitudes towards mathematics did not change. The reason for the attitudes of students towards mathematics between 6th and 8th years did not change could be explained with the statements of half of the teacher participated into the study as "… The attitude towards mathematics goes on how it starts. That is, if a student enjoys mathematics, there will ne change in this no matter how many year pass…" In other words, this could be caused by the facts that as the teachers, at least half of them, thought that the attitudes of the students did not change and they had some negative opinions about them, they did not take the required precautions or make an effort to change the attitudes in a positive way.

Another finding of this study was that the factors affecting the attitude towards mathematics could be classified by the students and teachers as teacher, friend, personal characteristics (psychology, intelligence style and effort), parents, mathematics topics, achievement, the perception of mathematics' difficulty, and the importance of mathematics.

While all of the teachers participated into this study perceived the teacher, that is themselves, as the most important factor affecting the attitudes, the students also perceived the teacher as the most important factor affecting the attitudes. This overlapped with the finding in most studies (Aiken, 1970; Samuelsson & Granström, 2007; Ünlü, 2007) as "the most important factor affecting the attitude was the teacher". In other words, the teacher factor that was composed of the personalities of the teachers, the methods and techniques they implemented in their courses and classroom management skills affected the attitudes of the students in a positive or negative way.

In this study, another factor affecting the attitude of the student was achievement. As mentioned by the students and teachers and many studies (Peker & Mirasyedioğlu, 2007; Samuelsson & Granström, 2007; Ünlü, 2007), when the achievement increased the attitude increased in a positive way as well; and vice versa, when the achievement decreased, the attitude decreased in a negative way as well.

As, again, stated in previous studies (Peker & Mirasyedioğlu, 2007; Ünlü, 2007) and mentioned by the students and teachers, "parents" was a factor affecting the attitudes. The desire to make their parents happy and receiving support from them affected the attitudes in a positive way.

As some teachers stated, the "personal characteristics" was also another factor affecting the attitudes of the students. That is, if a student had a numerical intelligence, effort and hard study, he

presented a positive attitude towards mathematics. As some of the teachers stated, mathematics topics were another factor affecting the attitudes. That is, the attitude of the student in one of the mathematics topics could be different from his attitude in another topic. The perception of mathematics' difficulty and importance were the other factors affecting the attitudes of students towards mathematics. While the perception of mathematics' difficulty caused a negative attitude towards mathematics, the perception of its importance in daily life caused a positive attitude towards mathematics. According to opinions of both teachers and students, one of the most important factors affecting the attitudes was friend. That is, a student could change his attitude in a positive or negative way influenced by the attitude of his friend towards mathematics. Again, that a student was laughed at or made fun of by his friends when he could not complete a mathematical task could establish a negative attitude towards mathematics due to the pressure.

Although of the factors affecting the attitude towards mathematics teacher, achievement and family to some extent were examined, how the factors like the personal characteristics, mathematics topics, the perception of mathematics' difficulty and importance and friend affected the attitude should be examined in detail.

As a result of the study, the attitudes of the students in the first section of the primary school were more positive than those of in the second section. The factors that caused this difference could be grouped as teachers, friends, the personal characteristics of the student, parents, mathematics topics, achievement, the perception of mathematics' difficulty, friends and the importance of mathematics. While some of these factors increased the positive attitudes towards mathematics, some of them caused the negative attitudes.

References

Aiken, L. R. (1970). Attitudes towards mathematics. *Review of Educational Research, 40*(4), 551-596.

Akdemir, Ö. (2006). *İlköğretim öğrencilerinin matematik dersine yönelik tutumları ve başarı güdüsü*. Yayınlanmamış yüksek lisans tezi, Dokuz Eylül Üniversitesi Eğitim Bilimleri Enstitüsü, İzmir.

Akgün, L. (2002). *Matematiğe karşı olumlu tutum geliştirme faktörleri*. Yayımlanmamış yüksek lisans tezi, Atatürk Üniversitesi Fen Bilimleri Enstitüsü, Erzurum.

Akman, B. (2002). Okul öncesi dönemde matematik. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 23*, 244-248.

Aksu, M. (1985). *Ortaöğretim kurumlarında matematik öğretimi ve sorunları*. Ankara: T.E.D.Yayınevi Öğretim Dizisi, No:3,Yorum-Basın Ltd. Şti.

Aktümen, M. ve Kaçar, A. (2008). Bilgisayar cebir sistemlerinin matematiğe yönelik tutuma etkisi. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *35*, 13-26.

Alkan, H., Bukova Güzel, E. ve Elçi, A. N. (2004, Temmuz). *Öğrencilerin matematiğe yönelik tutumlarında matematik öğretmenlerinin üstlendiği rollerin belirlenmesi.* XIII. Ulusal Eğitim Bilimleri Kurultayı, İnönü Üniversitesi, Eğitim Fakültesi, Malatya.

Altun, M. (1995). *İlkokul 3., 4. ve 5. sınıf öğrencilerinin problem çözme davranışları üzerine bir çalışma*. Yayımlanmamış doktora tezi. Hacettepe Üniversitesi, Ankara.

Aydın, B. (2003). Bilgi toplumu oluşumunda bireylerin yetiştirilmesi ve matematik öğretimi. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi*, *2*(14), 183-190.

Baki, A. (2006). *Kuramdan uygulamaya matematik eğitimi*. Trabzon: Derya Kitabevi.

Baroody, A. J. (1987). *Children's mathematical thinking; A developmental framework for preschool, primary, and special education teachers*. New York: Teachers College, Columbia University.

Başar, M., Ünal, M. ve Yalçın, M. (2002, Eylül). *İlköğretim kademesiyle başlayan matematik*

korkusunun nedenleri. V.Ulusal Fen Bilimleri ve Matematik Eğitimi Kongresi, ODTU, Ankara, Türkiye.

Baykul, Y. (1990). *İlkokul Beşinci Sınıftan Lise ve Dengi Okulların Son Sınıflarına Kadar Matematik ve Fen Derslerine Karşı Tutumda Görülen Değişmeler ve Öğrenci Yerleştirme Sınavındaki Başarı ile İlişkili Olduğu Düşünülen Bazı Faktörler*. Ankara: ÖSYM Yayınları.

Bekdemir, M. (2007). İlköğretim matematik öğretmen adaylarındaki matematik kaygısının nedenleri ve azaltılması için önerileri (Erzincan Eğitim Fakültesi Örneği). *Erzincan Eğitim Fakültesi Dergisi*, *9*(2), 131-144.

Bindak, R. (2005). İlköğretim öğrencileri için Matematik Kaygı Ölçeği. *F. Ü. Fen ve Mühendislik Bilimleri Dergisi*, *17* (2), 442-448.

Bloom, B. J. (1998). *İnsan Nitelikleri ve Okulda Öğrenme*. (D. A. Özçelik, Çev.). İstanbul: Milli Eğitim Basımevi.

Bogdan, R. C., & Biklen, S. K. (1992). *Qualitative research for education*. Boston: Allyn and Bacon.

Bulut, S., Yetkin, İ. E. ve Sazak, S. (2002). Matematik öğretmen adaylarının olasılık başarısı, olasılık ve matematiğe yönelik tutumlarının cinsiyete göre incelenmesi. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, 22, 21-28.

Cai,J., Mayer.J.C. & Wong.N. (1997). Parental Roles in Student's Learning of Mathematics. *Annual Meeting of American Educational Research Association*.2-21. Retrieved October 19, 2009, from http://*www.eric.ed.gov/ERICWebPortal/recordDetail?accno=ED412087.*

Dane, A., Doğar, Ç. & Balkı, N. (2004). İlköğretim 7. sınıf matematik ders kitaplarının değerlendirilmesi. *Erzincan Eğitim Fakültesi Dergisi*, *6*(2), 1-18.

Dursun, Ş. Ve Dede, Y. (2004). Öğrencilerin matematikte başarısını etkileyen faktörler. Matematik öğretmenlerinin görüşleri bakımından. *GÜ, Gazi Eğitim Fakültesi* Dergisi, *24*(2), 217-230.

Ekizoğlu, N. ve Tezer, M. (2007). The relationship between the attitudes towards mathematics

and the success marks of primary school students. *Cypriot Journal of Educational Sciences*, *1*(2), 43-57.

Ersoy Y. (2003) Teknoloji destekli matematik eğitimi-1: Gelişmeler, politikalar ve stratejiler. *İlköğretim-Online 2* (1), 18-27.

Gür, H. & Seyhan, G. (2006). İlköğretim 7. sınıf öğrencilerinin matematik öğretiminde aktif öğrenmenin öğrenci başarısı üzerine etkisi. *BAÜ Fen Bilimleri Enstitüsü Dergisi*, *8*(1), 17-27.

Güven, Y. (2001). İlköğretimde (4-5) öğrencilerinin matematik dersi ile ilgili olarak görüşlerine ve kendini yeterli görme düzeyine ilişkin bir ön çalişma. *S.D.Ü. Burdur Üniversitesi Eğitim Fakültesi Dergisi*, *2*(2), 102-112.

Harman, A. ve Akın, M. F. (2006). Eğitim fakültesi öğrencilerinin matematik dersinin öğretim şekli üzerine bir değerlendirme. *Elektronik Sosyal Bilimler Dergisi*, *5*(18), 124-130.

Kabaca, T. & Erdoğan, Y. (2007). Fen bilimleri, bilgisayar ve matematik eğitimi alanlarindaki tez çalişmalarinin istatistiksel açidan incelenmesi. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi*, *2*(22), 54-63.

Kaban, İ. (2006). *MEB 2004 eğitim programı çerçevesinde ilköğretim I. kademede okutulan matematik kitaplarında yapılan değişikliklerin matematiğe karşı olumlu tutum geliştirmeye katkısı üzerine*. Yayınlanmamış yüksek lisans tezi, Selçuk Üniversitesi Fen Bilimleri Enstitüsü, Konya.

Kandemir, M. (2007). Sınıf öğretmeni adaylarının temel matematik dersine ilşkin tutumları ve kavram öğrenim düzeyleri. *Erzincan Eðitim Fakültesi Dergisi*, *9*(2), 13-32.

Kennedy, L. M. & Tipps, S. (1991). *Guiding children's learning of mathematics.* Belmont, California: Wadsworth Publishing Company.

Koca Özgün, S. A. & Şen, A.İ. (2006). Orta öğretim öğrencilerinin matematik ve fen derslerine yönelik tuutmlarının nedenleri. *Eurasian Journal of Educational Research*, 23, 137-147.

McMillan, J. H., & Schumacher, S. (2006). Research in education: Evidence-based inquiry. London: Pearson (Sixth Edition).

MEB, (2005). İlköğretim okulu matematik dersi 6–8 sınıflar öğretim programı, Talim Terbiye Kurulu Başkanlığ: Ankara.

Melancon, J. G., Thompson, B. & Becnel, S. (1993). How elementary school student think about mathematics. *Annual Meeting of the Southwest Educational Research Association, 2-18.*

Moralı, S., Köroğlu, H. ve Çelik, A. (2004). Buca eğitim fakültesi matematik öğretmen adaylarının soyut matematik dersine yönelik tutumları ve rastlanan kavram yanılgıları. *GÜ, Gazi Eğitim Fakültesi Dergisi 24*(1),161-175.

Nazlıçiçek, N., & Erktin, E. (2002). İlköğretim matematik öğretmenleri için kısaltılmış matematik tutum ölçeği. *V. Ulusal Fen Bilimleri ve Matematik Eğitimi Kongresi Bildiriler Kitabı,* 860-865.

Peker, M.& Mirasyedioğlu, Ş. (2007). Pre-service elementary school teachers' learning styles and attitudes towards mathematics. *Eurasia Journal of Mathematics, Science & Technology Education*, *4*(1), 21-26.

Reyes, L. H. (1984). Affective Variables and Mathematics Education. *The Elementary School Journal, 84*(5), 558-581.

Samuelsson, J. & Granström, K. (2007). Important prerequisites for students' mathematical achievement. *Journal of Theory and Practice in Education*, *3*(2), 150–170.

Serin, O. (2004, Temmuz). *Öğretmen adaylarının problem çözme becerisi ve fene yönelik tutum ile başarıları arasındaki ilişki.* XIII. Ulusal Eğitim Bilimleri Kurultayı, İnönü Üniversitesi, Eğitim Fakültesi, Malatya.

Taşdemir, C. (2009). İlköğretim ikinci kademe öğrencilerinin matematik dersine karşı tutumları: Bitlis ili örneği. *Dicle Üniversitesi Ziya Gökalp Eğitim Fakültesi Dergisi*, *12*, 89-96.

Telese, J.A. (1997, January). Hispanic Students' Attitudes Toward Mathematics And Their Classroom. *Annual Meeting of the Southwest Educational Research Association.* 2-37. Retrieved June 19, 2009, from http://www.eric.ed.gov/ERICWebPortal/recordDetail?accno=ED407256.

Turanlı, N., Keçeli, V. ve Türker, N. K. (2007). Ortaöğretim ikinci sınıf öğrencilerinin karmaşık sayılara yönelik tutumları ile karmaşık sayılar konusundaki kavram yanılgıları ve ortak hataları. *BAÜ FBE Dergisi*, *9*(2), 135-149.

Umay, A. (1996). Matematik eğitimi ve ölçülmesi. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 12*(1), 145-149.

Ünlü, E. (2007). İlköğretim okullarındaki üçüncü, dördüncü ve beşinci sınıf öğrencilerinin matematik dersine yönelik tutum ve ilgilerinin belirlenmesi. *Dumlupınar Üniversitesi Sosyal Bilimle Dergisi*, *19*, 129-148.

Weissglass, J. (2002). Inequity in mathematics education: Questions for educators. *The Mathematics Educator, 12*(2), 34-39.

Yenilmez, K ve Kakmacı, Ö. (2008). İlköğretim yedinci sınıf öğrencilerinin matematikteki hazırbulunuşluk düzeyleri. *Kastamonu Eğitim Dergisi, 16*(2), 529-542.

Yenilmez, K. & Can, S. (2006) Matematik öğretimi dersine yönelik görüşler. *Ondokuz Mayıs Üniversitesi. Eğitim Fakültesi Dergisi, 22*, 47-59.

Yenilmez, K. ve Özabacı, N. Ş. (2003). Yatılı öğretmen okulu öğrencilerinin matematik ile ilgili tutumları ve matematik kaygı düzeyleri arasındaki ilikşi üzerine bir çalışma. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi, 2*(14), 132-146.

Yıldırım, K. (2006). Çoklu zeka kuramı destekli kubaşık öğrenme yönteminin ilköğretim 4. sınıf öğrencilerinin matematik dersindeki erişilerine etkisi. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi, 7*(2), 301-315.

Yıldız, S. (2006). *Üniversite sınavına hazırlanan dershane öğrencilerinin matematik dersine karşı tutumları*. Yayınlanmamış yüksek lisans tezi, Hacettepe Üniversitesi Fen Bilimleri Enstitüsü, Ankara.