Available online at www.sciencedirect.com
ScienceDirect
Procedia Social and Behavioral Sciences 1 (2009) 291–295
Procedia Social and Behavioral Sciences

World Conference on Educational Sciences 2009

Examining elementary school students' attitudes towards mathematics in terms of some variables

Davut Köğce[a]*, Cemalettin Yıldız[b], Mehmet Aydın[c], Rıdvan Altındağ[d]

[a,b]*Karadeniz Technical University, Fatih Faculty of Education, Department of Primary Mathematics Education, Trabzon / TURKEY*
[c]*Karadeniz Technical University, Fatih Faculty of Education, Department of Secondary Science and Mathematics Education, Trabzon / TURKEY*
[d]*Damudere Elementary School's Mathematics Teacher, Giresun / TURKEY*

Received October 8, 2008; revised December 22, 2008; accepted January 5, 2009

Abstract

The purpose of this study is to determine and compare how the attitudes towards mathematics of second grade students in elementary school changes according to some variables. This study was carried out by using survey method. As data collection tool, Mathematics Attitude Questionnaire (MAQ) which consists of 37 items each with five response alternatives covering the attitudes of students towards mathematics was used. In this research, this questionnaire was administered to 200 elementary school students from two different primary schools in 2007-2008 education terms in the city of Trabzon, TURKEY. The data were analyzed by one-way ANOVA and independent samples t-tests using the statistical package program (SPSS 10.0). As a result, it is revealed that there are statistically significant differences in terms of the attitudes towards mathematics according to their grade levels, but gender of students.

Keywords: Students' attitudes; mathematics attitude questionnaire; elementary school

1. Introduction

Learning mathematics has become a necessity for an individual's full development in today's complex society. Despite its utility and importance, mathematics is perceived by most pupils as difficult, boring, not very practical, and abstract, etc (Ignacio, Nieto & Barona, 2006). Therefore, students' low success level in mathematics has been a worry for a long time in many countries. There are a lot of factors affecting students' success in mathematics. One of these factors is their mathematical fears (Peker & Mirasyedioğlu, 2008). One of the reasons for mathematical fears is attitude towards mathematics (Baloğlu, 2001). It is generally believed that students' attitudes towards mathematics determine their mathematical success. A student's constant failure in mathematics and his/her mathematics anxiety can make him to believe that he can never do well on the subject thus accepting defeat. On the

* Davut Köğce. Tel.: 0542-300-38-11
E-mail address: d_kogce@yahoo.com

1877-0428/$–see front matter © 2009 Elsevier Ltd. All rights reserved.
doi:10.1016/j.sbspro.2009.01.053

other hand, his successful experience can make him to develop a positive attitude towards learning mathematics (Akinsola & Olowojaiye, 2008; Biller, 1996). So, the importance of measuring students' attitudes increases every passing day in educational system (Gerçek, Köseoğlu, Yılmaz & Soran, 2006). In a teaching settings in which student's attitudes are not considered, expected learning experiences become difficult and hence teaching activities are not precisely performed. Whereas, conducting teaching activities are the signs for students' success in education. To achieve the expected student success, it is required to know students' attitudes (Hançer, Uludağ & Yılmaz, 2007), because one of the objectives of elementary mathematics education is to get students improve affirmative attitudes towards mathematics. Determining how much students reached the educational objectives will be beneficial for assessing of the current education and, if there are needed, doing some changes on it. Determining student attitudes which can be affected by different variables will be beneficial for remediation of students' disregard, biases and learning difficulties about mathematics. A lot of studies has been performed which have aimed at specifying of attitudes both primary and secondary school levels (Altun, 1995; Aşkar, 1986; Baykul, 1990; Güler, 1997; Peker & Mirasyedioğlu, 2008; Yılmaz, 2006). However, there have not attained enough studies determining and comparing how elementary school students' attitudes towards mathematics changes according to grade levels in Turkey so far.

If it is considered that education is a process which is deliberate, has goals and aimed to have students gain a positive behavioral change through this process in general, it is hoped that attitudes of students towards mathematics positively improves through this process in all grade levels of elementary schools. So, it is important to be conduct a study determining and comparing how elementary school students' attitudes towards mathematics changes according to grade levels in order to improve mathematics education. Therefore, the aim of this study is to determine and compare how elementary school (6, 7 and 8. grades) students' attitudes towards mathematics changes according to some variables such as gender, whether receive private tuition, math-achievement score, educational background of parents, profession of parents and grade levels.

2. Methods

This study was carried out by using survey method.

2.1. Population and sample

Population of study consisted of students who studied at two different public elementary schools in the city of Trabzon, TURKEY, in the school term of 2007-2008. Sample of the study comprised of 200 elementary school students randomly chosen from these primary schools (68 students from grade 6, 67 students from grade 7 and 65 students from grade 7)

2.2. Instrument

Mathematics Attitude Questionnaire (MAQ) used as the data collection tool in this study was developed by Duatepe and Çilesiz (1999) because of determining attitudes of first year university students' attitudes towards mathematics. It was restructured by this study's authors according to levels of elementary school students for this study. MAQ is made up of two sections. The first section which investigating the background information about students like gender, whether receive private tuition, mathematics success rating, educational background of parents and profession of parents and grades. The second section consists of 37 items each with five alternative responses ("strongly agree", "agree", "be undecided", "disagree", and "strongly disagree") covering the attitudes of students towards mathematics. Scoring was from 5 to 1 point, that is, 5 point for strongly agree, 4 point for agree, 3 point for be undecided, 2 point for disagree and 1 point for strongly disagree of the item if positively warded. High scores from the questionnaire shows positive attitudes. The minimum score which can be get from questionnaire is 37 and the maximum one is 185. It was agreed as low attitude scores are among 37 to 111, tolerable attitude ones are among 112 to 158 and high attitude ones are among 159 to 185. Where the item is negatively warded, scoring was in reverse order. To increase the validity of the instrument, mathematics educators' and elementary school mathematics teachers' views were received. The reliability coefficient of the instrument was established using Cronbach alpha-

reliability coefficient method and it was found to be 0.92 after it was administered to 48 grade 6 students in the pilot study.

2.3. Data Analysis

MAQ scores formed the basis of data analysis. After the necessary pre-processing, coding, and transferring to electronic storage, the results were analyzed by one-way Anova and independent samples t-tests using the statistical package program (SPSS 10.0). When determining the significance of statistical analysis, 95% confidence level with a 5% margin of error was accepted.

3. Findings and Discussion

Analyses of the student responses to MAQ items according to some variables are represented in Table 1. The findings are offered according to sequence of these variables.

Table 1. The relationship between the features of students and attitudes towards mathematics

Features of Students	Sub-features	Analysis results of the students' responses to MAQ								
		Grade 6			Grade 7			Grade 8		
		f	X	p	f	X	p	f	X	p
Gender	Girl	36	142.80	$t_{(66)} = 0.96$	36	145.63	$t_{(65)} = 1.050$	37	127.48	$t_{(63)} = 1.660$
	Boy	32	137.09	$p = 0.34$	31	138.70	$p = 0.298$	28	137.53	$p = 0.102$
Private tuition	Yes	40	146.72	$t_{(66)} = 2.79$	41	151.53	$t_{(65)} = 3.811$	51	134.68	$t_{(63)} = 1.836$
	No	28	130.67	$p = 0.007^{**}$	26	128.07	$p = 0.000^{**}$	14	121.35	$p = 0.071$
Math-achievement score	MAS1	30	132.56	$F_{(2-65)} = 10.215$	16	129.62	$F_{(2-64)} = 3.866$	17	116.41	$F_{(2-62)} = 9.055$
	MAS2	20	134.28	$p = 0.000^{**}$	23	140.04	$p = 0.026^{**}$	16	125.68	$p = 0.000^{**}$
	MAS3	17	160.64		28	151.71		32	143.06	
Educational background of father	PEB	25	122.12	$F_{(2-65)} = 20.188$	28	123.21	$F_{(2-64)} = 18.863$	25	117.32	$F_{(2-62)} = 9.234$
	SEB	22	143.04	$p = 0.000^{**}$	25	155.80	$p = 0.000^{**}$	30	142.40	$p = 0.000^{**}$
	GEB	21	158.47		14	157.00		10	136.30	
Educational background of mother	PEB	38	127.21	$F_{(2-65)} = 20.863$	45	130.93	$F_{(2-64)} = 19.542$	43	123.93	$F_{(2-62)} = 8.031$
	SEB	22	152.45	$p = 0.000^{**}$	19	166.57	$p = 0.000^{**}$	21	147.14	$p = 0.001^{**}$
	GEB	8	167.50		3	162.00		1	149.00	
Profession of father	GE	34	148.23	$F_{(2-65)} = 4.700$	33	140.84	$F_{(2-64)} = 1.518$	33	131.90	$F_{(2-62)} = 4.894$
	TP	11	138.00	$p = 0.012^{**}$	9	156.77	$p = 0.227$	8	153.87	$p = 0.011^{**}$
	SE	23	129.13		25	139.36		24	124.33	
Profession of mother	HW	55	135.27	$F_{(2-65)} = 8.071$	61	141.83	$F_{(2-64)} = 0.204$	61	131.75	$F_{(2-62)} = 0.152$
	GE	12	163.41	$p = 0.001^{**}$	4	146.25	$p = 0.816$	3	136.66	$p = 0.859$
	SE	1	127.00		2	153.00		1	121.00	
Grades	Grade 6	68	140.11							
	Grade 7	67	142.43				$F_{(2-197)} = 3.194$			
	Grade 8	65	131.81				$p = 0.043^{**}$			
	Total	200	138.19							

Independent samples t-test for analysis of two independent variables and one-way ANOVA for analysis of three independent variables are used.

*** p < 0,05, there is statistically significant difference.*

Curtailments:

1. Math-Achievement Score: MAS1*: Math-Achievement Score is 1,* MAS2*: Math-Achievement Score is 2-3,* MAS3: *Math-Achievement Score is 4-5.*

2.Educational Background of Parents: PEB: *Primary Educational Background,* SEB: *Secondary Educational Background,* GEB: *University graduate background.*

3. Profession of Parents: GE: *Government Employee,* TP: *Trades People,* SE: *Self-Employment,* HW*: House-Wife*

As seen from Table 1, it is found that the attitudes towards mathematics of grade 6, grade 7 and grade 8 students are not significantly affected by gender (Grade 6: $t_{(66)} = 0.96$ $p > .05$, $X_{girls} = 142.80$ and $X_{boys} = 137.09$, Grade 7: $t_{(65)} = 1.050$ $p > .05$, $X_{girls} = 145.63$ and $X_{boys} = 138.70$) and Grade 8: $t_{(63)} = 1.660$ $p > .05$, $X_{girls} = 127.48$ and

X_{boys} = 137.53). However if means of each grades are attended for gender, females students' attitudes are more positive than males in grade 6 and grade 7, except for grade 8. This finding is consistent with of results studies conducted by Güler (1997) on grade 8, Yılmaz (2006) on grade 6, Çakır, Şenler and Taşkın (2007) on elementary school students, Kaplan & Kaplan (2006) on high school students and Çelik and Bindak (2005) on university students. In other words, gender do not affects the attitudes towards mathematics.

According to results of independent samples t-tests from Table 1, it is determined that receiving private tuition has significant effect on attitudes towards mathematics at grade 6 and grade 7 students, but this variable do not have any significant effect on attitude towards mathematics at grade 8 students (Grade 6: $t_{66)} = 2.79$ $p < .05$, $X_{yes} = 146.72$ and $X_{no} = 130.67$, Grade 7: $t_{(65)} = 3.811$ $p < .05$, $X_{yes} = 151.53$ and $X_{no} = 128.07$, Grade 8: $t_{(63)} = 1.836$, $p > .05$, $X_{yes} = 134.68$ and $X_{no} = 121.35$). In spite of no significant effect on attitude towards mathematics of grade 8 students, it is seen that the attitude means of students receiving private tuition are more high than ones of students no receiving private tuition.

As seen in Table 1 showing the results of one-way ANOVA analysis about relationship between students' mathematics achievement score and their attitudes towards mathematics, there is a significant difference in favor of high achievement students at grade 6, 7 and 8. (Grade 6: $F_{(2-65)} = 10.215$, $p < .05$, $X_{MAS1} = 132.56$, $X_{MAS2} = 134.28$ and $X_{MAS3} = 160.64$, Grade 7: $F_{(2-64)} = 3.866$ $p < .05$, $X_{MAS1} = 129.62$, $X_{MAS2} = 140.04$ and $X_{MAS3} = 151.71$, Grade 8: $F_{(2-62)} = 9.055$ $p < .05$, $X_{MAS1} = 116.41$, $X_{MAS2} = 125.68$ and $X_{MAS3} = 143.06$). This finding supports to the results of the study by Tay and Akyürek Tay (2006). Based on this finding, it could be said that sensory features of students affect their achievement.

As seen in Table 1 showing the results of one-way ANOVA analysis about relationship between students' attitudes towards mathematics and educational background of their parents, it's observed that there is a significant difference between their attitude towards mathematics and educational background of their parents for each grades in elementary schools. This finding is consistent with of results studies conducted by Yılmaz (2006) on grade 6 and Çakır, Şenler and Taşkın (2007) on secondary grade students.

As seen in Table 1 showing the results of one-way ANOVA analysis about relationship between profession of parents and students' attitudes towards mathematics, there is found a significant difference in favor of GE attitudes of grade 6 students and TP ones of grade 8 students between profession of father and attitudes towards mathematics, but grade 6 students' attitudes are not significantly affected by this variables (Grade 6: $F_{(2-65)} = 4.700$, $p < .05$, $X_{GE} = 148.23$, $X_{TP} = 138.00$ and $X_{SE} = 129.13$, Grade 7: $F_{(2-64)} = 1.518$ $p > .05$, $X_{GE} = 140.84$, $X_{TP} = 156.77$ and $X_{SE} = 139.36$, Grade 8: $F_{(2-62)} = 4.894$ $p < .05$, $X_{GE} = 131.90$, $X_{TP} = 153.87$ and $X_{SE} = 124.33$). Otherwise, although there is found a significant difference in favor of GE attitudes of grade 6 students between profession of mother and their attitudes towards mathematics, grade 7 and grade 8 students' attitudes are not significantly affected by this variables (Grade 6: $F_{(2-65)} = 8.071$ $p < .05$, $X_{HW} = 135.27$, $X_{GE} = 163.41$, $X_{SE} = 127.00$, Grade 7: $F_{(2-64)} = 0.204$, $p > .05$, $X_{HW} = 141.83$, $X_{GE} = 146.25$, $X_{SE} = 153.00$, Grade 8: $F_{(2-62)} = 0.152$, $p > .05$, $X_{HW} = 131.75$, $X_{GE} = 136.66$, $X_{SE} = 121.00$).

As seen in Table 1, there is a significant difference between the students' attitudes towards mathematics and their grades ($F_{(2-197)} = 3.194$ $p < .05$, $X_{Grade\ 6} = 140.11$, $X_{Grade\ 7} = 142.43$ and $X_{Grade\ 8} = 131.81$). If the mean scores of their attitudes are looked according to each grade, it is seen that grade 7 students' mean score is higher and grade 8 students' mean score is the lowest than other grades. This finding is consistent with the study by Baykul (1990) and Altun (1995). Moreover, this finding is similar with results of a study by Çakır, Şenler and Taşkın (2007) in order to determine elementary school students' attitudes towards science course.

4. Conclusion and Suggestions

When the results are examined, it is possible to make some inferences as following:

The results revealed that there are statistical significant differences elementary school students' attitudes of towards mathematics according to these variables: (a) Receiving private tuition at grade 6 and 7, (b) Their mathematics achievement score and educational background of parents at each grade levels, (c) Profession of their fathers at grade 6 and 8, (d) Profession of mothers at grade 6, (e) Grade level of students in elementary schools.

There could not be found any significant difference between elementary school students' attitudes towards mathematics according to these variables: (a) Gender at each grade, (b) Taking private tuition at grade 8, (c) Fathers' professions at grade 7, (d) Mothers' professions at grade 7 and 8.

Some suggestions could be made for teachers according the result of this study:

Awarding of the students' attitudes towards mathematics would be useful for the teachers. At the beginning of each semester, attitude test could be applied to the students, so that teachers can identify the students who have negative attitude toward mathematics and can take required precautions.

In order to make student active, to increase their motivation, and attitudes, mathematics should be associated with everyday life.

Using concrete materials in learning environments positively increases students' mathematics achievement and their attitudes towards mathematics.

When students are satisfied with the activities in the learning environment, learning would be more permanent and meaningful. Therefore, this situation is important for students to have positive attitude.

References

Akinsola, M. K., & Olowojaiye, F. B. (2008). Teacher instructional methods and student attitudes towards mathematics. *International Electronic Journal of Mathematics Education,* 3 (1), 60-73.

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

Aşkar, P. (1986). Matematik dersine yönelik tutum ölçen likert tipi ölçeğin geliştirilmesi. *Eğitim ve Bilim Dergisi*, 11(62), 31-36.

Baloğlu, M. (2001). Matematik korkusunu yenmek. *Kuram ve Uygulamada Eğitim Bilimleri Dergisi,* 1(1), 59-76.

Baykul, Y. (1990). *İlkokul beşinci sınıftan lise ve dengi okulların son sınıflarına kadar matematik ve fen derslerine karşı tutumda görülen değişmeler ve öğrenci seçme sınavındaki başarıları ile etkili olduğu düşünülen bazı faktörler.* Ankara: ÖSYM Yayınları.

Biller, J. (1996). *Reduction of mathematics anxiety.* Paper presented at the Annual National Conference on Liberal Arts and Education of Artists, New York, (ERIC Document Reproduction Service No. ED 406196).

Çakır, N. K., Şenler, B., & Taşkın, B. G. (2007). İlköğretim II. kademe öğrencilerinin fen bilgisi dersine yönelik tutumlarının belirlenmesi. *Türk Eğitim Bilimleri Dergisi*, 5(4), 637-655.

Çelik, H. C., & Bindak, R. (2005). Sınıf öğretmenliği bölümü öğrencilerinin matematiğe yönelik tutumlarının çeşitli değişkenlere göre incelenmesi. *Kastamonu Eğitim Dergisi*, 13(2), 427-436.

Çepni, S. (2007). *Araştırma ve proje çalışmalarına giriş.* Genişletilmiş 3. Baskı, Trabzon: Celepler Matbaacılık.

Duatepe, A., & Çilesiz, Ş. (1999). Matematik tutum ölçeği geliştirilmesi. *H.U. Journal of Education*, 16, 45-52.

Gerçek, C., Köseoğlu, P., Yılmaz, M., & Soran, H. (2006). An analyses of the attitudes of teachers candidates towards computer use. *H.U. Journal of Education*, 30, 130-139.

Güler, F. (1997). *İlköğretim ikinci kademe öğrencilerinin matematik dersine karşı tutumlarının eğitim sistemi açısından değerlendirilmesi: Kırşehir örneği*. Yayınlanmamış yüksek lisans tezi, Gazi Üniversitesi, Fen Bilimleri Enstitüsü, Ankara.

Hançer, A. H., Uludağ, N., & Yılmaz, A. (2007). The evaluation of the attitudes of science teacher candidates towards chemistry lesson. *H.U. Journal of Education*, 32, 100-109.

Ignacio, N. G., Nieto, L. J. B., & Barona, E. G. (2006). The affective domain in mathematics learning. *International Electronic Journal of Mathematics Education*, 1(1), 16-32.

Kaplan, A., & Kaplan, N. (2006). Ortaöğretim öğrencilerinin matematik dersine karşı tutumları. *Journal of Qafqaz University*, 17, 20-23.

Peker, M., & Mirasyedioğlu, Ş. (2008). Pre-service elementary school teachers' learning styles and attitudes towards mathematics. *Eurasia Journal of Mathematics, Science & Technology Education,* 4(1), 21-26.

Tay, B., & Akyürek Tay, B. (2006). Sosyal bilgiler dersine yönelik tutumun başarıya etkisi. *Türk Eğitim Bilimleri Dergisi*, 4(1), 73-84.

Yılmaz, M. (2006). İlköğretim altıncı sınıf öğrencilerinin matematik dersine ilişkin tutumlarının bazı değişkenlere göre incelenmesi. *Milli Eğitim Dergisi*, 172, 240-249.