Kuram ve Uygulamada Eğitim Bilimleri • Educational Sciences: Theory & Practice - 11(3) • Summer • 1277-1283

The Attitudes and Opinions of the Students towards Mathematics Course: The Comparison of TIMSS 1999 and TIMSS 2007

Safiye BİLİCAN[a]
Ankara University

R. Nükhet DEMİRTAŞLI
Ankara University

Sevilay KİLMEN
Abant İzzet Baysal University

Abstract

The purpose of this study was to determine whether the attitudes of the students who participated in the application within the context of TIMSS 1999 and 2007 projects towards the "Maths course" and their opinions about "teaching activities in Maths course" had changed according to the mentioned years or not. The sample of TIMSS 1999 was comprised of 7834 students from the 8th grade and the sample of TIMSS 2007 was comprised of 4498 students from the 8th grade. The students were selected by means of stratified sampling method within the ratio of seven geographical regions and schools. The responses of students to the choices of common items in the questionnaires were summarized as percentages and they were illustrated with comparative graphics according to the years. The results of the study showed that the students have more positive attitudes towards the Maths course in TIMSS 2007 than they had in TIMSS 1999. In addition, the students more frequently reported to establish relationship with daily life and their learning in math; cooperative learning activities were increased by the time. In addition, essay exams and multiple choice test and quizzes were used more frequently. In terms of using maths course materials and devices there was no change in using calculator; however, an increase was observed in the use of computer.

Key Words

TIMSS, TIMSS Student Questionnaire, Attitudes towards Mathematics Course.

In today's world, the technology that develops rapidly and the increase in knowledge has led to the change in the expectations of the communities from the individuals. In this respect, the role of the educational systems is to educate individuals that construct the information in globalized world, think critically, and establish to connect phenomena and incidents. In this context, the importance of assessment studies has increased over times which present empirical data about a country. Such empirical findings in field of education present a ranking of a country among the other countries and also give an opportunity to evaluate national educational policies for that country. The projects, such as TIMSS (Trends in International Mathematics and Science Studies), PIRLS (Progress in International Reading Literacy Study) and PISA (Programme for International Student Assessment), which were applied for this purpose and organized by OECD and aiming at determining the students' achievements and in school and out-of-school factors that affect their achievements are the main case studies in the field of education (Wu, 2010). Among these applications, TIMSS is an international project that collects information about the settings and factors that affect the learning and teaching processes like student, teacher and school principals besides testing the students'

a Research Assistant Safiye BILICAN is currently a PhD student at the Department of Measurement and Evaluation. Her research interests include large scale testing, Item Response Theory and item bias. *Correspondence:* Res. Assist. Safiye Bilican. Ankara University Faculty of Educational Sciences, Department of Measurement and Evaluation, 06590 Ankara / Turkey. E-mail: safiyebilican@yahoo.com Phone: +90 312 363 33 50/3108. Fax: +90 312 363 6145.

achievements in Science and Maths. TIMSS participants come from different countries around the world. TIMSS was firstly held in 1995 and then it is carried out respectively in 1999, 2003 and 2007 with four-year intervals. Turkey participated into TIMSS application in 1999 and 2007 at the level of 8th grades. TIMSS Maths assessment framework is in a structure in which the students' skills that requires them to apply their knowledge in the subjects like fraction and numbers, measurement, data presentation, analysis and probability, algebra and geometry into simple situations, in routine Maths problem solving and in non-routine math problem solving which the solution requires multi stages are tested (Mullis et al., 2008). TIMSS of the Maths achievement results test are interpreted within four different proficiency levels which are defined as the international levels. In each of the proficiency level, it explained skills that students could perform depend on the performance in TIMSS Maths test.

In terms of general Maths achievement mean, Turkey was in the 32nd row among the 38 countries in TIMSS 1999 and in the 37th row among the 59 countries in 2007. According to the TIMSS 1999 results, only 1% of the Turkish students could organize the given information, generalize, and explain the solving strategies in the solution of the non-routine math problems (Mullis al., 2000). However, the results of the TIMSS 2007 showed that only a few of the Turkish students (5%) could generalize and had high level skills like solving complex and multi stage problems or making inference (Yayan, 2009).

The results of TIMSS 1999 and TIMSS 2007 have presented important information about the revision of the educational policies and teaching programs in Turkey. In this context, primary school programs have been renewed with a student-centred perspective and put into practice in the first section of the primary education since 2004. The Maths teaching program which started to be implemented in the first and the second section in the perspective of student-centred of the new programs aimed at educating individuals that could use Maths in daily life settings, solve problems, share their ideas and solutions and enjoy learning Maths (Milli Eğitim Bakanlığı [MEB], 2005). The affective characteristics of the students have an important role in Maths teaching (Doğan & Barış, 2010; McLeod, 1992; Papanastasiou, 2002). Maths achievement could be affected by many variables like the features of the school and the student, the attitudes and perceptions of the students, socioeconomic variables. These variables affect the students' achievements in the following educational institution and their attitudes and perceptions which determine their selection of professions (Hammouri, 2004; Reynods & Walberg, 1992).

In literature, there is no sufficient research with TIMSS 1999 Turkish data. This situation is the same for research which was carried out with TIMSS 2007 Turkish data. The major of studies with TIMSS 2007 Turkish data is related with predictor variables of students' achievement in that period (Özdemir, 2003; Öztürk, 2010; Yaman, 2004; Yayan, 2003) and also the number of studies in terms of comparison of TIMSS 1999 and TIMSS 2007 is limited (Barış, 2009). In this study also, the opinions of the students were questioned about "teaching activities in Maths course". The research results indicated that teachers' teaching activities in Maths course had an important impact on attitudes and interest of the students towards mathematics (Akyüz, 2006; Barış, 2009; Cribari, 2006; Hare, 1999; Papanastasiou, 2002).

In this context, knowing which factors are related to the students' achievements that they perform in international projects like TIMSS will provide important opportunities about taking precautions related to the educational policies the countries have. As it is known, TIMSS applications provide rich information about the factors related to the student achievement by means of the surveys about teachers, school administrators and teaching programs besides student surveys. In this study, the part of the student surveys that is related to Maths course is examined.

Purpose

The purpose of this study is to determine whether the students' attitudes "towards the Maths course" and their opinions "teaching activities in Maths course" which are tested through questionnaires applied to the students in the context of TIMSS project that Turkey participated in 1999 and 2007 years have changed during the aforementioned periods or not and to compare the tendencies of the Turkish students with the international mean values.

Method

Research Design

In this study, it was aimed at determining the attitudes, values, self-efficacy and opinions towards math course and teaching activities of the Turkish

students who participated into the TIMSS in 1999 and 2007 Turkish students' attitudes and opinions on the Maths teaching applications depending on the responses of students gave to the common items in student questionnaire which were implemented in both periods. The study is a singular survey research. In this kind of survey, every unit, group, subject is separately described. Description of units, groups, subjects is limited to past or present time. Sometimes, this description could be a function of time. In this respect, this study is a cross sectional survey (Karasar, 2004, pp. 79-80).

TIMSS Samples

The target population was 8th grade students in primary school for TIMSS 1999 and TIMSS 2007. The selection of the sampling from the population was accomplished through stratified sampling method. Firstly, the geographical regions were defined as a stratum and then schools from each stratum were selected randomly. After that, one or two classes were randomly selected from these schools. All the students from these selected classes were included into the sampling. When the Turkey data were taken into account, while 7834 students, 42.1% of whom were girls and 57.9% of them were boys, from the 8th grades were selected from the seven regions of Turkey for TIMSS 1999 application and 4498 students, 46.62% of whom were females and 53.4% of them were males, participated into TIMSS 2007 application (Olson, Martin, & Mullis, 2008).

Data

TIMSS International Study Centre presents student survey data on the official web site of the institution (http://timss.bc.edu). The data of the study were retrieved from this web site and organized in accordance with the purpose of this study. In student survey, there are items measuring "attitudes towards Maths", "the value given to the Maths" and "teaching activities in Maths course" in the scope of the Maths course (Mullis, et al., 2005) In this study, the common items in student questionnaire in TIMSS 1999 and 2007 terms were determined. These items were closed ended and Likert type. The features that these items measured were classified in two dimensions as: *the attitudes, value and self-efficacy perceptions of the students towards Maths and their opinions on in-class teaching activities about Maths topics* (Mullis et al., 2008).

Data Analysis

In this study, the responses s that the Turkish students gave to the items measuring *the attitudes, value and self-efficacy perceptions of the students towards Maths and their views on in-class teaching activities about Maths topics* and common items in student surveys in 1999 and 2007 TIMSS Maths test. These responses and the ratio of the distribution of these responses according to the choices were presented with comparative graphics. The significance of the difference between the percentages related to the responses students gave according to the periods was tested at the level of 0.05 and by means of *z*-test (Akhun, 1982; Kutsal & Muluk, 1972).

Results

In this part, the findings about the research questions were summarized and interpreted within the framework of the purpose of the study.

How did the Attitudes, Value and Self-Efficacy Perceptions of the Students related to the Maths Change in TIMSS 1999 and 2007?

The distribution of the responses of the statement "I am good at Maths" indicated that students' self-efficacy perception about Maths course changed in a positive direction when the responses of 1999 and 2007 were compared. This finding is similar for international means. The international mean of the students replying this statement as "Completely agree" was higher in 2007 than in 1999 ($z_{(2514)} = 3.95$; $p < .05$). As the distribution of the responses of the statement "I enjoy learning Maths" was examined, the percentage of the all students who replied the statement "I enjoy learning Maths" as completely agree ($z_{(5067)} = 20.30$; $p < .05$) and partly agree ($z_{(4508)} = 12.70$; $p < .05$) increased remarkably when compared to the year 1999. This seemed positive in terms of the targets related to the affective features of the new primary education program. In terms of international means, the percentages of the students who stated that they were completely agree with this statement were above the international mean for both years.

The distribution of the responses of the statement "Maths is boring" indicated that although the percentage of the ones thinking that Maths was boring in 1999 was lower ($z_{(1031)} = 2.31$; $p < .05$) than the ones in 2007, an increase ($z_{(3274)} = 13.07$; $p < .05$) was observed in the percentage of the ones who were completely disagree with this statement in 2007.

This finding is similar to the responses given to the statement "I enjoy learning Maths". When the three findings above were evaluated together, it could be interpreted that the attitudes of the students towards Maths course changed in a positive way.

When the distribution of the responses of the statement "I have to be good at Maths in order to get the job I want" was analyzed, both in 1999 and 2007, most of the students presented responses approving this statement. In terms of international means, the percentage of students stating that they were completely agree was above the international mean for both terms.

The distribution of the responses of the statement "I have to be good at Maths in order to enter the department I want at the university" indicated that the percentage of the ones thinking that they had to be good at Maths in order to enter the department they wanted at the university increased ($z_{(7175)} = 13.71$; $p < .05$) from 1999 to 2007. In terms of international means were examined, the percentage of the students who were completely agree with this statement was above the international mean for both years.

How were the Opinions about Doing Maths Courses in TIMSS 1999 and 2007 Years?

The distribution of the responses of the statement "We have quizzes, tests or written exams in Maths course" showed that quizzes, tests or written exams were done more frequently in 2007.

The distribution of the responses of the statement "We use calculator in Maths course" indicated that almost 65% of the students in 1999 stated that they never used calculator in Maths course. This percentage increased ($z_{(7990)} = 11.43$; $p < .05$) in 2007. According to this, in most of the 8th grade Maths course in Turkey, calculators were not used.

The distribution of the responses of the statement "We use computer in Maths course" indicated that while computers were hardly ever used in Maths courses in 1999, the percentage of the students who replied this statement as "never" decreased ($z_{(9629)} = 30.54$; $p < .05$) in 2007. The percentage of the students who stated frequency of computer use in Maths course as "in every course or almost in every course" was higher ($z_{(448)} = 2.71$; $p < .05$) in 2007 than in 1999. This indicated that the frequency of using computers in Maths course increased. Similar result was also observed in the international means of the responses given to this statement.

The distribution of the responses of the statement "We associate what we learn in Maths with our daily life" indicated the percentage of the students who replied the frequency of associating what they learned with their daily lives as "in every course" or "almost in every course" in 2007 increased remarkably ($z_{(2236)} = 11.60$; $p < .05$) when compared to the one in 1999; the percentage of the students who replied this frequency as "never" decreased ($z_{(2818)} = 7.57$; $p < .05$) when compared to the one in 1999. The similar result was also observed in the international means of the responses given to this statement. This finding indicated that the teaching activities related to the daily life situations were used more frequently in 2007 than they were used in 1999.

The distribution of the responses of the statement "We work together in small groups in Maths courses" showed that most of the students enrolled at in the 8th grade stated that they sometimes worked together in small groups or never did in both 1999 and 2007. The percentage of the students who replied the frequency of working in small groups in Maths courses decreased ($z_{(3924)} = 7.20$; $p < .05$) when compared to the one in 1999.

The distribution of the responses of the statement "We start to do our homework in Maths course" indicated that the percentages of the ones who did their homework in classroom were low in both 1999 and 2007. It was also seen that the international means were similar to the responses of the Turkish students. This finding indicated that homework was done out-of-school environments.

Discussion

In this study, the opinions of the students towards the Maths course were evaluated for TIMSS 1999 and TIMSS 2007 for the 8th grade sampling. When the findings of the study were evaluated in general, the following conclusions were drawn out of the data obtained from the common survey items in TIMSS 1999 and TIMSS 2007 Maths applications for the 8th grades.

According to the findings of the study related to the attitudes of the students towards mathematics and value and self-efficacy beliefs, it can be understood that students developed more positive attitudes towards mathematics and they perceive themselves more adequately in mathematics in years. The studies in literature indicated that there is a positive relationship between the mathematic efficacy beliefs of the students and their mathematics

achievements (Dandy & Nettelbeck, 2002; House, 2004; O'Dwyer, 2005; Randhawa, Beamer, & Lundberg, 1993; Shen, 2002). When this finding and results of the related studies are evaluated together, it can be concluded that the mathematics achievements of the students who considered themselves as adequate will be affected positively.

Active learning, individual differences and variety of teaching methods have become more important in the Teacher Education Program which is renewed at the end of 90's. According to TALIS (2007) Turkey Report, the teachers who have professional experience with 1-6 years have graduated from the renewed teacher education program. The ratio of these teachers in all teachers is 35% (Büyüköztürk, Akbaba, &Yıldırım, 2010). So, the teacher group may have contribution to student's positive opinions and attitudes towards mathematics.

The ratio of the students who thought that they should be good at mathematics in order to get the job in the future and enter the department at the universities they like increased in 2007. This finding can be interpreted as students give more importance to mathematics for the future in recent years. It was also mentioned in studies that both students and parents gave importance to mathematic in the period of entering the university which is particularly determinant for the students' future (Howie, 2002; Maqsud & Khalique, 1991; Reynolds, 1991).

In another dimension of the study, the opinions of the students on the way mathematics course is taught are questioned. The findings within this scope indicated that measurement and teaching are interrelated. According to this, students take quizzes, tests or written exam types frequently while they are being taught mathematics. The frequency of this type of application increased in 2007. The studies showed that teachers frequently used multiple choice test applications which require routine procedures in in-class evaluations (Anılan & Sarıer, 2008; Berberoğlu, Demirtaşlı, Güzel, Arıkan, & Tuncer, 2009; Kilmen & Demirtaşlı, 2009; Orbeyi, 2007).

The frequency of computer and calculator usage was asked within the scope of tool usages during the mathematics course. The findings revealed that calculator was not used very often and there was no significant difference among the periods in terms of usage frequency. There are various findings related to the contribution of calculator usage to the mathematics achievement. In some studies which are used TIMSS 1999 data, Akyüz (2006) found that the usage of calculator in mathematics course had a positive impact on students' mathematics achievement in Belgium, but in Netherlands and Slovakia had a negative impact. House (2002) also found that there was a negative and significant relationship between usage of calculator and mathematics achievement for Japanese student and but he did not found significant relationship for American students. Keys (1999) found low and not significant correlation ((rho=-0.17) between usage of calculator and mathematics achievement in TIMSS 1995 data. It was found that the use of calculators did not increase the achievement in mathematics course both for simple operations and more complex operations (Hembree & Dessert, 1986; National Council of Teachers of Mathematics [NCTM], 2000).

The frequency of computer use for mathematics teaching increased when compared to the one in 2007. However, this increase was observed in "some parts of the course" category. Antonijević (2006) stated that most of the students in 4 participant country (the USA, the Netherlands, Bulgaria and Serbia) of TIMSS 2003 whose success was over the average "sometimes" used computers. On the other side, many research showed that computer based teaching increases students' learning motivation and the achievement in mathematics course, facilitated to have positive attitudes towards mathematics (Aktümen & Kaçar, 2003; Baki, Kösa, & Berigel, 2007; Bedir, Yılmaz, & Keşan, 2005; Işıksal & Aşkar, 2005; Liao, 2007; Özdemir & Tabuk, 2004; Senteni, 2004).

From TIMSS 1999 to TIMSS 2007, the ratio of the students who stated that they frequently established relationship with daily life and their learning in math increased. The studies indicated that teaching activities which carried out with daily life settings increased students' achievement in mathematics course and also facilitated to have positive attitudes towards mathematics (Ekem, 2001; Özgen & Pesen, 2008).

The ratio of the students who stated that they worked in small groups in mathematics course in 2007 was higher than the ones in 1999. The studies revealed that collaborative learning activities increased the achievement in mathematics course, particularly in primary school 6^{th} – 8^{th} grades (Bilgin & Akbayır, 2002; Erçelebi, 1995; Norwood, 1995; Yıldız, 1998).

The ratio of starting and completing the assignments in classroom was low in both periods. This finding indicated that the assignments are completed in out-of-school settings. The studies showed that there is negative correlation or no correlation between the assignments and achievement (Altun, 2007; Berberoğlu, 2008).

References/Kaynakça

Altun, A. (2007) *Effect of student and school related factors on mathematics achievement in Turkey at eight grade level.* Yayımlanmamış yüksek lisans tezi, Orta Doğu Teknik Üniversitesi, Ankara.

Akhun, İ. (1982). *Hipotez testi ile ilgili bir araştırma***.** Ankara: Ankara Üniversitesi Yayınları, No: 110.

Aktümen, M. ve Kaçar, A. (2003). İlköğretim 8. sınıflarda harfli ifadelerle işlemlerin öğretiminde bilgisayar destekli öğretimin rolü ve bilgisayar destekli öğretim üzerine öğrenci görüşlerinin değerlendirilmesi. *Kastamonu Eğitim Dergisi*, *11* (2), 339-358.

Anılan, H. ve Sarıer Y. (2008). Altıncı sınıf matematik öğretmenlerinin matematik dersi öğretim programının alt boyutlarına ilişkin görüşleri. *On Dokuz Mayıs Üniversitesi Eğitim Fakültesi Dergisi, 2*, 33-45.

Antonijević, R. (2006). *Usage of computers and calculators and students' achievement: Results from TIMSS 2003*. Retrived October 07, 2010 from http://www.eric.ed.gov/erıcdocs/data/ericdocs2sql/content_storage_01/0000019b/80/2d/7b/a.pdf

Akyüz, G. (2006). Türkiye ve Avrupa Birliği ülkelerinde öğretmen ve sınıf niteliklerinin matematik başarısına etkisinin incelenmesi. **İlköğretim Online**, *5* (2), 61-74.

Baki, A., Kösa, T. ve Berigel, M. (2007, May). *Bilgisayar destekli materyal kullanımının öğrencilerin matematik tutumlarına etkisi.* Paper presented at the meeting of The Proceedings of 7th International Educational Technology Conference, Near East University, Northcyprus. [

Barış, F. (2009). *TIMSS-R ve TIMSS-2007 sınavlarının öğrenci başarısını yordayan değişkenler açısından incelenmesi.* Yayımlanmamış yüksek lisans tezi, Hacettepe Üniversitesi, Ankara.

Bedir, D., Yılmaz, S. ve Keşan, C. (2005, Eylül). *Bilgisayar destekli matematik öğretiminin ilköğretimde öğrenci başarısına etkisi.* XIV. Eğitim Bilimleri Kongresi'nde sunulmuş sözlü bildiri, Pamukkale Üniversitesi, Eğitim Fakültesi, Denizli.

Berberoğlu, G. (2008). Ev ödevlerinin öğrenme ile ilişkisi. *Cito Eğitim: Kuram ve Uygulama Dergisi, Tanıtım Sayısı*, 50-54.

Berberoğlu, G., Demirtaşlı, N. Ç., Güzel, Ç. İ., Arıkan S. ve Tuncer, Ç. Ö. (2009). Okul dışı etmenlerin okul başarısı ile ilişkisi. *Cito Eğitim: Kuram ve Uygulama Dergisi*, *Ocak-Mart 2010 Sayısı*, 27-38.

Bilgin, T. ve Akbayır, K. (2002). *İşbirlikli öğrenmenin dizi ve serilerin öğretimindeki etkililiği.* http://www.fedu.metu.edu.tr/UFBMEK- 5/netscape/b_kitabi/PDF/Matematik/Bildiri/t213da.pdf adresinden 08 Kasım 2009 tarihinde edinilmiştir.

Büyüköztürk, Ş., Akbaba, S. A. ve Yıldırım, K. (2010). *TALIS-2007 uluslararası öğretme ve öğrenme araştırması Türkiye ulusal raporu.* http://digm.meb.gov.tr/uaorgutler/OECD/TALIS_tr_Rapor.pdf adresinden 10 Şubat 2011 tarihinde edinilmiştir.

Cribari, R. D. (2006). *Socio-cultural factors and seventh grade students' attitudes and belief about mathematics*. Unpublished doctoral dissertation, University of Northern Colorado, Colarado. [

Dandy J., & Nettelbeck, T. (2002). The relationship between IQ, homework, aspirations and academic achievement for Chinese, Vietnamese and Anglo-Celtic Australian school children. *Educational Psychology*, *22* (3), 267-275.

Doğan, N. ve Barış, F. (2010). Tutum, değer ve özyeterlik değişkenlerinin TIMSS-1999 ve TIMSS-2007 sınavlarında öğrencilerin matematik başarılarını yordama düzeyleri. *Eğitimde ve Psikolojide Ölçme ve Değerlendirme Dergisi*, *1* (1), 44-50.

Ekem, N. (2001, Eylül). *Bilim-kurgu ve fen eğitimi*. Fen Bilimleri Eğitimi Sempozyumu'nda sunulmuş sözlü bildiri, Maltepe Üniversitesi, İstanbul.

Erçelebi, E. (1995). *Geleneksel öğretim yöntemleri ile işbirlikli öğrenme yönteminin matematik öğretimi üzerindeki etkileri.* Yayımlanmamış yüksek lisans tezi, Dokuz Eylül Üniversitesi, İzmir.

Hare, M. (1999). *Revealing what urban early childhood teachers think about mathematics and how they teach it: Implications for practice.* Retrieved April 17, 2010 from http://people.exeter.ac.uk/PErnest/hare.

Hembree, R., & Dessert, D. (1986). Effects of hand-held calculators in precollege mathematics education: A meta-analysis. *Journal For Research In Mathematics Education, 17* (2), 83-99.

Hammouri, H. (2004). Attitudinal and motivational variables related to mathematics achievement in Jordan: Findings from the Third International Mathematics and Science Study (TIMSS). *Educational Research, 46* (3), 241-257.

House, J. D. (2002). Instructional practices and mathematics achievement of adolescent students in Chinese Taipei: Results from the TIMSS 1999 assessment. *Child Study Journal*, *32* (3), 157-178.

House J. D. (2004). Cognitive-motivational characteristics and science achievement of adolescent students: Results from the TIMSS 1995 and TIMSS 1999 assessments. *International Journal of Instructional Media*, *31* (4), 411-424.

Howie, S. J. (2002). *English language proficiency and contextual factors influencing mathematics achievement of secondary school pupils in south Africa*. Unpublished doctoral dissertation, University of Twente, Twente.

Işıksal, M., & Aşkar, P. (2005). The effects of spreadsheet and dynamic geometry software on the achievement and self-efficacy of 7th grade students. *Educational Research*, *47* (3), 333-350.

Karasar, N. (2004). *Bilimsel araştırma yöntemi: Kavramlar, ilkeler, teknikler*. Ankara: Nobel Yayın Dağıtım.

Keys, W. (1999). What can mathematics educators in England learn from TIMSS? *Educational Research and Evaluation*, *5* (2), 195-213.

Kilmen, S. ve Demirtaşlı, N. Ç. (2010). Sınıf öğretmenlerinin ölçme ve değerlendirme ilkelerini uygulama düzeylerine ilişkin görüşleri. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Dergisi*, *42* (2), 27-55.

Kutsal, A. ve Muluk, F. Z. (1972). *Uygulamalı temel istatistik.* Ankara: Hacettepe Üniversitesi Yayınları.

Liao, Y. C. (2007). Effects of computer-assisted instruction on students' achievement in Taiwan: A meta-analysis. *Computers & Education*, *48* (2), 216-233.

Maqsud, M., & Khalique, C. (1991) Relationship of some socio-personal factors to mathematics achievement of secondary and university students in Bophuthatswana. *Educational Studies in Mathematics*, *22* (4), 377-390.

Mcleod, D. (1992). Research on affect in mathematics education: A Reconceptualization. In D. A. Grows (Ed.), *Handbook of research on mathematics teaching and learning* (pp. 575-596). New York: Macmillan.

Milli Eğitim Bakanlığı (MEB). (2005). *İlköğretim 1-5 sınıf programları tanıtım kitapçığı*. Ankara: Yazar.

Mullis, I. V. S., Martin, M. O., Foy, P., Olson, J. F., Preuschoff, C., Erberber, E. et al. (2008). *TIMSS 2007 international mathematics report: Findings from IEA's trends in international mathematics and science study at the fourth and eighth grades*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Mullis, I. V. S., Martin, M. O., Gonzalez, E. J., Gregory, K. D., Garden, R. A., O'Connor, K. M. et al. (2000). *TIMSS 1999 international mathematics report: Findings from IEA's repeat of the third international mathematics and science study at the eighth grade*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Mullis, I. V. S., Martin, M. O., Ruddock, G. J., O'Sullivan, C. Y., Arora, A., & Erberber, E. (2005). *TIMSS 2007 assessment frameworks*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

National Council of Teachers of Mathematics (NCTM). (2000). *Principles and standards for school mathematics*. Reston, VA: author.

Norwood, K. S. (1995). The effects of the use of problem solving and cooperative learning on the mathematics achievement of underprepared college freshmen. *Primus, 5* (3), 229-52.

O'Dwyer, L. M. (2005). Examining the variability of mathematics performance and its correlates using data from TIMSS '95 and TIMSS '99. *Educational Research and Evaluation, 11* (2), 155–177.

Olson, J. F., Martin, M. O., & Mullis, I. V. S. (2008). TIMSS 2007 Technical report. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Orbeyi, S. (2007). *İlköğretim matematik dersi öğretim programının öğretmen görüşlerine dayalı olarak değerlendirilmesi.* Yayımlanmamış yüksek lisans tezi,18 Mart Üniversitesi, Çanakkale.

Özdemir, E. (2003). *Modeling of the factors affecting science achievement of eighth grade turkish student based on the International Mathematics and Science Study-Repeat (TIMSS-R) Data*. Yayımlanmamış yüksek lisans tezi, Orta Doğu Teknik Üniversitesi, Ankara.

Özdemir, A. Ş. ve Tabuk, M. (2004). Matematik dersinde bilgisayar destekli öğretimin öğrenci başarı ve tutumlarına etkisi. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi, 3* (5), 142-152.

Özgen, K. ve Pesen, C. (2008). Probleme dayalı öğrenme yaklaşımı ve öğrencilerin matematiğe yönelik tutumları. *Dicle Üniversitesi Ziya Gökalp Eğitim Fakültesi Dergisi, 11*, 69-83.

Öztürk, L. (2010). *TIMSS 2007 ve eğitim sistemimizin başarısı: öğretmen ve yönetici görüşleri*. Yayımlanmamış yüksek lisans tezi, Marmara Üniversitesi, İstanbul.

Papanastasiou, E. (2002). Factors that differentiate mathematics students in Cyprus, Hong Kong, and the USA. *Educational Research and Evaluation, 8*, 129-146.

Randhawa, B. S., Beamer, J. E., & Lundberg, 1. (1993). Role of mathematics self-efficacy in the structural model of mathematics self-efficacy in the structural model of mathematics achievement. *Journal of Educational Psychology*, *85* (1), 41-8.

Reynolds, A. J. (1991). The Middle schooling process: Influences on science and mathematics achievement from the longitudinal study of American Youth. *Adolescence*, *16* (101), 132-157.

Reynolds, A. J., & Walberg, H. J. (1992). A structural model of high school mathematics outcomes. *Journal of Educational Research*, *89* (3), 150-158.

Senteni, A. (2004). Mathematics and computer-aided learning. *Academic Exchange Quarterly*, *8* (2), 194-199.

Shen, C. (2002). Revisiting the relationship between students' achievement and their self-perceptions: A cross-national analysis based on TIMSS 1999 data. *Assessment in Education: Principles, Policy and Practice, 9* (2), 161-184.

Yaman, İ. (2004). *Modeling the relationship between the science teacher characteristics and eight grade Turkish student science achievements in TIMSS-R*. Yayımlanmamış yüksek lisans tezi, Orta Doğu Teknik Üniversitesi, Ankara.

Yayan, B. (2003). A cross-cultural comparison of mathematics achievement in the Third International Mathematics and Science Study-Repeat (TIMSS-R). Yayımlanmamış yüksek lisans tezi, Orta Doğu Teknik Üniversitesi, Ankara.

Yayan, B. (2009). Uluslararası Matematik ve Fen çalışması (TIMSS 2007) ve Türk öğrencilerin TIMSS 2007'deki matematik performanslarının değerlendirilmesi. *Cito Eğitim: Kuram ve Uygulama Dergisi, 3,* 39-52.

Yıldız, V. (1998). *İşbirlikli öğrenme ve geleneksel öğretimin okulöncesi çocuklarının temel matematik başarıları üzerindeki etkileri ve mevcut uygulamalarla ilgili öğretmen görüşleri*. Yayımlanmamış doktora tezi, Dokuz Eylül Üniversitesi, İzmir.

Wu, M. (2010). *Comparing the similarities and differences of PISA 2003 and TIMSS*. OECD Education Working Papers, No. 32, OECD Publishing. Retrived May 07, 2011 from http://dx.doi.org/10.1787/5km4psnm13nx-en.