

## PAPER DETAILS

TITLE: Explaining Dimensions of Middle School Mathematics Teachers' Use of Textbooks

AUTHORS: MERIC ÖZGELDI

PAGES: 24-36

ORIGINAL PDF URL: <https://dergipark.org.tr/tr/download/article-file/160874>

# Explaining Dimensions of Middle School Mathematics Teachers' Use of Textbooks

Meriç ÖZGELDİ<sup>1</sup>

**Abstract-** The purpose of the study was to describe middle school mathematics teachers' use of textbooks. For this purpose, the Use of Mathematics Textbooks Questionnaire was distributed to 531 middle school mathematics teachers. The results of the study showed that teachers used the student edition textbook during the class and prior to class; and mostly read it for the topic, but rarely for problems and examples. Teachers frequently selected questions from the workbook that were not included in the student edition textbook. They frequently used questions in the workbook similar to the ones in the high school entrance exam questions. They used the teacher edition textbook to read the curriculum objectives and to prepare for the class but they very rarely tended to look up the answers of the questions from the teacher edition textbook. They frequently used auxiliary books to select questions that were not included in the student edition textbook.

**Keywords:** mathematics textbooks, mathematics teachers' use of textbooks, middle school

**Özet-** Ortaokul Matematik Öğretmenlerinin Ders Kitabı Kullanım Boyutlarını Açıklama. Bu çalışmanın amacı, ilköğretim matematik öğretmenlerinin ders kitabı kullanımlarını tanımlamaktır. Bu amaçla, Matematik Öğretmenlerinin Ders Kitabı Kullanım Ölçeği, 531 ilköğretim matematik öğretmenine dağıtılmıştır. Çalışmanın sonuçları göstermektedir ki, öğretmenler ders kitabını sıklıkla derse hazırlık sürecinde ve ders sırasında kullanırken nadiren problemler ve örnekler için kullanmaktadır. Öğretmenler özellikle konunun günlük hayatta ilişkilendirilmesi, diğer derslerle bağlantı kurulması, konu sırasının takibi için ders kitabından faydalanmaktadır. Öğretmenler, çoğunlukla çalışma kitabında bulunan merkezi sınav sorularına benzer soruları kullanmaktadır. Öğretmen kılavuzunu ise kazanımlara bakmak ve derse hazırlık yapmak için kullanmaktadır. Bununla beraber, öğretmenler yardımcı kitapları merkezi sınav sorularına benzer soruları ve ders kitabında olmayan soruları yardımcı kitaplardan seçmek için kullanmaktadır.

**Anahtar Kelimeler:** matematik ders kitabı, ilköğretim matematik öğretmenlerinin ders kitabı kullanımları

## Introduction

In school context, mathematics textbooks are among the most trusted materials that are directly related to teacher's teaching and student's learning (Beaton et al., 1996), and the most commonly used resources for mathematical domains, topics, and the pedagogical practices used in classrooms (Valverde et al., 2002). Teachers often rely heavily on textbooks for decisions such as what to teach, how to teach it, what kinds of tasks and exercises to assign to their students (Robitaille & Travers, 1992); and students often use textbooks for classroom exercises and homework assignments (Fan et al., 2004). It is reasonable to argue that mathematics textbooks constitute an important part of mathematics learning and teaching.

Textbooks have also an important role for interpreting a curriculum. They provide "an interpretation of policy in terms of concrete actions of teaching and learning" (Valverde et al., 2002, p. vii), and make possible a connection between the curriculum intentions and classroom activities constructed by teacher (Schmidt, McKnight, & Raizen, 2002). From this point of view, textbooks mediate the relationship between the curriculum objectives and the application of the instruction (Törnroos, 2005); and they are seen as mediators between the intentions of the curriculum and classroom instruction (Schmidt, McKnight, Valverde, Houang & Wiley, 1997; Stein & Kim, 2009). Therefore, mathematics textbooks are considered as curriculum materials in many studies due to their key role in interpreting the curriculum.

Taking the related literature into account, it can be proposed that curriculum materials are important parts of the lessons in which teachers and students work together. In particular, curriculum materials are generally considered as the resource for teachers to use in the instruction providing instructional and pedagogical strategies (Eisenmann & Even, 2009). They are integral part of teachers' daily work and offer ongoing support for pedagogy and subject matter content throughout an entire school year (Collopy, 2003); and provide ideas and practices which frame classroom activities via text and diagrammatic representations and help teachers in achieving goals that they presumably could not or would not accomplish on their own (Brown, 2009). Therefore, curriculum materials are viewed to provide "uniquely intimate connection to teaching" (Ball & Cohen, 1996, p.6).

<sup>1</sup> Meriç ÖZGELDİ, Dr. Araştırma Görevlisi, Mersin Üniversitesi, Eğitim Fakültesi İlköğretim Bölümü Matematik Eğitimi A.B.D., Mersin, mericozgeldi@mersin.edu.tr

In recent years, there has been an increasing interest among the researchers in terms of analyzing the role of mathematics curriculum materials in learning and teaching of mathematics and teachers' use of curriculum materials (Lloyd, Herbel-Eisenmann, & Remillard, 2009). Researchers have attempted to analyze and examine the way of teachers' interaction with mathematics curriculum materials from different point of views (e.g., Brown, 2009; Haggarty & Pepin, 2002; Remillard, 1999, 2005; Sherin & Dake, 2004). The focus has been placed on what happens when teachers use curriculum materials or textbooks, how they use them, and why (Remillard, 2009). Therefore, investigating teachers' use of curriculum materials is a critical problem in interpreting the teacher-curriculum material interaction considering that value of curriculum materials is likely to depend on the ways they are used (Cohen, Raudenbush, & Ball, 2003).

The teachers' interaction with the resources, associating in particular textbooks, in Turkey has not received sufficient attention by the researchers. These interactions have not so far clearly emphasized as potential influences on teaching of mathematics in the middle school level. Generally, such kinds of considerations have been largely ignored in educational studies in Turkey. For this reason, it could be claimed that there is a need for specifying the interaction between teachers and textbooks and the role of textbooks in teachers' works. In this context, as Haggarty and Pepin (2002) reported, different cultural and educational values certainly have particular meaning in providing a representative picture of a country and also promote a shared understanding and principle for components of framework for use of textbooks and curriculum materials. Owing to that, the data from Turkish educational context provides a particular cultural educational characteristic about using mathematics textbooks and additional information for the related literature on textbook use.

In this study, mathematics textbooks were considered as curriculum materials in terms of explaining teachers' use of textbooks since textbooks mediate the relationship between the curriculum objectives and the enactment of the instruction. Additionally, mathematics textbooks are considered as resources for teaching and learning of mathematics since set of mathematics textbooks (e.g., student edition textbook, workbook, teacher edition textbook, and auxiliary book) provide materials for students and teachers. Regarding the existing literature on mathematics teachers' use of curriculum materials and textbooks and the relationship between teachers and resources, this study aimed to describe middle school mathematics teachers' use of mathematics textbooks.

### ***Mathematics Textbooks in Turkish Schools***

In Turkey, mathematics textbooks have official status and reflect official mathematics curriculum. To be used in schools, any mathematics textbook needs to be approved by the Turkish Ministry of National Education (MoNE). Among the approved mathematics textbooks, MoNE decides which textbook can be used by which public schools, and distributes them free of charge to students and teachers. There are six major textbook publishers which commercially produce middle school mathematics textbooks (i.e., grades 6-8). There is no significant variation in content among the mathematics textbooks from different publishers considering that all textbooks are designed to reflect the national curriculum. Particularly, mathematics textbooks (i.e., grades 1-8) are prepared in triple sets consisting of student edition textbook, workbook and the teacher edition. The student edition includes problems, examples, definitions, and activities that support student learning in mathematics. The workbook contains additional problems and exercises. The teacher edition is designed to help teachers prepare lessons and includes step-by-step teaching notes, expected learning outcomes, curriculum objectives, suggestions for enrichment exercises and activities, answer keys, and additional comments. Moreover, the structure of the teacher edition comprises a copy of the student edition textbook and workbook pages with solutions and answers on it. In this study, use of sixth, seventh, and eight grade students edition, workbook, and teacher edition textbooks were analyzed.

## **Method**

### ***Participants***

The stratified random sampling techniques were used to produce representative samples. All sixth, seventh, and eighth grade mathematics teachers in public schools in Turkey were identified as the target population of this study. Since it was not possible to obtain accurate estimates of target population, it was appropriate to define an accessible population. The accessible population was determined as all sixth, seventh, and eighth grade mathematics teachers in the public schools in Turkey. The results of the study will be generalized to this population.

The criteria of the State Planning Organization (SPO) were used to group the cities according to their socio-economic development levels. The socio-economic development levels according to "Survey on the Ranking of Provinces and Regions by Socio-Economic Development Levels" prepared in Turkey (2003) was used to select the subgroups. Selecting participants using this categorization, it was intended to achieve two primary goals:

- (1) The first goal was to achieve heterogeneity in mathematics teaching experience and vocational experiences because more experienced teachers generally located in Western Turkey more than East.
- (2) The second goal was to select participants using different textbook series because there were seven textbooks series in use at the elementary school level throughout Turkey. This criterion allowed the investigation of uses of different textbooks series by teachers.

In the report, 58 socio-economic variables were used to group cities into five categories from the most developed to the least developed. Dinçer, Özaslan, and Kavasoglu (2003) stated that all 81 Turkish cities were included in the grouping in 2003. The schools, which were listed in the Education Statistics of Turkey (EST), were selected in terms of five socio-economic development levels. The three cities from each socio-economic development levels were randomly selected. Six per cent of the elementary schools were randomly selected from each city. Totally, 515 middle schools in 15 different cities in Turkey and 531 mathematics teacher from those schools were involved in the study.

### ***Instrument***

The Use of Mathematics Textbooks Questionnaire (Özgeldi, 2012) which measures the frequency of the use of textbooks by mathematics teachers along four dimensions was used in this study. In particular, the Reading Student Edition Textbook and Reading Teacher Edition Textbook dimensions comprised a series of decisions related to preparation for lessons, doing the introduction just as shown in the student edition textbook, connecting the concepts with daily life as shown in the textbook, using the textbook to relate the subject to other/different lessons, and using the textbook for definitions, problems, and examples. These dimensions involved teachers' reading decisions about what kinds of activities or examples were suggested in the textbooks and what students were expected to learn, as Sherin and Drake (2004) identified. Moreover, the Selecting Questions from Workbook and Selecting Tasks and Problems from Auxiliary Books dimensions comprised a series of decisions related to selecting questions, problems, and tasks from workbook and auxiliary books.

This questionnaire required teachers' responses to items in a five point Likert scale ("1"=Never, "2"=Rarely, "3"=Sometimes, "4"=Often, and "5"=Always). Since "5" was the most favorable result and "1" was the least favorable result on the five point Likert scale, "3" was considered to be the midpoint. Therefore, teachers' responses on questionnaire items with a mean of 3.00 or greater were referred to as favorable result (i.e. teachers were likely to be frequent users of textbooks), responses with means less than 3.00 were referred to as less unfavorable responses (i.e. teachers were likely to be infrequent users of textbooks). Moreover, since the responses of "4"=Often and "5"=Always were the most favorable results for the five-point scale, the frequency distribution for teachers' responses on questionnaire items was referred to teachers frequently used the textbooks. On the other side, since the responses of "1"=Never and "2"=Rarely were the least favorable results for the five-point scale, the frequency distribution for teachers' responses on questionnaire items was referred to teachers used the textbooks rarely or never.

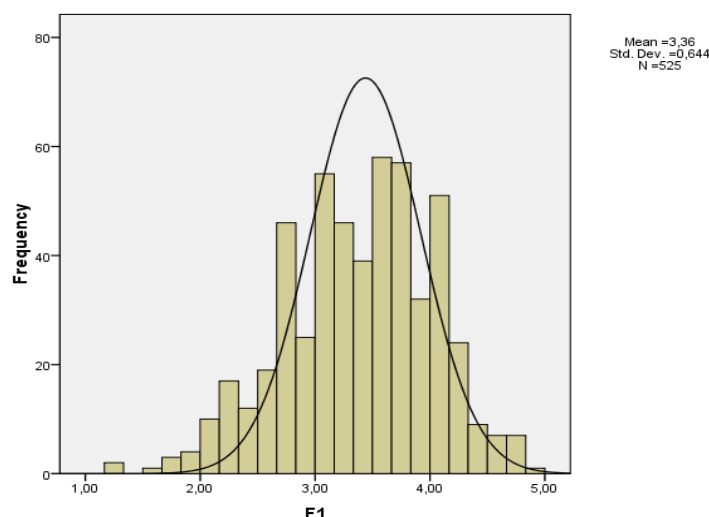
For the Use of Mathematics Textbooks Questionnaire, the reliability of each factor was found .89, .79, .91, and .92 for Reading Student Edition Textbook, Selecting Questions from Workbook, Reading Teacher Edition Textbook, and Selecting Tasks and Problems from Auxiliary Books, respectively. The 35-item Use of Mathematics Textbooks Questionnaire was found to measure four factors of the teachers' use of textbooks. The four-factor structure was examined with the confirmatory factor analysis (CFA) approach. The four-factor structure that was obtained from the exploratory factor analysis was fit to the data well,  $\chi^2(554) = 2321.11$  ( $P < .001$ , RMSEA=.075 (90% CI=.069, .081), SRMR=.081, CFI=.95, and NNFI=.94. The overall goodness-fit statistics implied that the data fitted the proposed CFA model reasonably well. The four-factor structure provided an acceptable good fit to the data.

### ***Results***

The following sections give the descriptive statistics results for each factor in order to explain middle school mathematics teachers' use of mathematics textbooks.

**Description of “Reading Student Edition Textbook” (Factor 1)**

Descriptive statistics results revealed that mathematics teachers generally used the student edition textbook for reading tasks and activities as indicated by the mean scores on 10 items ranging from 3.01 to 3.76 on a five-point scale. For the “reading student edition textbook” dimension (Factor 1), the mean score was 3.36 (SD=.644) (see Figure 1). The position of mean score of this dimension represented the higher mean scores of the five-point scale implied that teachers frequently used student edition textbook for reading topics, introductory tasks, and definitions. A mode of 3.40 could be considered as an additional evidence for this interpretation. This dimension had a large range, from 1.20 to 4.89. Moreover, the frequency distribution of teachers’ responses with means greater than 3.5 showed that while most of the teachers (46.9%) frequently used student edition textbook for selecting questions, some teachers (26.1%) used them rarely or never.



**Figure 1.** Frequency distribution of F1 (Factor 1)

For the reading student edition textbook dimension, means and standard deviations were computed for 10 items (see Table 1). For this dimension, teachers’ responses resulted in higher means on item 6 (i.e. I use the student edition textbook during class). The mean score was 3.76 (SD=1.024) which is very close to 4 on a five-point scale. The mean score at the higher end of the 5-point scale implied that teachers most of time used student edition textbook during the class. A mode of 4.00 can be considered as an additional evidence for this interpretation. Moreover, the frequency distribution for this item revealed that most of the teachers (65.1%) frequently used student edition textbook during the class, whereas few teachers (13.6%) used them rarely or never.

**Table 1.** Item descriptive summaries for the “Reading Student Edition Textbook” dimension, mean values sorted in descending order

Items	M	SD
6. I use the student edition textbook during class	3.76	1.024
1. I use the student edition textbook to prepare for the lesson	3.75	.949
5. I explain the subject similarly to the student edition textbook	3.45	.946
2. I do the introduction just as shown in the student edition textbook	3.37	.946
7. I use the student edition textbook when/if I make definitions	3.37	1.008
10. I pick the mathematical references (graphics, tables, presentations etc.) from the student edition textbook	3.37	.890
3. I connect the concepts with daily life as shown in the student edition textbook	3.30	.842
4. I use the student edition textbook to relate the subject to other/different lessons.	3.21	.963
8. I pick the examples that I use during the class from the student edition textbook	3.04	.902
9. I pick the problems that I refer to during class from the student edition textbook	3.01	.903

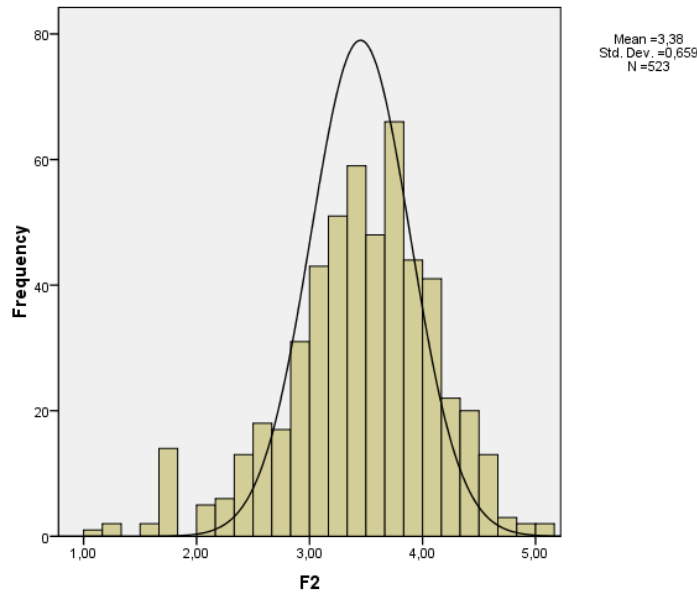
*Note.* Teachers’ use of textbook scores were based on a Likert scale ranging from “1”= never to “5”= always

According to Table 1, teachers' responses resulted in higher mean on item 1 (i.e. I use the student edition textbook to prepare for the lesson). The mean score for this item was closer to the mean score of item 6. The frequency distribution for item 1 showed that about 64% of the teachers frequently used the student edition textbook prior to the class for preparing the lesson, whereas around 10% of the teachers used it rarely or never. Moreover, the mean score for item 5 was 3.45 (SD=. 946) which is close to 3.5 on a five-point scale. The frequency distribution for item 5 (i.e. I explain the subject similarly to the student edition textbook) revealed that almost 54% of the teachers frequently explain the subject similarly to the student edition textbook, whereas around 17% of the teachers explained the subject similarly to the student edition textbook rarely or never. On the other hand, teachers' responses resulted in lower means on item 9 (i.e. I pick the problems that I refer to during class from the student edition textbook) and item 8 (i.e. I pick the examples that I use during the class from the student edition textbook). The frequency distribution for these items revealed that while about 30% of the teachers frequently used the student edition textbook for problems and examples, whereas about 25% of the teachers used it rarely or never.

In summary, teachers used the student edition textbook for mostly during the class and for preparing for the lesson. Their tendency was to explain the subject similarly to the student edition textbook. They also used the student edition textbook for explaining the topic and the introductory tasks; however, they rarely used it for selecting problems and examples. These results indicated that teachers read the student edition textbook mostly during the class and prior to class; and mostly read it for the topic, but rarely for problems and examples.

#### **Description of "Selecting Questions from Workbook" (Factor 2)**

Descriptive statistics results revealed that mathematics teachers generally used workbook for selecting questions and problems as indicated by the mean scores on six items ranging from 3.01 to 3.75 on a five-point scale. For the "selecting questions from workbook" dimension (factor 2), the mean score was 3.38 (SD=.659) (see Figure 2). The position of mean score of this dimension implied that teachers frequently used the workbook for selecting questions. This was also evidenced by a modal value of 3.67. This dimension had a large range, from 1.00 to 5.00. Moreover, the frequency distribution of teachers' responses with means greater than 3.5 showed that while most of the teachers (49.9%) frequently used workbook for selecting questions, some teachers (20.8%) used it rarely or never.



**Figure 2.** Frequency distribution of F2 (Factor 2)

Tablo 1 incelendiğinde görüldüğü gibi, öğretmenlerin yarısından fazlası, okullarda öğretmenlerin karar alma sürecine katıldıklarını (%54,3) ifade ederlerken; müdürlerin de büyük çoğunluğu (%91,3) öğretmenlerin karar alma sürecine katıldıklarını belirtmişlerdir. Eğitim denetçilerin ise tamamı öğretmenlerin bazen katıldıklarını belirtmişlerdir.

For this dimension, means and standard deviations were computed for six items (see Table 2). For this dimension, teachers' responses resulted in higher means on item 13 (i.e. I prefer questions similar to the

ones in the common exam questions (i.e. High School Entrance Exam) that are in the workbook)). The mean score was 3.75 (SD = .87) which was very close to 4 on a five-point scale. The mean score implied that teachers most of time used questions in the workbook similar to the ones in the high school entrance exam questions. A mode of 4.00 can be considered as an additional evidence for this interpretation. The frequency distribution for this item revealed that most of the teachers (67.4%) frequently questions similar to the common exam questions, whereas few teachers (8.1%) used them rarely or never.

**Table 2** Item descriptive summaries for the “Selecting Questions from Workbook” dimension, mean values sorted in descending order

Items	<i>M</i>	<i>SD</i>
13. I prefer questions similar to the ones in the common exam questions (i.e. High School Entrance Exam) that are in the workbook	3.75	.870
15. I try and pick questions from the workbook that are not included in the student edition textbook	3.50	.957
16. I assess the students’ success on the subject with the questions in the workbook.	3.43	.980
12. I answer the questions in the workbook during class	3.31	.957
14. I try and pick questions from the workbook similar to the ones in the student edition textbook	3.26	1.008
11. I pick the questions that I answer during class from the workbook	3.01	.933

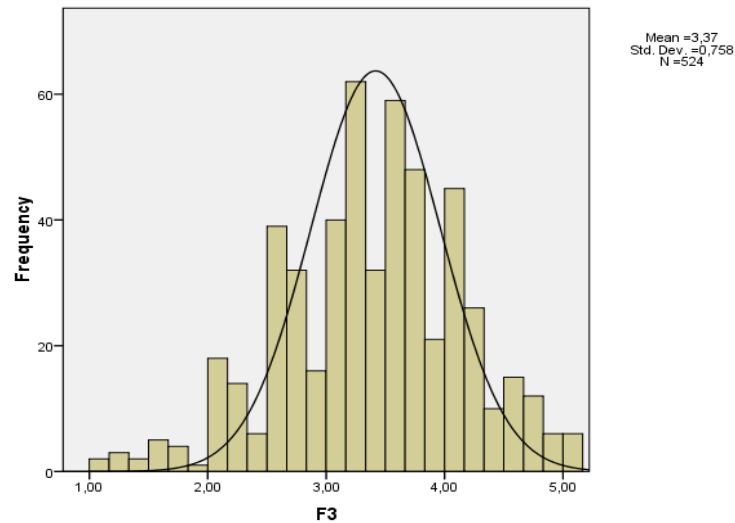
*Note.* Teachers’ use of textbook scores were based on a Likert scale ranging from "1"= never to "5"= always

According to Table 2, teachers’ responses resulted in higher means on item 15 (i.e. *I try and pick questions from the workbook that are not included in the student edition textbook*). The mean scores for this item 3.50 (SD=.957). The frequency distribution for this item showed that almost 55% of the teachers mentioned that they frequently selected questions from the workbook that were not included in the student edition textbook, whereas almost 14% of the teachers mentioned that they selected them rarely or never. On the other hand, teachers’ responses resulted in lower means on item 11 (i.e. *I pick the questions that I answer during class from the workbook*). The mean score was 3.01 (SD=.933) which close to 3 on a five-point scale. The frequency distribution for this item revealed that some of the teachers (31.3%) frequently picked the questions from the workbook, whereas others (26.5%) picked them rarely or never.

Briefly, teachers pointed out that they frequently used questions in the workbook similar to the ones in the high school entrance exam questions. They stated that they frequently selected questions from the workbook that were not included in the student edition textbook; however, they occasionally picked the questions to use during the lesson.

### **Description of “Reading Teacher Edition Textbook” (Factor 3)**

Descriptive statistics results revealed that mathematics teachers generally used the teacher edition textbook as indicated by the mean scores on 10 items ranging from 2.75 to 4.30 on a five-point scale. For the “reading teacher edition textbook” dimension (factor 3), the mean score was 3.37 (SD=.758) (see Figure 3). The position of mean score of this dimension indicated that teachers frequently used teacher edition textbook for guiding activities. A mode of 3.60 could be considered as an additional evidence for this interpretation. It is interesting to note that this dimension had a quite large range from a maximum of 5.00 to a minimum of 1.00. Moreover, the frequency distribution of teachers’ responses with means greater than 3.5 showed that while most of the teachers (47.3%) frequently read teacher edition textbook, some of them (27.1%) used them rarely or never.



**Figure 3** Frequency distribution of F3 (Factor 3)

For the Reading Teacher Edition Textbook dimension, means and standard deviations were computed for 10 items (see Table 3). For this dimension, the teachers' responses resulted in higher means on item 18 (i.e. *I refer to the teacher edition textbook for objectives*) with the mean score was 4.3 (SD = .862). A mode of 5.00 can be considered as an additional evidence for this interpretation. The mean score implied that teachers frequently used teacher edition textbook to read the curriculum objectives. The frequency distribution for this item revealed that most of the teachers (86.2%) frequently used teacher edition textbook for objectives, whereas very few teachers (5%) used it rarely or never.

**Table 3.** Item descriptive summaries for the "Reading Teacher Edition Textbook" dimension, mean values sorted in descending order

Items	<i>M</i>	<i>SD</i>
18. I refer to the teacher edition textbook for objectives	4.30	.862
17. I refer to the teacher edition textbook while preparing for the class.	3.88	.945
22. I refer to the teacher edition textbook for subjects/occasions that are not clear in the student edition textbook.	3.59	1.051
23. I refer to the teacher edition textbook while performing the student edition textbook activities.	3.36	1.054
26. I learn the alternative assessment tools (i.e. portfolio, concept map, interview etc.) from teacher edition textbook	3.26	1.089
20. I refer to the teacher edition textbook to pick the performance task subjects.	3.23	.981
21. I refer to the teacher edition textbook for concepts that I forgot/don't know.	3.23	1.14
19. I refer to the teacher edition textbook to pick additional questions.	3.20	1.001
25. I refer to the teacher edition textbook about how to use the material during class.	2.88	1.175
24. I refer to the teacher edition textbook for the answers to the questions in the student edition textbook/workbook.	2.75	1.205

*Note.* Teachers' use of textbook scores were based on a Likert scale ranging from "1"= never to "5"= always

According to Table 3, the teachers' responses resulted in higher means on item 17 (i.e. *I refer to the teacher edition textbook while preparing for the class*) and item 22 (i.e. *I refer to the teacher edition textbook for subjects/occasions that are not clear in the student edition textbook*). The mean scores for these items were higher than 3.50. The frequency distribution for item 34 revealed that almost 70% of the teachers frequently used teacher edition textbook for preparing for the class, whereas about 8% of the teachers used it for this purpose rarely or never. Moreover, the frequency distribution for item 39 showed

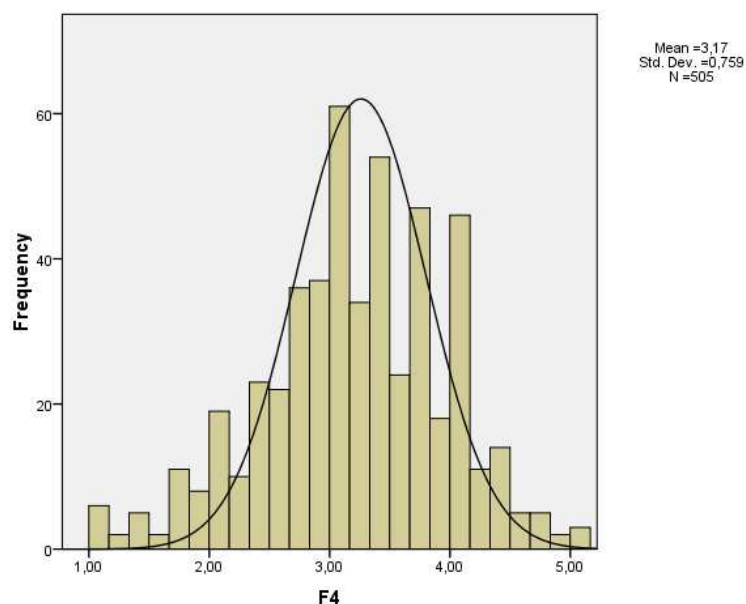


that about 60% of the teachers used teacher edition textbook for subjects/occasions that were not clear in the student edition textbook, whereas almost 16% of the teachers used it rarely or never. On the other hand, teachers' responses resulted in lower means on item 24 (i.e. *I refer to the teacher edition textbook for the answers to the questions in the student edition textbook/workbook*) with the mean score was 2.75 (SD = 1.205). The frequency distribution for this item revealed that some of the teachers (29.6%) used teacher edition textbook for the answers to the questions in the student edition textbook and/or workbook, whereas most of the teachers (45.6%) used it rarely or never.

Briefly, these results indicated that teachers frequently used teacher edition textbook to read the curriculum objectives and to prepare for the class but they very rarely tended to look up the answers of the questions from teacher edition textbook.

#### **Description of “Selecting Tasks and Questions from Auxiliary Books” (Factor 4)**

Descriptive statistics results revealed that mathematics teachers commonly used auxiliary books for selecting tasks and questions as indicated by the mean scores on nine items ranging from 2.60 to 3.71 on a five-point scale. For the “selecting tasks and questions from auxiliary books dimension” (factor 4), the mean score was 3.17 (SD=.759) (see Figure 4). The position of mean score of this dimension represented the mean score of the five-point scale implied that teachers frequently used auxiliary books for selecting tasks and questions. A mode of 3.00 could be considered as an additional evidence for this interpretation. This dimension had a large range, from 1.00 to 5.00. Moreover, the frequency distribution of teachers' responses with means greater than 3.5 showed that while some of the teachers (34.7%) used auxiliary books for selecting tasks and questions, some of them (35.8%) used them rarely or never.



**Figure 4.** Frequency distribution of F4 (Factor 4)

For this dimension, means and standard deviations were computed for nine items (see Table 4). For this dimension, the teachers' responses resulted in higher means on item 32 (i.e. *I use questions similar to the ones in the common exam questions (i.e. High School Entrance Exam) that are in the auxiliary books*) with the mean score was 3.71 (SD = .885). The mean score implied that teachers most of time used questions in the auxiliary books similar to the ones in the high school entrance exam questions. A mode of 4.00 can be considered as an additional evidence for this interpretation. The frequency distribution for this item revealed that most of the teachers (66.3%) frequently used questions in the auxiliary books similar to the ones in the common exam questions, whereas very few teachers (9.6%) used them rarely or never.

**Table 4.** Item descriptive summaries for the “Selecting Tasks and Questions from Auxiliary books” dimension, mean values sorted in descending order

Items	M	SD
32. I use questions similar to the ones in the common exam questions (i.e. High School Entrance Exam) that are in the auxiliary books	3.71	.885
29. I pick questions from auxiliary books that are not included in the student edition textbook.	3.67	.937
27. I pick the questions that I answer during class from auxiliary books.	3.39	.889
33. I pick the problems that I solve during class from auxiliary books.	3.29	.898
34. I pick the questions that I use in the exams from the auxiliary books.	3.08	.970
31. I refer to auxiliary books for examples that I use during class.	3.19	.982
28. I explain the subjects as in auxiliary books.	2.84	.994
30. I refer to auxiliary books for definitions I make/use during class.	2.81	1.059
35. I assess the students' success on the subject by the question from the auxiliary books.	2.6	1.065

*Note.* Teachers' use of textbook scores were based on a Likert scale ranging from "1"= never to "5"= always

According to Table 4, teachers' responses resulted in higher means on item 29 (i.e. *I pick questions from auxiliary books that are not included in the student edition textbook*). The mean scores for this item 3.67 (SD=.937). The frequency distribution for this item showed that about 65% of the teachers frequently selected questions from auxiliary books that were not included in the student edition textbook, whereas almost 11% of the teachers selected them from those books rarely or never. On the other hand, teachers' responses resulted in lower means on item 35 (i.e. *I assess the students' success on the subject by the question from the auxiliary books*) with the mean score was 2.6 (SD = 1.065). The frequency distribution for this item revealed that few teachers (21.1%) frequently assessed students' success on the subject by the question from the auxiliary books; whereas other (43%) used it rarely or never.

Briefly, teachers frequently used auxiliary books to select questions similar to the ones in the high school entrance exam questions. They also tended to used them to select questions that were not included in the student edition textbook. On the other side, they signified that they rarely assessed students' success on the subject by the question from the auxiliary books.

## Discussion

In this study, the Reading Student Edition Textbook dimension involved teachers' planning activities for instruction prior to class, as Remillard (1999) identified. Based on Sherin and Drake's (2004) characterization, these activities were related to reading the student edition textbook to find activities and examples from the text (or in the curriculum) and what students are expected to learn. Considering these descriptions, the data from this study described that teachers read the student edition textbook to determine the structure and content of the instruction prior to lesson.

According to the teachers' responses to the items in the Reading Student Edition Textbook dimension, the mean value for this dimension was found to be 3.36 (out of 5 as the maximum score possible). It could be interpreted that the teachers read mathematics student edition textbook to determine the structure and content of the instruction prior to lesson at a “moderate” level. There might be an issue to be considered while interpreting this result. The issue is that teachers' uses of other resources might influence the reading student edition textbook score. This assumption is also confirmed by the findings of other researchers (e.g., Adler, 2000; Cohen et al., 2003) stating that teachers do not isolate resources from one to another and use them as *a set of resources* corresponding to a variety of things in teachers work. Consequently, teachers use student edition textbook and other resources as a whole for determining the structure and content of the instruction.

For Reading Student Edition Textbook dimension, the analysis of the frequency distributions showed that teachers most frequently used the student edition textbook to prepare for the lesson and during class and explained the topic of the lesson similarly to the student edition textbook. It can be inferred that teachers have a general overview of what they teach with paying attention to the details of the instruction through using student edition textbook. This result supports the findings of other researchers (e.g., Remillard & Bryans, 2004; Schmidt et al., 1997) stating that textbooks do not force teachers to use the same way for instruction; rather they help shape the process of instructing mathematical topics and skills.

Besides all these, reading textbook activities may be also worth to be considered to explain teachers' planning activities prior to lesson. Based on the teachers' responses given to the items in the Reading Teacher Edition Textbook dimension, the mean value for this dimension was found to be 3.37 which was the almost same mean value of the Reading Student Edition Textbook dimension. It could be interpreted that the teachers also read teacher edition textbook to determine the structure of instruction prior to lesson. This situation could be discussed in two ways. The first issue is that teachers use the student edition textbook as well as the teacher edition textbook to plan what kinds of activities or examples and what students are expected to learn. The analyses of the frequency distributions for Reading Teacher Edition Textbook dimension support this assumption considering that teachers most frequently used the teacher edition textbook for topics/occasions that were not clear in the student edition textbook.

The second issue is about the structure of the teacher edition textbook containing copies of the student edition textbook and workbook pages. The analyses of mathematics textbooks support this assumption. Consequently, teachers used teacher edition textbook for additional suggestions and for making instructional decisions based on the student edition textbook content. In any case, teachers' use of textbook is strongly associated with their use of teacher edition textbook. Further research is needed to confirm and find possible explanations for this relationship.

There are two dimensions related to selecting tasks, problems, and questions from resources in this study. The first one is Selecting Questions from Workbook dimension comprising teachers' selecting questions and problems for classroom activities from mathematics workbooks. The second one is the Selecting Tasks and Questions from Auxiliary books dimension involving teachers' selecting tasks and questions from these books. The main difference between these dimensions is based on the nature of the resource. However, the way of teachers' uses of those books is very similar.

According to the teachers' responses given to Selecting Questions from Workbook dimension, the mean value for this dimension was found to be 3.38; whereas the mean value of the Selecting Tasks and Questions from Auxiliary books dimension was found to be 3.17. This could be interpreted that teachers used workbook and auxiliary books for selecting questions and problems at a moderate level. There might be two explanations for interpreting this result. First, teachers do not only use the workbook but also look for several books for selecting questions and problems. It could be argued that the analyses of frequency distributions for both dimensions support this assumption because these analyses showed that teachers most frequently used questions from the workbook and auxiliary book that were not included in the student edition textbook. In other words, teachers knew what the mathematics student edition textbook involved and made an evaluation with respect to the student edition textbook content; and then tended to use other books or resources.

Second explanation could be that the process of selection and integration of tasks and problems from resources is intertwined considering that teachers selected and integrated problems from the student edition textbook, workbook, and other books in terms of the difficulty level of the problems. Particularly, teachers drew attention to the problems that all students could solve at least a problem and gave opportunities to solve them, as Doerr and Chandler-Olcott (2009) pointed out. It could be interpreted that teachers are not only concerned with selecting tasks from the textbooks, but they also consider students' levels of mathematical understanding (Durwin & Sherman, 2008); therefore, teachers make necessary modifications in resources for their students (McDuffie & Mather, 2009).

### **Implications**

The findings of this study can have some important implications for mathematics instruction and might be helpful for educational leaders and policy-makers to increase the prospects of success for implementation of educational resources. Particularly, the findings of the study will be of importance for mathematics teachers in terms of interpreting textbooks into the mathematics classroom. It might help mathematics teachers in finding solutions for the problems they face when they are in trouble in interpreting and selecting tasks and questions from textbooks. The findings of the study showed that mathematics teachers mostly preferred the student edition textbook for deciding what students could learn from the textbook. Teachers planned and executed the instruction according to the content of the student edition textbook. Particularly, when teachers used the real life connections, introductory activities, and connections with other courses from the student edition textbook, students were more likely to understand the purpose of the lesson and realize the importance of the subject in the real life and other courses. It seemed that teachers kept students engaged in learning mathematics when they selected the introductory activities, real-life cases, and connections with other courses. It could be claimed that these kinds of tasks in the textbooks are valuable for both teachers and students since students can follow the tasks and see what would happen next and teachers easily manage the instruction. On the other hand, there should be more alternatives that help

teachers integrate and adapt the tasks into the instruction. Therefore, the teacher edition textbook should include several tasks that support teachers to introduce the lesson and make connections with real life and other courses.

## References

- Adler, J. (2000). Conceptualising resources as a theme for teacher education. *Journal of Mathematics Teacher Education*, 3(3), 205–224.
- Ball, D. L., & D. K. Cohen (1996). Reform by the book: What is — or might be — the role of curriculum materials in teacher learning and instructional reform? *Educational Researcher* 25(9), 6-8.
- Beaton, A. E., Mullis, I. V. S., Martin, M. O., Gonzalez, E. J., Kelly, D. L., & Smith, T. (1996). *Mathematics achievement in middle school years: IEA's Third International Mathematics and Science Study (TIMSS)*. Boston, MA: Centre for the Study of Testing, Evaluation, and Educational Policy, Boston College.
- Brown, M. W. (2009). The Teacher-tool relationship: Theorizing the design and use of curriculum materials. In J. T. Remillard, B. A. Herbel-Eisenmann, & G. M. Lloyd (Eds.), *Mathematics teachers at work: Connecting curriculum materials and classroom instruction* (pp.17-36). New York: Routledge.
- Collopy, R. (2003). Curriculum materials as a professional development tool: How a mathematics textbook affected two teachers' learning. *Elementary School Journal*, 103(3), 287–311.
- Cohen, D., Raudenbush, S., & Ball, D. (2003). Resources, instruction, and research. *Educational Evaluation and Policy Analysis*, 25(2), 119-142.
- Dinçer, B., Özasan, M., & Kavasoglu, T.(2003), *İllerin ve bölgelerin sosyo-ekonomik gelişmişlik sıralamasi araştırması 2003*, Devlet Planlama Teşkilatı Yayınları.
- Doerr, H. M., & Chandler-Olcott, K. (2009). Negotiating the literacy demands of standards-based curriculum materials: A site for teachers' learning. In J. T. Remillard, B. A. Herbel-Eisenmann, & G. M. Lloyd (Eds.), *Mathematics teachers at work: Connecting curriculum materials and classroom instruction* (pp.283-301). New York: Routledge.
- Durwin, C. C., & Sherman, W. M. (2008). Does choice of college textbook make a difference in students' comprehension? *College Teaching*, 56(1), 28-34.
- Eisenmann, T., & Even, R. (2009). Similarities and differences in the types of algebraic activities in two classes taught by the same teacher. In J. T. Remillard, B. A. Herbel-Eisenmann, & G. M. Lloyd (Eds.), *Mathematics teachers at work: Connecting curriculum materials and classroom instruction* (pp. 152-170). New York: Routledge.
- Fan, L., Chen, J., Zhu, Y. Qiu, X., & Hu, J. (2004). Textbook use within and beyond mathematics classrooms: A study of 12 secondary schools in Kunming and Fuzhou of China. In L. Fan, N. Y. Wong, J. Cai, & S. Li (Eds.), *How Chinese learn mathematics: Perspectives from insiders* (pp.228-262). Singapore: World Scientific.
- Haggarty, L. & Pepin, B. (2002). An investigation of mathematics textbooks and their use in English, French and German Classrooms: Who Gets an Opportunity to Learn What? *British Educational Research Journal*, 28(4): 567-590.
- Lloyd, G. M., Herbel-Eisenmann, B. A., & Remillard, J. T. (2005). Researching teachers' use of mathematics curriculum materials: Advancing the research agenda. In G. M. Lloyd, M. Wilson, J.L. M. Wilkins, & S. L. Behm (Eds.), *Proceedings of the 27th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education [CDROM]*. Eugene, OR: All Academic.
- Özgeldi, M. (2012). *Middle school mathematics teachers' use of textbooks and integration of textbook tasks into practice: A mixed methods study*. Unpublished doctoral dissertation, Middle East Technical University, Ankara, Turkey.
- Remillard, J. T. (1999). Curriculum materials in mathematics education reform: A framework for examining teachers' curriculum development. *Curriculum Inquiry*, 29(3), 315–342.
- Remillard, J. T. (2005). Examining key concepts in research on teachers' use of mathematics curricula. *Review of Educational Research*, 75(2), 211–246.
- Remillard, J. T. (2009). Considering what we know about the relationship between teachers and curriculum material. In J. T. Remillard, B. A. Herbel-Eisenmann, & G. M. Lloyd (Eds.), *Mathematics teachers at work: Connecting curriculum materials and classroom instruction* (pp.85-92). New York: Routledge.

- Remillard, J. T., & Bryans, M. B. (2004). Teachers' orientations toward mathematics curriculum materials: Implications for teacher learning. *Journal of Research in Mathematics Education*, 35(5), 352–388.
- Robitaille, D. F. & Travers, K.T. (1992). International studies of achievement in mathematics. In Douglas A. Grouws (Ed.), *Handbook of Research on Mathematics Teaching and Learning* (pp. 687-709). NY: Macmillan Publishing Co.
- Schmidt, W. H., McKnight, C.C., & Raizen, S. A. (2002). *A splintered vision: An investigation of U.S. science and mathematics education*. New York, Boston, Dordrecht, London, Moscow, Kluwer Academic Publishers.
- Schmidt, W. H., McKnight, C.C., Valverde, G.A., Houang, R.T., & Wiley, D.E. (1997). *Many visions, many aims: cross-national invention of curricular intentions in school mathematics* (Vol. 1), Dordrecht: Kluwer.
- Sherin, M. G., & Drake, C. (2004). *Identifying patterns in teachers' use of a reform-based elementary mathematics curriculum*. Manuscript submitted for publication.
- Stein, M. K., & Kim, G. (2009). The role of mathematics curriculum materials in large-scale urban reform. In J. T. Remillard, B. A. Herbel-Eisenmann, & G. M. Lloyd (Eds.), *Mathematics teachers at work: Connecting curriculum materials and classroom instruction* (pp.37-55). New York: Routledge.
- Törnroos, J. (2005). Mathematics textbooks, opportunity to learn and student achievement. *Studies in Educational Evaluation*, 31(4): 315–327.
- Valverde, G. A., Bianchi, L. J., Wolfe, R. G., Schmidt, W. H., & Houang, R. T. (2002). *According to the book. Using TIMSS to investigate the translation of policy into practice through the world of textbooks*. Dordrecht: Kluwer Academic Publishers.

### Genişletilmiş Özet

Matematik ders kitabı, matematik öğretiminde ve öğreniminde en çok güvenilen materyaller arasında yer almaktadır (Beaton ve diğerleri, 1996). Öğretmenler genellikle ders kitaplarından neyi öğretecekleri ve nasıl öğretecekleri konusunda yararlanırken (Robitaille & Travers, 1992); öğrenciler sıklıkla sınıf içi alıştırmaları ve ödevlerini yapmak için ders kitaplarını kullanır (Fan ve diğerleri, 2004). Bu nedenle matematik ders kitaplarının matematik öğretiminde ve öğreniminde önemli bir yere sahip olduğu söylenebilir.

Son yıllarda yapılan çalışmalar, ders kitapları ve materyallerinin matematik eğitiminde ve öğretiminde öğretmen tarafından nasıl kullanıldığını araştırmakta ve bu çalışmalara olan ilgi günden güne artmaktadır (Lloyd, Herbel-Eisenmann, & Remillard, 2009). Araştırmacılar, öğretmenin öğretim materyali veya ders kitaplarıyla nasıl etkileşime girdiğini farklı açılardan incelemekte ve araştırmaktadır (örneğin, Brown, 2009; Haggarty & Pepin, 2002; Remillard, 1999, 2005; Sherin & Dake, 2004). Öğretmenlerin materyal kullanımlarının araştırılması, öğretmen ve materyal kullanımı arasındaki etkileşimi yorumlama bakımından önemli bir unsurdur; çünkü öğretim materyalinin değeri nasıl kullanıldığına bağlıdır (Cohen, Raudenbush, & Ball, 2003).

Öğretmen ve öğretim kaynakları arasındaki ilişkiyi anlamak matematiğin eğitimi ve öğretimi için önemlidir. Son zamanlarda öğretmenlerin materyal kullanımları üzerine yapılan çalışmalar (örneğin, Remillard, 2005; Remillard & Bryans, 2004; Sherin & Drake, 2004) ve ders kitapları üzerine yapılan çalışmalar (örneğin, Brown, 2009; Haggarty & Pepin, 2002) göstermektedir ki öğretmen ve kaynaklar arasında karşılıklı bir ilişki olduğundan dolayı bu ilişki dikkatli bir şekilde incelenmelidir. Bu noktada belirtilmelidir ki, matematik öğretmenlerinin ders kitabı kullanımları ve öğretmen-ders kitabı arasındaki ilişki matematik öğretiminin nasıl gerçekleştiği hakkında önemli bilgiler sunar.

Ölçeğin pilot çalışmaları tamamlandıktan sonra, ortaya çıkan faktör yapısını doğrulamak üzere tabakalandırılmış rasgele örneklem yöntemi ile katılımcılara ulaşılmıştır. Hedef kitle, devlet okullarında altıncı, yedinci ve sekizinci sınıflarda öğretmenlik yapan matematik öğretmenlerdir. Hedef kitlenin hepsine ulaşmak mümkün olmadığı için Dinçer, Özasan ve Kavasoglu (2003) tarafından Türkiye'nin 81 ilinde yapılan illerin ve bölgelerin sosyo-ekonomik gelişmişlik sıralamasına göre çalışmaya dâhil edilecek iller belirlenmiştir. Toplamda 15 farklı ilden 515 ilköğretim okulunda çalışan 531 matematik öğretmeni çalışmaya katılmıştır.

Bu çalışmada, matematik öğretmenlerinin ders kitabı kullanım sıklıklarını dört boyutta ölçen Matematik Öğretmenlerinin Ders Kitabı Kullanım Ölçeği (Özgeldi, 2012) kullanılmıştır. Bu ölçeğin Ders Kitabını Yorumlama ve Öğretmen Kılavuzunu Yorumlama boyutları öğretmenin derse hazırlık ve ders

sürecinde, özellikle derse giriş, kavramların günlük yaşamla olan ilişkilerini kurma, konunun diğer derslerle ilişkilendirilmesi, tanımların yapılması, örneklerin seçilmesi gibi kararları içerir. Çalışma Kitabından Soru Seçme ve Yardımcı Kitaplardan Soru ve Problem Seçme boyutları ise öğretmenin soru, problem ve görevleri seçme kararlarını içerir.

Betimsel istatistik sonuçları göstermektedir ki, matematik öğretmenleri ders kitabını genellikle kitapta yer alan görevleri yorumlamak için kullanmaktadır. 10 maddeden oluşan birinci faktörün ortalaması 3.36 ( $S_s=.644$ ) olarak bulunmuştur. Bu faktör için maddelerin ortalamalarına bakıldığında, öğretmenlerin ders kitaplarını derse hazırlık yapmak için kullandıkları aynı zamanda kitaptaki konu girişlerini ve günlük hayat ilişkilerini kurmak için kullandıkları söylenebilir.

Betimsel istatistik sonuçları göstermektedir ki, matematik öğretmenleri çalışma kitaplarını soru ve problem seçmek için kullanmaktadır. 6 maddeden oluşan ikinci faktörün ortalaması 3.38 ( $S_s=.659$ ) olarak bulunmuştur. Bu faktör için maddelerin ortalamalarına bakıldığında, öğretmenlerin çalışma kitaplarını merkezi sınav (örn. SBS) sorularına benzer soruları kullandıkları ve çalışma kitabından ders kitabında olmayan soruları seçtikleri söylenebilir.

Betimsel istatistik sonuçları göstermektedir ki, matematik öğretmenleri öğretmen kılavuzunu kazanımlara bakmak ve derse hazırlık yapmak için kullanmaktadır. 10 maddeden oluşan üçüncü faktörün ortalaması 3.37 ( $S_s=.758$ ) olarak bulunmuştur. Bu faktör için maddelerin ortalamalarına bakıldığında, öğretmenlerin öğretmen kılavuzunu derse hazırlık aşamasında kullandıkları ve ders kitabında açık olmayan durumları öğretmen kılavuzu netleştirdikleri söylenebilir.

Betimsel istatistik sonuçları göstermektedir ki, matematik öğretmenleri yardımcı kitapları soru ve problem seçmek için kullanmaktadır. 9 maddeden oluşan dördüncü faktörün ortalaması 3.37 ( $S_s=.758$ ) olarak bulunmuştur. Bu faktör için maddelerin ortalamalarına bakıldığında, öğretmenlerin yardımcı kitapları merkezi sınav (örn. SBS) sorularına benzer soruları kullandıkları ve ders kitabında olmayan soruları yardımcı kitaplardan seçtikleri söylenebilir.

Çalışmanın sonuçları, matematik öğretimi konusunda hazırlanan kaynaklarla ilgili olarak eğitim politikasına önemli katkılar sağlayabilmektedir. Özellikle ders kitaplarının kullanan öğretmenler, öğretimleri sırasında kaynaklardan alıştırma ve soru seçme konularında karşılaştıkları sorunları bu araştırmada belirtilen bulgularla çözebilir.