Journal of Computer and Education Research
(ISSN:2148-2896)
April 2017 Volume 5 Issue 9
www.joucer.com http://dergipark.gov.tr/jcer

Research Article

Analysis of Questions about Fractions in the Fifth Grade Mathematics Textbooks with Respect to TIMMS Cognitive Process Skills Levels

Melike TURAL SÖNMEZ[1]

[1] İstanbul Aydın University, Faculty of Education, Departmentof Science and Mathematics Education, mtural5@yahoo.com

Article Info

Received: *October 27, 2016*
Accepted: *April 20, 2017*
Online: *May 13, 2017*

Keywords: Fractions, TIMSS, mathematics education, document analysis

Abstract

In this study, the questions included in the fractions unit of the fifth grade mathematics textbooks were investigated by cognitive process skills in Trends in International Mathematics and Science Study (TIMSS). Written document analysis was used in the study. Two textbooks were chosen randomly among the books which were authorized by the Board of Education, Ministry of National Education, to be used as the class textbooks for five years beginning from 2013-2014 education year. Kappa coefficient was utilized for the reliability of the codification. Findings of the research indicate that the questions included in the textbooks are available at most at application level, and variance of the questions in terms of cognitive qualifications shows no differences. Furthermore, the subdivisions of both first textbook and the second textbook no homogenous relation has been identified among the cognitive qualifications of the questions. In the textbooks being investigated, there are differences in the quantity of the the questions and their leading competence. At the end of the investigation, some suggestions have been stated for the analysis of the questions, researchers studying on the field, authors and for the ones evaluating the textbook.

To cite this article:
Tural Sönmez, M. (2017). Analysis of questions about fraction in the fifth grade mathematics textbooks with respect to TIMMS cognitive process skills levels. *Journal of Computer and Education Research*, 5 (9), 61-73. https://doi.org/10.18009/jcer.58936

Introduction

Curriculum, at any educational level, is the main source that teachers employ to determine what students should learn. Educational instruments are required so that productive and reliable training could be achieved in the school climate. Textbooks constitute to the main part of the teaching- learning environment. According to the research carried out by Seven (2001), the textbooks are employed by 72.64 % to support in the teaching-learning process. A similar finding is stated by Duatepe, Paksu and Akkuş (2007) that textbooks are employed in the majority of the mathematics classes. With respect to other learning instruments, textbooks play a important role in ensuring permanent learning. The textbooks must be sufficient in form and content so that they could fulfill their functions in learning (Çakır, 2009), because the cases that come out as the result of the designing,

employing methods and the writing of the textbooks, have effects upon learning process (Keleş, 2001). It is crucial for the equity principle, stated in the curriculum, that textbooks be of good quality so that every student can take advantage of it. As extra learning materials are not affordable for some students, the textbooks distributed for free, should be devised in an effective way so as not to let that come out as an disadvantage in return. Draft textbooks devised by Board of Education are investigated and evaluated under four criteria; convenience of the content within the laws of the constitution, scientific qualification of the content, the qualification of the content corresponding the goals of education and curriculum, embracing qualitative visual and content design that support the education of the students' self development features (Ministry of National Education (MEB), 2013). In this way, the books, authorized by the Board of Education according to their convenience within the criteria mentioned above, are permitted to be studied in the schools.

Fractions are one of the subjects therein the Mathematics that the students mostly have difficulties in (Aksu, 1997; Ubuz and Haser 2001). Fractions, at any class level, are included in curriculum (MEB, 2013). In terms of functional and conceptual levels, much more period of time has been allocated for the fractions included in the fifth grade mathematics curriculum. The objectives of the fractions in the secondary school mathematics education curriculum devised by MEB, in 2013 are as follows;

> This training field includes all class levels. Students in the fifth grade are expected to read natural numbers and use four processing with them. Within this class level, students are expected to conceptualize and transform full numbers and compound fractions, sequence the fractions with equal denominators or fractions with twice or more of each other, do addition or subtraction operations and conceptualize these fractions and operations. At this class level, decimal demonstrations are also provided and the students are required to sequence these decimal demonstrations and the numbers given and then demonstrate those numbers on the numerical axis and do addition and subtraction operations. Percentage concept is also included on numbers and operations learning field and then it is expected to be engaged with the fractions and decimal demonstrations. (MEB, Secondary mathematics teaching curriculum, 2013; p. 10).

Despite being emphasized at any class level, why students have difficulties in acquiring fractions has been subject to many investigations. When the studies carried out on fractions are investigated, it is confirmed that fractions symbolized as a/b embody more than one single meaning such as; component, total division, percentage, scaling, and processor operator (Behr, Wachmuth, Post and Lesh, 1984). To understand fractions more effectively,

the meanings of the notions symbolized as a/b should be studied separately and then the meanings should be integrated with each other. One of the reasons for the difficulties the students confront in conceptualizing fractions and the operations within fractions can be -though component-total relation is emphasized intensively- not providing the students with the other meanings of the notions mentioned above (Mack 1995; Toluk, 2002). As the objectives of fractions at fifth grade class level are investigated, the meanings of component-total and division-scaling are expected to be emphasized.

It can be taken into consideration that the quality of the textbook as well as the performances of the teachers in the class is effective on enhancing students' success in mathematics. Haggarty and Pepin (2002) examined mathematics textbooks and their use in lower secondary classrooms in England, France and Germany. An analysis of the data suggests that learners in the different countries are offered different mathematics and given different opportunities to learn that mathematics, both of which are influenced by textbook and teacher. Kajande and Lovric (2009) emphasis that textbooks could contribute to creation and strengthening of students' misconceptions. Remillard (2000) states that reform oriented textbook could contribute to teachers learning as well. That is why the investigations carried out on content analysis of the textbooks are of great importance to this matter.

The study, carried out by Aydoğdu- İskenderoğlu and Baki (2011), is one of the mathematics education textbook investigations. In that study, they investigated the questions, included in one of the eighth grade textbooks, in respect to PISA mathematics sufficiency scale. Findings of the investigation indicate that questions from all levels have not been included in the textbook. Questions, samples, problems and drills at 1st, 2nd ,3rd, and 4th levels have been found out. The second level with 47 % is the most dominant one among the other levels. Concerning the units in the textbooks, sufficiency level of the questions can vary. Toptaş, Elkatmış and Karaca (2012) evaluated the questions in the fourth grade mathematics textbooks with respect to mathematics sufficiency scale and compared these questions with the variance of the learning fields in TIMMS exam. Being investigated in regards to the knowledge, application, reasoning cognitive process, frequency value of the questions included in the textbooks indicates that there are similarities between learning fields in TIMSS exam and the number and operation. However, it shows no similarities in geometry and measurement, and data analyses fields. Çakır (2009), in his study on

mathematics textbooks, states that the drills in textbooks do not provide opportunities for self-assessment, education assessment questions devised in the units are not adequate, questions for enhancing high-level thinking skills are not included in sufficient quantities and the questions are not structured logically enough as to encourage students to search and investigate. Chang, Cromley, and Tran (2016) examined prevalence of coordination tasks in textbooks. According to their studies different coordination tasks are used earlier and later in learning and for different topics, as well as for specific pedagogical and scaffolding purposes.

In the study carried out by Kolovou, van den Heuvel-Panhuizen and Bakker (2009), they found out that the students performed inadequate competence in solving fourth grade problems in TIMSS exam. For this reason, they conducted a study on the textbook analysis. They classified the problems included in the fourth grade textbooks of six series in regards to their cognitive levels. Within the concerning levels, descriptions and definitions were established through samples. These categories are as follows; the first one includes simple problems based on operation, the third one includes non-routines and puzzle-like problems that require high-level thinking skills and the second one consists of problems not included in the first and third categories. The structure of the problems in the second category is not puzzle-like one, but these problems, on one hand, can encourage students to investigate and search, on the other hand, they can provide the students with positive attitudes towards solving non-routine mathematics problems. Subsequent to the investigation, the units were specified, categories and subcategories were classified. Findings of the research demonstrate that very few of the problems within the textbook take place in the third category.

The findings of the investigation, especially carried out following international exams such as PISA and TIMSS, are as follows; class textbooks are insufficient in meeting the attainment (Toptaş, Elkatmış and Karaca, 2012; Aktaş and Aktaş, 2011); when classified as cognitive level, the questions in the textbook tend to be of lower level (Aydoğdu-İskenderoğlu and Baki, 2011; Kolovou, van den Heuvel-Panhuizen and Bakker, 2009)

It is crucial that the textbooks, studied in the fifth grade primary education, be devised in respect to a form of high-quality since some objectives are adopted at this class level. As the fractions, the students mostly have difficulties in acquiring, are included in the objectives of the fifth grade textbooks in detail, it becomes urgent that fifth grade textbooks

be investigated. In this study, bearing in mind the cognitive process in TIMSS mathematics field, the questions, problems drills and samples in the mathematics textbooks which were authorized by MEB to be used as class textbooks for five years, are identified according to the ways they are classified in. The aim of this study is to find out how subtitles within the units undergo a change with respect to cognitive process. Besides, the instructive competence of the questions, problems and investigations included in the fifth grade textbooks are to be investigated as well.

The questions conducted in this study are as follows;

Questions, problems, drills and samples included in the fractions unit of the fifth grade mathematics textbooks, which were authorized by MEB, to be used as the class textbooks in 2013-2104 education year

- How have they been classified in respect to cognitive processes specified in TIMMS?
- Is there any homogeneity amongst the sub-themes specified in regards to cognitive processes in TIMMS?
- How do they perform in the sense of guiding students?

As the mathematics textbook is the basic resource for the teachers, Semerci (2004) states that an effective mathematics teaching and training can only be achieved via a well-organized mathematics textbook. This situation imposes an important responsibility on the teachers, authors of mathematics textbooks and on the ones assessing these textbooks. Therefore; investigations being carried out on mathematics education field play an important role in evaluating students' test scores and motivating students to achieve higher levels. In that respect, the investigation being carried out is to contribute the field being studied.

Method

In this study, document analysis has been employed (Cohen and Manion, 1992; Ekiz, 2003; Yıldırım and Şimşek, 2005). Document analysis is the process of investigation in which the records and documents related to the study are gathered and encoded in respect to specific norms and systems (Çepni, 2009). In the study two textbooks have been chosen randomly and the questions on fractions included in those textbooks have been investigated. Table 1 shows the description of the textbooks having been investigated.

Table 1. Description of the textbooks

Edition Year	Naming the books in the investigation	Publishing House Type	Class level
2013	The first book investigated	Private publishing House	Fifth grade
2013	The second book investigated	Board	Fifth grade

Table 2 shows the themes of the unit, quantity of the objectives in regards to period allocated for the themes.

Table 2. Description of fraction unit (MEB, 2013)

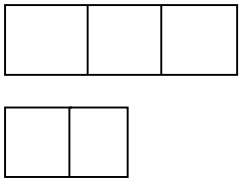
Unit	THEMES	Quantity of Objectives	Period (hours)	%
4	Fractions (5.1.3.1.-5.1.3.7 objectives)	7	20	11
	Operations in fractions: adding subtracting (5.1.4.1-5.1.4.2.)	2	9	5
	Decimal demonstration (5.1.6.1- 5.1.5.5)	5	16	9
	Percentage (5.1.6.1.-5.1.6.4)	4	12	7

Fractions unit in both of the textbooks display differences in that they include samples, drills, questions and problems which are devised structurally in different ways. Principally, drills, questions and problems in the textbooks are specified under different headings. The headings in the first textbook are, for instance, "let's remember, activity, sample, let's think over it, let's see what we have learnt" and on the contrary, in the second textbook; "let's recall, let's do it together, it is your turn, let's try this, did you know that, let's correct the mistakes". In order to be able to establish a common format between the textbooks and carry out the evaluation accordingly, these questions have been classified into two groups; questions with solutions and the questions expected to be solved by the students. The questions under these headings have been categorized in respect to TIMMS cognitive process. In this classification including all the questions in the fourth unit, 124 questions in the first textbook, 359 questions in the second textbook and in total 483 questions have been investigated.

These process skills have been categorized as knowledge, application and reasoning. Of these categories, knowledge category includes "the truths, operations and concepts" which have to be recognized by the students. A sample question that evaluates the knowledge level can be as follow;"$\frac{2}{5} + 1\frac{1}{5}$ find the solution (corollary)".

The second category, application, "focuses on students' conceptual recognition and knowledge skills in answering questions and doing problems." "Write fractions equal to ¾ through modelling this fraction" can be set as a sample for evaluating cognition process of the application.

The third category, "reasoning, includes extraordinary situations that go beyond the routine problem solving, complex contents and multi-level problems." In compliance with this category, the following question in the second textbook can be set as an example.



According to the diagram given, Derya indicates that" $\frac{1}{3} > \frac{1}{2}$ "Are you agree/disagree with Derya? Give your reasons.

Figure 1. An example problem of reasoning category

While encoding the data, the solutions have been accomplished by specifying the questions in the unit. Thereafter, necessary skills required for solving problems have been determined. Subsequent to this process, it has been determined in which level they fall into in the mathematics competence scale and classification, then classification has been achieved. Questions have been categorized into sub-headings such as knowledge, application and reasoning. If the study, being investigated during the encoding, consists of two or more dimensions underlying the main heading, it is then taken into account in the dimension that embodies the maximum learning. Sub-headings have been encoded and saved in to SPSS. The obtained data within the quantitative data has been analyzed through frequency and percentage.

With a view to enriching the accuracy of the findings, a researcher specialized in mathematics education has analyzed the questions included in one of the sub-headings of the textbook. Encodings have been carried out in respect to cognitive process in TIMMS. The codes of the questions included in the evaluation have been compared via Kappa test. Kappa coefficent has been found ad 0,81. Kappa coefficent indicates that inter-rater reliability of the scoring instrument is above average. For the differences in encodings, evaluations have been revised and consensus has been built between the specialist and the researcher.

Findings

Variances of the questions differ in the books. While 61 questions, of 124 questions included in the fourth unit of the first book, are set with their solutions, the solutions of 63 questions are spared to students themselves. The percentage of the solutions spared to students themselves is %51, but it is %74 in the second textbook. This percentage reveals that the second textbook provides students with more problem-solving opportunities.

When the questions in the first textbook are investigated with regard to cognitive processes, 14 questions are at knowledge level, 81 questions are at application level and 29 questions are at reasoning level. In the second textbook it has been observed that 306 questions are at knowledge level, 205 questions are at application level and 118 questions are at reasoning level (Table 3). It is observed that the questions at the application level are predominant in the first textbook with 65.3% and in the second book with 57,1 %. In the first book, with 23,4% and in the second book with 32,9 % there are questions at reasoning level and in the first book with 11,3% and in the second book with 10%, there are questions at knowledge level. According to chi-square test, textbooks and cognitive process, no meaningful correlation (*chi-square* (1)= 3, 916;*p*=0,141) between variances of the questions for $p<0,05$ value.

Table 3. Percentages of the questions in the textbooks by cognitive processes

			TIMSS Cognitive process level			Total
			Knowledge	Application	Reasoning	
Textbook	1	Frequency	14	81	29	124
		%	11,3%	65,3%	23,4%	100,0%
	2	Frequency	36	205	118	359
		%	10,0%	57,1%	32,9%	100,0%

When the questions, in the fraction units in two of the fifth grade mathematics textbooks which were authorized by MEB in 2013-2014, are investigated in with and without solution question format; the investigation reveals that the format, in which the solutions are given and spared to the students in the first and second textbook, includes questions mostly at application level (Table 4).

Table 4. Percentages of the questions in the books with solution or without solution format by cognitive processes levels

Text Book			TIMMS cognitive process skills			Total
			knowledge	Application	Reasoning	
First Book	With solution	f	4	37	20	61
		%	6,6%	60,7%	32,8%	100,0%
	Without solution	f	10	44	9	63
		%	15,9%	69,8%	14,3%	100,0%
Second book	With solution	f	5	56	32	93
		%	5,4%	60,2%	34,4%	100,0%
	Without solution	f	31	149	86	266
		%	11,7%	56,0%	32,3%	100,0%

When the questions, in the fractions units in two of the fifth grade mathematics textbooks which were authorized by MEB in 2013-2104 education year, are investigated it is observed that there is no homogeneity among the subdivisions (Table 5).

Quantity of the questions in the subdivisions of the first book has been observed, and the result come out in the way the quantity of numbers increases as the themes go further. This situation

in the first text book can have its source in bunching themes and extended content in the subdivision as the teaching process proceeds. Besides, no homogeneity among the cognitive levels of the questions included in the subdivisions of the first textbook has been observed (*chi-square* (1)= 25.71, p=.028) (Table 5). In the subdivisions of the second book, it has been seen that the questions included in do not have an invariant value. The questions included in the last subdivision have been conferred to possess the utmost quality of the questions among other subdivisions. As it is in the first textbook, no homogeneity among the cognitive levels of the questions has been observed in the subdivisions of the second textbook as well (*chi-square* (1)==27.60; p=.016).

Table 5 Cognitive processes of the questions according to the subdivisions of the unit on the textbooks.

Textbook			1	2	3	4	5	6	7	8	Total
First Textbook	Cognitive process	Knowledge	4	3	2	0	0	2	0	3	14
			28,6%	21,4%	14,3%	,0%	,0%	14,3%	,0%	21,4%	100,0%
		Application	6	5	8	7	8	18	11	18	81
			7,4%	6,2%	9,9%	8,6%	9,9%	22,2%	13,6%	22,2%	100,0%
		Reasoning	0	3	3	7	4	3	2	7	29
			,0%	10,3%	10,3%	24,1%	13,8%	10,3%	6,9%	24,1%	100,0%
	Toplam		10	11	13	14	12	23	13	28	124
			8,1%	8,9%	10,5%	11,3%	9,7%	18,5%	10,5%	22,6%	100,0%
Second Textbook	Cognitive process	Knowledge	4	0	11	0	4	4	0	13	36
			11,1%	,0%	30,6%	,0%	11,1%	11,1%	,0%	36,1%	100,0%
		Application	10	29	24	16	24	33	20	49	205
			4,9%	14,1%	11,7%	7,8%	11,7%	16,1%	9,8%	23,9%	100,0%
		Reasoning	9	16	11	10	15	13	10	34	118
			7,6%	13,6%	9,3%	8,5%	12,7%	11,0%	8,5%	28,8%	100,0%
	Total		23	45	46	26	43	50	30	96	359
			6,4%	12,5%	12,8%	7,2%	12,0%	13,9%	8,4%	26,7%	100,0%

Drills, questions, samples and problems within the units have been confirmed to have different structures in both of the textbooks. Concerning the questions, evaluating the same objectives; it has been observed in the second textbook that the substructure, ensuring the students to get motivated, has been obtained much more than it is in the first book. For instance, in the unit of fraction comparison, while questions in the first textbook on fraction comparison are asked as follow;

"$\frac{1}{8}$, $\frac{1}{3}$, $\frac{1}{6}$, and $\frac{1}{4}$ organize the unit fractions by fraction set"

Question concerning the same objective in the second textbook has been asked as above.

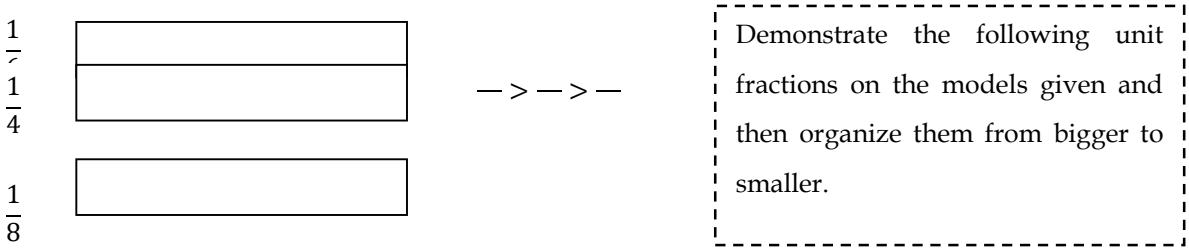


Figure 2. An example on question format of second textbook

When the instructions at the questioning level have been investigated by concerning the first question in the textbook, it is concluded that it is very difficult for a student to reach a solution without a fraction set. As for the question evaluating the same attainment in the second textbook, it could be easier for a student to reach a solution by himself without a fraction set. Thinking that there are such-like questions; the second textbook could be regarded as having better instruments and ensuring materials for self-study. Above mentioned question format in the second textbook is seen to have been used in other themes as well. For instance;

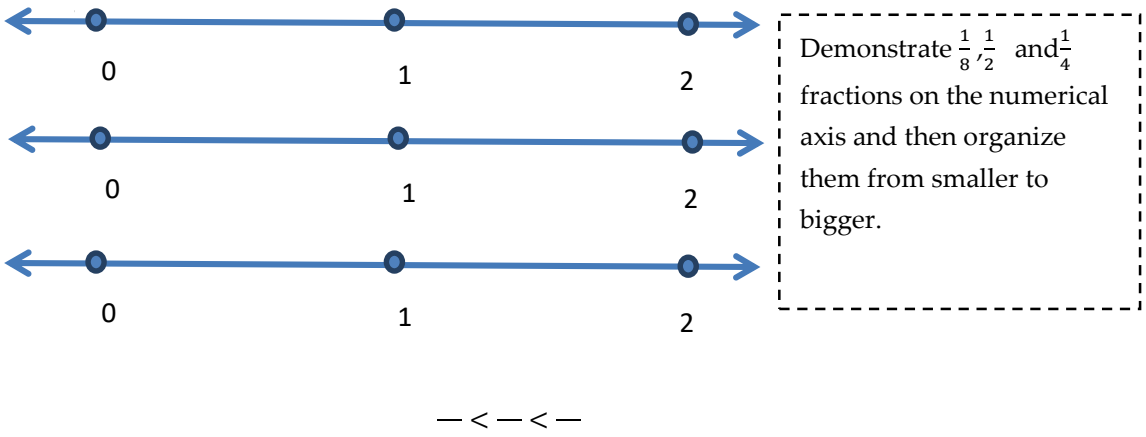


Figure 3. Example of second textbook question format consistency within itself

This situation indicates that the textbook reveals consistency within itself, demonstrations and the student guidance. When the questions with solutions are investigated in the second textbook it is observed that alternative methods to the question solutions are also suggested. For example;

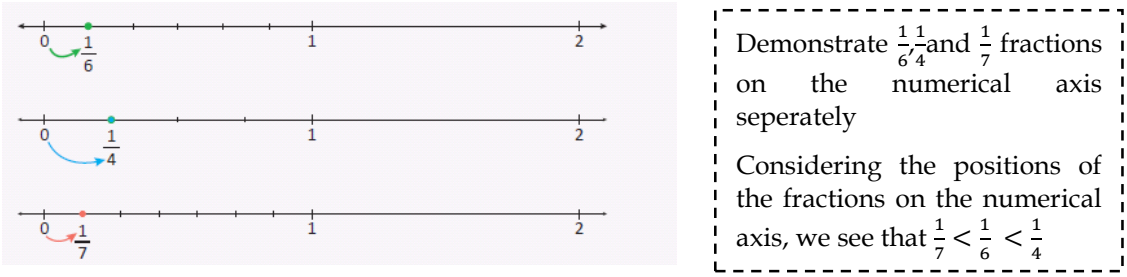


Figure 4. Example of questions' alternative solutions in the second textbook

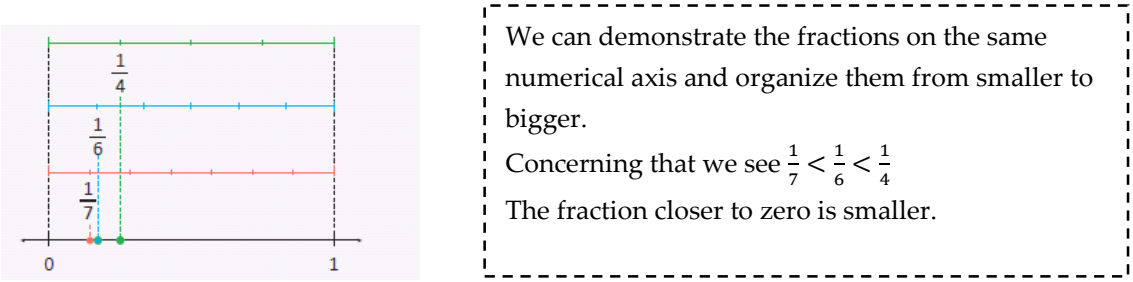


Figure 5. Example of questions' alternative solutions in the second textbook

Discussion and Conclusion

In this study, the questions included in the fraction unit of fifth grade class textbooks have been investigated by TIMMS cognitive processes. The variance of the questions' cognitive level have been discussed in compliance with the subdivisions of the unit and having solutions or not having solutions.It has been identified that the second textbook includes questions three times more than the first textbook. Concerning the evaluation of cognitive process in the fraction unit of the textbooks, it has been observed that the application level in both of the textbooks includes the utmost questions and significant quantity of questions have been identified at reasoning level. Similarity among the questions in both textbooks has been confirmed by chi-square in respect to cognitive processes.

The variances of the mathematics questions in 2011 TIMMS exam according to the cognitive processes are as follows; 40% at knowledge level, 40% at application level, 20% at reasoning level. Toptaş, Elkatmış and Karaca (2012) identified the knowledge level, in regards to analysis of the fourth grade mathematics textbook, as 41,55% application level 32,80% and reasoning level 25%. Çakır (2009) revealed, in his study on fifth grade mathematics textbook, that problems in the textbook did not provide the student with opportunities for self-assessment and enhance students' high-level thinking skills. It has been stated that the questions, included in the books being studied in Japan – the country excelled in international exams on mathematics teaching- have multi-representations such as symbol and diagrams, have been devised in a way that the students can correlate by using reasoning strategies and they contain similarities within themselves (Mayer, Sims ve Tajika, 1995). The conclusion of this research states that the increase in the quantity of the questions, included in the book published in 2013, at reasoning level has been achieved in the way as it is suggested in literature of mathematics investigations. However, the research identifies that there is not any consistency between the books in respect to directive function and the quality of the questions. Quantity of the questions in fractions unit, their directive function and variance according to the cognitive levels do not have similarities within themselves. Directive function of the questions could be a leading factor in students' learning.

The findings of the research are of great importance in the sense of questioning the changing education concept in the world and revising and devising the books to be prepared by TIMMS criteria in the future. The research also indicates that the fifth grade textbooks, which are authorized by the assessment boards, differ by quantity, quality and directive functions of the questions. Investigations could be carried out on students' learning of fractions in different schools utilizing different textbooks. Findings of a research like this can provide an insight to the researchers studying on the field, official and authorized institutions, authors and the teachers. Especially, thereafter, the content and the variance of the questions, in respect to cognitive levels, can be taken into consideration while writing and evaluating the books to be published in the future. Investigations, which analyze the curriculum

application in different class levels, national exam scores and class textbooks in depth in respect to various variables, can be carried out.

References

Aksu, M. (1997). Student performance in dealing with fractions. *The Journal of Educational Research*, *90*(6), 375-380.

Aktaş, M.C. & Aktaş D. Y. (2011). İlköğretim 7. sınıf matematik öğretim programı, ders ve öğrenci çalışma kitaplarında dörtgenler arasındaki ilişkilerin anlatımının incelenmesi. *Education Sciences*, *7*(2), 848- 858.

Altun, M. (2005). *Matematik öğretimi*. İstanbul: Alfa Basım Yayım Dağıtım.

Aşıcı, M., Baysal, N. & Şahenk- Erkan, S. (2012). Türkiyede yapılan 2009 PİSA ve seviye belirleme sınavındaki (SBS) okuma becerileri sorularının karşılaştırılması, *Eğitim ve Öğretim Araştırmaları Dergisi, 1* (2), 210-217

Aydoğdu- İskenderoğlu, T. & Baki, A., (2011). İlköğretim 8. sınıf matematik ders kitabındaki soruların PISA matematik yeterlilik düzeylerine göre sınıflandırılması, *Eğitim ve Bilim*, *36,* (161),287- 301

Batur, Z. & Ulutaş, M. (2013). PISA ile türkçe öğretim programındaki okuduğunu anlama kazanımlarının örtüşme düzeylerinin incelenmesi. *International Journal Of Social Science, 6* (2), 1549-1563.

Behr, M.J., Wachsmuth, I., Post, T. & Lesh , R. (1984). Order and equivalence of rational numbers: A clinical teaching experiment. *Journal For Research İn Mathematics Education, 15* (5), 323-341

Chang, B.L., Cromley, J.G. & Tran, N. (2016). Coordinating multiple representations in a reform calculus textbook. *Int J of Sci and Math Educ, 14*, 1475. doi:10.1007/s10763-015-9652-3

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,* 567–590. doi:10.1080/0141192022000005832

Çakır, İ. (2009). *İlköğretim beşinci sınıf matematik ders kitaplarının öğretmen ve öğrenci görüşleri doğrultusunda değerlendirilmesi* (Yayımlanmamış yüksek lisans tezi). Çukurova Üniversitesi Sosyal Bilimler Enstitüsü, Adana.

Haser, Ç. & Ubuz, B. (2001). İlköğretim 5. sınıf Öğrencilerinin Kesirler Konusunda Kavramsal Anlama ve İşlem Yapma Performansı, *IV. Fen Bilimleri Eğitimi Kongresi,* 609-612, MEB Yay, Ankara.

Kajander, A. & Lovric, M. (2009). Mathematics textbooks and their potential role in supporting misconceptions. *International Journal of Mathematical Education in Science and Technology, 40* (2),173-181

Kolovou. A., van den Heuvel-Panhuizen,. M., & Bakker. A. (2009). Non-routine problem solving tasks in primary school mathematics textbooks – A needle in a haystack. *Mediterranean Journal for Research in Mathematics Education*, *8*, (2), 31-68

Mack, N. (1995). Confounding whole number and fraction concept when building on domain: Partitioning, units, and understanding multiplication of fractions. *Journal For Research İn Mathematics Education*, *32* (3), 267- 295

Milli Eğitim Bakanlığı. (2009). *İlköğretim matematik dersi 6-8. sınıflar öğretim programı ve kılavuzu*, Ankara: Yazar.

PISA Country Profiles. (2009). PISA country profiles. http://pisacountry.acer.edu.au/index.php.adresinden 1.6.2013 tarihinde alınmıştır.

Ponte. J. P. ve Marques. S., (2011). Proportion in school mathematics textbooks: A comparative study. *International Journal for Research in Mathematics Education, 1,*(1), 1-16

Remillard, J. (2000). Can curriculum materials support teachers' learning? two fourth-grade teachers' use of a new mathematics text. *The Elementary School Journal, 100(4),* 331-350. Retrieved from http://www.jstor.org/stable/1002146

Suh J.M., Johnston C., Jamieson S., Mills M. (2008). *Mathematics teaching in the middle school.* Reston: Vol. 14, Iss. 1; pg. 44

TIMSS (2011) international results in mathematics. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College. http://timssandpirls.bc.edu/timss2011/downloads/T11_IR_Mathematics_FullBook.pdf adresinden 2.4.2013 tarihinde alınmıştır.

Toptaş. V., Elkatmış. M. ve Karaca T., (2012). İlköğretim 4. sınıf matematik programının öğrenme alanları ile matematik öğrenci çalışma kitabındaki soruların zihinsel alanlarının TIMSS'e göre incelenmesi. *Ahi Evran Üniversitesi Kırşehir Eğitim Fakültesi Dergisi (KEFAD)* 13(1), 17-29.