Teachers' Views on the Problem-Solving & Problem-Posing Tasks in Primary School Mathematics Textbooks

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Abstract

This paper aims to reveal teachers' views on the problem-solving & problem-posing tasks of primary school mathematics textbooks. The study utilized the single-case embedded design. We examined the mathematics textbooks used in the Turkish public schools in the 2017-2018 academic year. Also, we interviewed twelve class teachers, who were determined by the criterion sampling method, to reveal their views on the textbooks. In order to collect data, we employed a "Data Coding Scheme" to determine the problem-solving & problem-posing tasks in the textbooks and a "Semi-Structured Interview Form" composed of two open-ended questions to find out about the teachers' views. Since the questions asked to the teachers were determined as themes in advance, the descriptive data analysis technique was used for data analysis. The study concludes that the examined mathematics textbooks contain a sufficient number of problem-solving tasks, which are equally distributed under each heading in the textbooks. On the other hand, it has been found that the textbooks contain a limited number of problem-posing tasks, which are not equally distributed under each heading. Furthermore, we determined that no textbook that we examined contains different types of problem-posing tasks. Also, according to the teachers whom we interviewed, although the number of problem-solving tasks in the textbooks is sufficient, the tasks should be more effective. They also stated that the textbooks contain very few problem-solving tasks requiring different problem-posing strategies.

Keywords: primary school mathematics textbooks, problem-solving tasks, problem-posing tasks, teachers' views

1. Introduction

Problem-solving is defined as a method or process by which a solution is found to a mathematical problem (Mayer, 2002; NCTM, 2000). On the other hand, problem-posing is defined as reformulating a given problem or producing new problems or questions (Cai & Hwang, 2002; English, 2003; Silver, 1994). Students can use various problem-solving strategies to solve problems as well as produce different problems by using various problem-posing strategies. Problem-posing situations can be classified as structured, semi-structured, or free problem-posing situations (Akay, 2006; Silver & Cai, 2005; Stoyanova, 1998). In a structured problem-posing situation, students try to produce new problems from a given problem. In a semi-structured problem-posing situation, students try to explore an open situation using figures, pictures, tables, or mathematical expressions. Finally, in a free problem-posing situation, the problem is not given: students are asked to produce a problem related to the subject (Akay, 2006; Dickerson, 1999; Kazak, 2012; Stoyanova, 1998). To develop these skills in students, both the teaching activities should be carried out systematically, and the teaching materials should allow the development of these skills.

Some studies have reported that there is a close relationship between problem-solving and problem-posing skills in the development of mathematical thinking and creativity and that these skills support each other (Gonzales, 1998; Kilpatrick, 1987; Lowrie, 2002; Rosli, 2013; Salman, 2012; Silver & Cai, 1996; Stoyanova, 2005). Therefore, to develop the mathematical creativity of students, it is recommended that courses should include a sufficient number of problem-solving and problem-posing tasks (Kilpatrick, 1987; Mamona-Downs, 1993). However, a thorough search

of the relevant literature (Cai & Jiang, 2016; Ev-Cimen & Yildiz, 2017; Isik, 2010; Izmirligil, 2008; Tertemiz, Ozkan, Coban Sural, & Unluturk Akcakin, 2015; Toluk & Olkun, 2002) showed that the studies conducted so far have dealt with problem-solving and problem-posing tasks separately. The present study, however, examined problem-solving and problem-posing tasks together and compared their inclusion in primary school mathematics textbooks. In this respect, the study is thought to contribute to the related literature.

Problem-solving and problem-posing are an important component of mathematics curricula and are at the center of mathematical tasks. Mathematics Course Curriculum for 1st to 8th Grades (Turkish Ministry of National Education [MoNE], 2018) also emphasizes the importance of problem-solving and problem-posing with learning outcomes such as *"(The student) Solves and poses problems that require addition, subtraction, multiplication, and division with natural numbers,"* and underlines the importance of addressing these skills effectively in the textbooks.

As is known, textbooks are the most frequently used tools in educational processes (Demirel & Kiroglu, 2005; Kilic & Seven, 2011). Textbooks provide resources for what students will learn and what teachers will teach in the teaching-learning process, especially in planned educational practices (Tertemiz, Ercan, & Kayabasi, 2011). Textbooks used as complementary teaching materials in learning and teaching processes are the most important materials for teachers. They enable teachers to teach their lessons in an organized manner (Kucukahmet, 2011). They also make it easier for students to learn a subject and allow them to revise it anywhere, any time, and at any pace (Duman & Cakmak, 2011). The study by Petterson et al. (1991) reported that textbooks are the most widely used teaching tools in the USA, Sweden, Greece, Australia, and Japan. Another study by Shannon (1982) reported that students spend 70% to 95% of their time in the classroom performing the tasks in their textbooks (Cited in Kilic & Seven, 2011). Finally, in a study conducted by Seven (2001) in seven Turkish provinces, it was reported that textbooks are the most widely (72.64%) used educational tools and that 69.5% of teachers use textbooks in every class.

Teachers often use textbooks to decide what subjects to teach and how to teach them; on the other hand, students often use them for in-class activities or to do their homework (Fan, Chen, Zhu, Qiu, & Hu, 2004; Kaya, 2008; Robitaille & Travers, 1992). Bulut (2013) reported that 75% of teachers often or always use mathematics textbooks in their classes while students use them mostly during the class or while doing their homework and rarely use them for their performance tasks or projects. It can be concluded from the above-mentioned studies that mathematics teachers regard textbooks as the most reliable teaching material (Beaton et al., 1996).

As in other countries, the most commonly used teaching material in Turkey is textbooks (Bulut, 2013; Seven, 2001). It is also known that students spend most of their time in the classroom with their textbooks. Therefore, mathematics textbooks, as one of the most important educational tools in mathematics education, have an essential place in the effective transfer of problem-solving and problem-posing skills. These skills should be taught to students through different tasks to be placed under each unit and heading in mathematics textbooks. For this reason, it is important to determine the views of teachers about problem-solving and problem-posing tasks in the textbooks. However, when we reviewed the relevant literature, we found that the studies are mostly focused on examining students' and teachers' views on the use of mathematics textbooks (Bakilan Mutu, 2008; Bulut, 2013; Cakir, 2006; Dapgin, 2015; Karakelleoglu, 2007; Kaya, 2008; Tutak & Guder, 2012), are conducted at only one grade-level (Aydogdu Iskenderoglu & Baki, 2011; Canibey, 2013; Gur & Kobak Demir, 2015; Ildiri, 2009; Tasdemir, 2011; Toptas, Elkatmis, & Karaca, 2012), and compare textbooks of different countries in terms of specific characteristics (Erbas & Alacaci, 2009; Hong & Choi, 2018; Incikabi & Ulusoy, 2019; Khalidova & Tapan-Broutin, 2017; Kul, Sevimli, & Aksu, 2018; Ozer, 2012). Moreover, we realized that most of these studies are not about primary school mathematics textbooks. In fact, to the best of our knowledge, no study has been conducted so far that examines the problem-posing tasks in primary school mathematics textbooks.

Therefore, we deemed it necessary to examine whether the mathematical tasks in Turkish primary school mathematics textbooks are effective in developing students' problem-solving and problem-posing skills. As such, the present study will make a precious contribution to the literature. Besides, we believe that the analysis of mathematics textbooks in terms of their effectiveness in developing students' cognitive skills will contribute a great deal to the designing of future textbooks as well as to future research to be conducted on this subject.

Based on these explanations, it is important that mathematics textbooks contain a sufficient number of effective tasks to develop students' problem-solving and problem-posing skills, which are two mathematical skills specified in the mathematics curricula. Taking this as a starting point, the present study aimed to examine the problem-solving & problem-posing tasks of primary school mathematics textbooks and to reveal teachers' views on them. To this end, answers to the following questions were sought:

1. Can the problem-solving & problem-posing tasks in primary school mathematics textbooks and workbooks meet the criteria set in the relevant literature?

2. What do teachers think about the problem-solving & problem-posing tasks in primary school mathematics textbooks and workbooks?

2. Method

2.1 Research Design

We employed a case study design in this study. Creswell (2007) describes case studies as a qualitative approach by which a researcher reports a given case or multiple cases in detail using multiple data collection tools (observations, interviews, documents, reports). Specifically, we utilized the single-case design, one of the case study designs introduced by Yin (1984) that involves multiple cases, each with multiple subunits included in the analysis. In this study, the single case is the problem-solving & problem-posing tasks in the mathematics textbooks, while subunits are the teachers' views and the textbooks.

2.2 Study Group

In the present study, we examined the mathematics textbooks for grades 1-4, published by the Turkish Ministry of National Education and other private publishers and approved by the Ministry for use in primary schools in the 2017-2018 academic year.

In addition, we interviewed twelve class teachers, who were selected through the criterion sampling method, to get their views on the problem-solving & problem-posing tasks in the textbooks. The main objective of the criterion sample is to examine cases that meet a predetermined set of criteria. The criteria can be set by the researcher, or a predetermined set of criteria can be used (Yildirim & Simsek, 2006). In this context, the following criteria were determined for the creation of the study group:

• Working in schools that are located in district centers and villages.

• Working in schools in district centers with socio-economic differences.

• Having different lengths of tenure as a teacher and different educational levels.

• Three class teachers from each grade level.

• Using mathematics textbooks in classes actively.

2.3 Data Collection Tools

We employed a "Data Coding Scheme" to identify the problem-solving & problem-posing tasks in the textbooks and to determine their distribution under each heading. In this scheme, two columns were allocated for problem-solving and problem-posing tasks. The column for problem-posing tasks was also divided into three columns for structured, semi-structured, and free problem-posing situations. Also, the following headings were included in the scheme: Let's "Do It Together," "Let's Solve and Pose a Problem," "Chapter Evaluation," and "Unit Evaluation." This scheme was completed separately for each textbook.

We also interviewed twelve class teachers to find out what they think about the problem-solving & problem-posing tasks in the mathematics textbooks for grades 1-4. To this end, we designed a "Semi-Structured Interview Form" composed of two open-ended questions. This form consists of two chapters: one for revealing the teachers' personal information and the other for revealing their views. The first chapter includes questions to find out about the participating teachers' sex, tenure, educational levels, and the grade level they teach. The second chapter comprises two open-ended questions, which were prepared to collect data suitable for the purpose of the research. Expert opinion was sought when preparing these questions. First, a draft of eight questions was prepared. This draft was then sent to an academician with a doctorate in classroom education. In accordance with the academician's opinions, we excluded four questions that were deemed irrelevant to the research question. Subsequently, the draft consisting of four questions was piloted with two class teachers, who stated that the two of the questions were close to each other in meaning. Afterward, the opinions of the teachers were shared with the academician, who recommended to merge the questions that are close in meaning. As a result, we obtained a final form consisting of two questions. The interview form was applied to 12 volunteering classroom teachers, three teachers from each grade level. The questions in the interview form are given below:

1. Considering the mathematics textbooks you are using in your classes, do you think they contain a sufficient number of effective problem-solving tasks?

2. Considering the mathematics textbooks you are using in your classes, do you think they contain a sufficient number of effective problem-posing tasks?

2.4 Data Collection

For data collection, we used document analysis and interview techniques. First, we employed the document analysis technique to assess the qualitative and quantitative characteristics of the problem-solving & problem-posing tasks in the textbooks. In document analysis, various written sources are analyzed to investigate some phenomena or situations (Yildirim & Simsek, 2006).

Second, we interviewed the teachers to reveal their views on the problem-solving &-posing tasks in the textbooks. For this purpose, a semi-structured interview form was used. During the interviews with the teachers, additional questions were asked in order not to miss important points. Each interview lasted approximately 40-60 minutes. According to Briggs (1986), the interview method, which is widely used in the field of social sciences, is a very effective data collection method that provides information about individuals' experiences, opinions, complaints, feelings, attitudes, and beliefs (Cited in Yildirim & Simsek, 2006).

2.5 Data Analysis

The descriptive analysis technique was used for data analysis. In the descriptive analysis, the data is summarized and interpreted according to predetermined themes. The data can be arranged according to the themes revealed by the research questions or by considering the questions used in the interview and observation processes. Descriptive analysis aims to convey the findings to the reader in an edited and interpreted form. The data obtained are first described systematically and clearly. Afterward, these descriptions are interpreted, the cause-effect relationship is examined, and some results are presented (Yildirim & Simsek, 2006).

In this study, the questions asked to the teachers were determined as themes. Data from these themes were analyzed and interpreted. Direct quotes from interviews with the teachers were included to support the data. The teachers' names were coded as T1, T2, T3, …, T12. The textbooks were also examined in the same way. Considering the research questions, problem-solving & problem-posing tasks in the mathematics textbooks were analyzed.

3. Results

To answer the first research question (Can the problem-solving & problem-posing tasks in primary school mathematics textbooks and workbooks meet the criteria set in the relevant literature?), we evaluated the qualitative and quantitative characteristics of the problem-solving & problem-posing tasks in the textbooks and workbooks. Both textbooks and workbooks of the 3rd and 4th grades were examined, whereas only the textbooks of the 1st and 2nd grades were examined since these grade levels do not have any mathematics workbooks. As a result of the examination of the textbooks and workbooks, a total of 1000 problem-solving tasks and 98 problem-posing tasks were determined. These tasks were included under the headings such as "Let's Do It Together," "It's Your Turn," "Exercises," "Let's Solve and Learn," "Let's Solve and Produce a Problem," "Let's Check What We Have Learned," "Chapter Evaluation," and "Unit Evaluation." However, since the headings in each grade level are named differently, we collected the headings "It's Your Turn," "Exercises," "Let's Solve and Learn," and "Let's Check What We Have Learned" under the "Chapter Evaluation" heading. Table 1 presents the distribution of problem-solving & problem-posing tasks by grade level.

Table 1. Distribution of Problem-Solving & Problem-Posing Tasks by Grade Level

Grade Level	Problem-Solving Tasks		Problem-Posing Tasks						
			Structured		Semi-Structured		Free		Total
	f	%	*f*	%	*f*	%	*f*	%	*f*
1st grade	164	16.4	0	0	1	1.17	0	0	1
2nd grade	151	15.1	3	27.27	5	5.89	0	0	8
3rd grade	318	31.8	1	9.10	54	63.53	0	0	55
4th grade	367	36.7	7	63.63	25	29.41	2	100	34
Total	1000	100	11	100	85	100	2	100	98

As shown in Table 1, a total of 1000 problem-solving tasks were examined. Of these, 164 are in the 1st-grade, 151 are in the 2nd-grade, 318 are in the 3rd-grade, and 367 are in the 4th-grade textbooks. These tasks consist of problems prepared for students to solve inside and outside the classroom. We found that the highest number of problem-solving tasks is in 4th-grade mathematics textbooks (36.7%), followed by 3rd-grade (31.8%), 1st-grade (16.4%), and 2nd-grade mathematics textbooks (15.1%). The number of problem-solving tasks seems to increase with each higher grade level, except for the 2nd-grade level.

On the other hand, a total of 98 problem-posing tasks were identified in the textbooks and workbooks. Of these, one is in the 1st-grade, eight are in the 2nd-grade, 55 are in the 3rd-grade, and 34 are in the 4th-grade textbooks. Also, of these tasks, 11 are structured problem-posing situations, 85 are semi-structured problem-posing situations, and 2 are free problem-posing situations. Accordingly, a great majority of the problem-posing tasks in the textbooks are semi-structured problem-posing situations. The 1st-grade mathematics textbooks contain no structured problem-posing situations, whereas the 4th-grade mathematics textbooks contain the greatest number of structured problem-posing situations (7 tasks/63.63%). The greatest number of semi-structured problem-posing situations (54 tasks/63.53%) is included in the 3rd-grade mathematics textbooks, followed by 4th-grade (25 tasks/29.41%), 2nd-grade (5 tasks/5.89%), and 1st-grade (1 task/1.17%) textbooks. Finally, we observed that only 4th-grade textbooks contain free problem-posing situations (2 tasks). We can conclude that the most frequently used problem-posing type in the textbooks is the semi-structured problem-posing situations. In contrast, there are very few structured and free problem-posing tasks in the textbooks. Specifically, 1st-grade, 2nd-grade, and 3rd-grade textbooks do not contain any free problem-posing situations.

We also examined the distribution of problem-solving and problem-posing tasks by headings in the textbooks.

Table 2 presents the distribution of problem-solving tasks by headings.

Table 2. Distribution of Problem-Solving Tasks by Headings

Grade Level	Problem-Solving Tasks								
	Introduction		Let's Solve and Produce a Problem		Chapter Evaluation		Unit Evaluation		Total
	f	%	*f*	%	*f*	%	*f*	%	*f*
1st grade	30	15.46	-	0	89	29.28	45	22.28	164
2nd grade	18	9.28	27	9	81	26.64	25	12.38	151
3rd grade	48	24.74	99	33	119	39.14	52	25.74	318
4th grade	98	50.52	174	58	15	4.94	80	39.60	367
Total	194	100	300	100	304	100	202	100	1000

It can be inferred from Table 2 that the greatest number of problem-solving tasks (304) is included under the "Chapter Evaluation" heading, followed by "Let's Solve and Produce a Problem" (300), "Unit Evaluation" (202), and "Introduction" (194) headings. We can see it as normal that "Chapter Evaluation" headings contain the most problem-solving tasks. In addition, the highest (39.14%) and the lowest (4.94%) percentage of problem-solving tasks are included under the "Chapter Evaluation" heading of 3rd-grade and 4th-grade textbooks, respectively. Also, 4th-grade textbooks contain the highest percentage (58%) of problem-solving tasks under the "Let's Solve and Produce a Problem" heading, whereas 1st-grade textbooks do not contain any problem-solving tasks (0%) under the same heading. Furthermore, 4th-grade textbooks contain the highest percentage (39.60%) of problem-solving tasks under the "Unit Evaluation" heading, whereas 2nd-grade textbooks contain the lowest percentage (12.38%) of problem-solving tasks under the same heading. Finally, and similarly, 4th-grade textbooks contain the highest percentage (50.52%) of problem-solving tasks under the "Introduction" heading, whereas 2nd-grade textbooks contain the lowest percentage (9.28%) of problem-solving tasks under the same heading.

Table 3 presents the distribution of problem-posing tasks by headings.

Table 3. Distribution of Problem-Posing Tasks by Headings

Grade Level	Problem-Posing Tasks								
	Introduction		Let's Solve and Pose a Problem		Chapter Evaluation		Unit Evaluation		Total
	f	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*
1st grade	-	0	-	0	1	5.88	-	0	1
2nd grade	-	0	1	1.54	6	35.30	1	8.33	8
3rd grade	-	0	37	56.92	9	52.94	9	75	55
4th grade	4	100	27	41.54	1	5.88	2	16.67	34
Total	4	100	65	100	17	100	12	100	98

Table 4. Teachers' Views on the Problem-Solving Tasks in the Textbooks

Category	*f* (%)	Code	Sample Quotes
Lacking Quality	8 (66.66)	Complex Abstract So many Unclear instructions	*T3: **They lack quality**. The topics are explained in a simple way but there are tasks with **complex** solutions.* *T5: There are very few tasks that require the students to **concretize or make mathematical shapes** or that allow us to use a projector when solving. The textbooks contain very few such mathematical problems.* *T6: There are very few tasks that students can **relate to their everyday life, which can develop their practical thinking skills**.* *T7: I hardly agree; the number of examples in which the solution is **explained step by step** is not enough.* *T8: Because the mathematics textbook contains **so many tasks** and examples, the students have trouble doing them all.* *T9: Students in the operational stage **have difficulty understanding** and solving abstract mathematical problems. Tasks in which the student will **simplify the solution** should be included.* *T11: I do not find mathematics textbooks effective and sufficient. Instead of giving information step by step, they try to teach by giving examples. There are **not enough** examples. They give all the learning outcomes **in a mixed** and gradual manner and address the same topics.* *T12: Mathematics textbooks are not inadequate, but **more tasks** can be included. **Problem-solving steps** and instructions can be clearer.*
Inadequate	4 (33.34)	Very few tasks Very few mathematical problems Very few problem-solving tasks	*T1: I think mathematics textbooks are **inadequate**. They may be adequate for successful students, but they are definitely inadequate for students with learning difficulties.* *T2: Absolutely, no. There are **very few tasks**, even on the most important topics. Unit Evaluation headings contain only a few tasks.* *T4: I don't think they're good enough because there **are very few** mathematical problems.* *T10: No, I **don't find the mathematics textbooks good enough**. There are only examples. There are not enough problem-solving tasks for the students to fully achieve the learning outcomes.*
Total	12 100		

Table 5. Teachers' Views on the Problem-Posing Tasks in the Textbooks

Category	*f* (%)	Code	Sample Quotes
Lacking Quality	3 (25)	Students fail to understand	*T7: Absolutely, no. The students **cannot produce problems**. They fail to understand what is given in the tasks. As such, they try to make random mathematical operations with the given numbers.*
		Not systematic	*T11: I do not like the problem-posing tasks in mathematics textbooks because the tasks **are not presented systematically**. Difficult and easy tasks are intertwined. There should first be easy tasks and then more challenging tasks; there should also be more problem-posing tasks.*
		Unclear instructions	*T12: There are problem-posing tasks in the textbooks, but **I don't think they can instruct the students well enough.***
Inadequate	9 (75)	Not enough space	*T1: Mathematics textbooks are not effective and sufficient for teaching problem-posing tasks. They do **not give enough space** to the problem-posing stages.*
			*T2: The number of examples in the textbook is **insufficient**. The number of problem-posing tasks is not even half the number of problem-solving tasks.*
			*T3: The textbooks **do not include different tasks and examples for each type of student**. Also, the number of examples is quite low.*
			*T4: The number of problem-posing tasks in the textbooks is **not enough**.*
		Very few different tasks	*T5: The mathematics textbook has an insufficient number of problem-posing tasks. There should be more tasks and examples. The tasks should **not be more difficult** than the students can understand and solve.*
		Very few tasks	*T6: I don't think they're good enough. We have to use **supplementary resources**. Also, sometimes we need to build extra problem-posing tasks.*
		Very few examples	*T8: No, I think the number of problem-posing tasks is insufficient. The **number of tasks that the students can understand and solve is very small**.*
		Supplementary resources	*T9: Yes, students now like to produce problems since the textbook contains problem-posing tasks; however, **more problem-posing tasks may be included**.*
			*T10: The textbooks are not adequate. There are **very few examples and tasks**. We need additional resources.*
Total	12 100		

It can be inferred from Table 3 that the greatest number of problem-posing tasks (65) is included under the "Let's Solve and Produce a Problem" heading, followed by "Chapter Evaluation" (17), "Unit Evaluation" (12), and "Introduction" (4) headings. We can see it as normal that "Let's Solve and Produce a Problem" headings contain the most problem-posing tasks. In addition, the highest (56.92%) and the lowest (0%) percentage of problem-posing tasks are included under the "Let's Solve and Produce a Problem" heading of 3rd-grade and 1st-grade textbooks, respectively. Also, 3rd-grade textbooks contain the highest percentage (52.94%) of problem-posing tasks under the "Chapter Evaluation" heading whereas 1st- and 4th-grade textbooks contain the lowest percentage (5.88%) of problem-posing tasks under the same heading. Furthermore, 3rd-grade textbooks contain the highest percentage (75%) of problem-posing tasks under the "Unit Evaluation" heading whereas 1st-grade textbooks do not contain any problem-posing tasks under the same heading. Finally, only 4th-grade textbooks contain problem-posing tasks under the "Introduction" heading.

To answer the second research question (*What do teachers think about the problem-solving & problem-posing tasks in primary school mathematics textbooks and workbooks?*), two questions were asked to the participating teachers. The first one was *"Considering the mathematics textbooks you are using in your classes; do you think they contain a sufficient number of effective problem-solving tasks?"* Table 4 presents the findings obtained from the participating teachers' answers to this question.

It can be inferred from Table 4 that 8 (66.66%) of the class teachers stated that the problem-solving tasks in mathematics textbooks lack quality. According to the quotes above, the teachers said that the problem-solving tasks include complex solutions and confuse the students with abstract data. The teachers also stated that the textbooks do not include tasks in which the students can concretize or which they can relate to everyday life, and the problem-solving steps and instructions are not clear. On the other hand, four of the class teachers (33.34%) stated that mathematics textbooks have an insufficient number of problem-solving tasks. They also stated that the textbooks lack enough tasks for students with learning difficulties, that the units contain very few problems, and that there are not enough tasks for the learning outcomes. So, we can conclude that while the majority of the teachers emphasized that there are no different types of problem-solving tasks in the textbooks, some teachers emphasized the scarcity of the tasks.

The second question asked to the teachers was, *"Considering the mathematics textbooks you are using in your classes, do you think they contain a sufficient number of effective problem-posing tasks?"* Table 5 presents the findings obtained from the participating teachers' answers to this question.

It can be inferred from Table 5 that three (25%) class teachers stated that the problem-posing tasks in mathematics textbooks lack quality. According to the quotes above, the teachers stated that problem-posing tasks are not easily understood by the students, that difficult and easy tasks are intertwined, which causes confusion among the students, and that they cannot instruct the students well enough. Also, nine (75%) class teachers think that the number of problem-posing tasks is quite low. In addition, they stated that the problem-posing tasks do not include the steps of producing a problem, that there are not many different tasks and examples for students at different achievement levels, and that there are not different types of problem-posing tasks and therefore they use supplementary resources. In short, the teachers stated that the mathematics textbooks they are using lack a sufficient number of problem-posing tasks, which allow students to produce their own problems.

4. Discussion

It was observed that the number of problem-solving tasks in the textbooks increases with each higher grade level because of the increase in the number of topics and learning outcomes specified in the mathematics curriculum of each grade level. However, it was also observed that there are more problem-solving tasks in the 1st-grade mathematics textbook than in the 2nd-grade textbook. This is because since the first graders encounter mathematical problems for the first time, every question in the textbook was considered a task. Ozer (2012) stated that the number of questions in the textbooks and workbooks in Turkey is much less than those in the USA and Singapore, so Turkish students use supplementary resources to solve different kinds of questions. Ildiri (2009) reported that the 5th-grade mathematics textbook and workbook do not contain enough tasks. Izmirligil (2008) noted that primary school mathematics workbooks contain an insufficient number of four basic operations-related tasks and questions that require students to use more than one solution. The present study found that the textbooks contain a sufficient number of problem-solving tasks but an insufficient number of effective problem-solving tasks, which is consistent with the relevant literature. Providing students with a learning environment where they will encounter and solve different types of mathematical problems will definitely contribute to their problem-solving skills (Tertemiz et al., 2015).

On the other hand, we found that the problem-solving tasks are equally distributed under each heading in mathematics textbooks. This equal distribution indicates that necessary emphasis is placed upon problem-solving tasks in the textbooks.

It was found that most of the problem-posing tasks in the textbooks are of the semi-structured problem-posing type. Besides, it was observed that none of the examined textbooks contains an equal number of different types of problem-posing tasks. In a study by Ev-Cimen and Yildiz (2017), it was reported that the most and the least encountered problem-posing types in the textbooks are semi-structured problem-posing tasks and free problem-posing types, respectively, which is also consistent with the present study. Zeybek, Ustun, and Birol (2018) found that only 25 (0.8%) of 2831 mathematical tasks included in secondary school mathematics textbooks were problem-solving tasks. They also found that 8th-grade textbooks do not include any problem-posing tasks. The small

number of problem-posing tasks, as reported by these studies, is consistent with the findings of this study. Erbas and Alacaci (2009) stated that there is an effective, remarkable type of heading in Turkish mathematics textbooks, which is not included in the textbooks of other countries: "Let's Produce and Solve a Problem." Placing more emphasis on this heading and providing students with examples that show them how to produce problems is important to develop students' problem-solving skills. It is considered important to design course materials and in-class practices that involve different types of problem-posing tasks (Structured, semi-structured, and free problem-posing situations) (Cunningham, 2004).

On the other hand, we found that the problem-posing tasks are not equally distributed under each heading in mathematics textbooks. This unequal distribution indicates that necessary emphasis is not placed upon problem-posing tasks in the textbooks.

In our study, 66.66% of the participating teachers stated that the problem-solving tasks in the textbooks lack quality, and 33.34% of them stated that there are not enough problem-solving tasks in the textbooks. In a study comparing Singaporean, Turkish, and American textbooks, Erbas and Alacaci (2009) reported that Singaporean textbooks include mathematical problems at different difficulty levels at the end of units. In contrast, Turkish and American textbooks contain mathematical problems with low and medium levels of difficulty. The authors also recommended that just like Singaporean textbooks, Turkish textbooks should also include more examples that will make it easier for students to perform problem-solving tasks. Their findings are consistent with those of the present study. Also, in Ildiri's (2009) study conducted to determine teachers' views on 5th-grade mathematics textbook and workbook, the participating teachers stated that the tasks in the textbooks do not encourage the students to do research, do not offer them an opportunity to discuss the result, are not appropriate for their learning levels, and do not enable them to learn new information. They also listed the characteristics of an effective mathematical task as short, concise, clear, up-to-date, containing drawings, encouraging students to do research, and appropriate for different learning levels.

Furthermore, in Ildiri's (2009) study, the participating teachers stated that there are not enough mathematical problems, and so they have to use supplementary resources to provide their students with different sorts of problems. In a study conducted to determine whether secondary school mathematics teachers use supplementary resources, Dapgin (2015) found that due to textbook-related reasons, teachers had to use resources in addition to textbooks. These reasons are listed as an insufficient number of and lack of diversity of mathematical problems (54%), the inadequacy of the textbooks in terms of topics covered (15%), and the inappropriateness of the textbooks for students' learning levels (8%). Bakilan Mutu's (2008) study reported that the participating teachers complained that mathematics workbooks do not contain a sufficient number of mathematical tasks. These above-mentioned studies, whose findings are consistent with those of the present study, also recommended that the textbooks should contain more mathematical tasks.

In our study, 25% of the participating teachers stated that the problem-posing tasks in the textbooks lack quality, and 75% of them stated that there are not enough problem-posing tasks in the textbooks. In Ildiri's (2009) study, the participating teachers stated that the 5th-grade math textbook and workbook encourage students to produce problems. However, Isik (2010) stated that mathematics textbooks in Turkey do not have enough problem-posing tasks, while Ev-Cimen and Yildiz (2017) reported that secondary school mathematics textbooks contain a limited number of problem-posing tasks. Cai and Jiang (2016) stated that both Chinese and American textbooks should include more problem-solving tasks of different types appropriate to students' learning levels. The results of their study are also consistent with the results of the present study.

As a result, the participating teachers stated that although the number of problem-solving tasks in the textbooks is sufficient, they lack quality. On the other hand, they thought that although the textbooks contain quality problem-posing tasks, their number is insufficient. Therefore, we believe that textbooks, which are the most widely used teaching tools in our country (Bulut, 2013; Seven, 2001), should include more quality problem-solving and problem-posing tasks.

5. Conclusion

Upon review of mathematics textbooks, our findings show that;

- There are sufficient number of problem-solving tasks in textbooks and they have a balanced distribution in terms of the chapters of the textbooks (Introduction, Let's Solve and Pose Problems, Chapter Evaluation, Unit Evaluation).

- The number of problem-posing tasks in textbooks is not sufficient and they don't have a balanced distribution in terms of the chapters of the textbooks (Introduction, Let's Solve and Pose Problems, Chapter Evaluation, Unit

Evaluation).

- Furthermore, the types of problem-posing tasks (structured, semi-structured and free). While the number of semi-structured problem-posing tasks is high in textbooks, there are scarcely any structured and free problem-posing tasks in all textbooks. In fact, there are no free problem-posing tasks in textbooks for 1st, 2nd and 3rd grade textbooks. This finding reveals that there is no textbook that includes various types of problem-posing tasks in a balanced manner.

The findings obtained from the interviews made with teachers show that;

- Teachers regard the problem-solving tasks in textbooks unqualified as they include complex solutions, are based on abstract data, are intensive and instructions regarding problem-solving are not clearly explained.

- They regard the problem-posing tasks insufficient due to the scarcity of the samples showing problem-posing steps, insufficiency of the tasks that students at different levels can pose problems and scarcity of different types of problem-posing tasks. They particularly stated that the numbers of different types of problem-posing tasks (structured, semi-structured and free) in textbooks are insufficient.

Based on the results of the research, suggestions for the features that should be considered in the mathematics textbooks that will be prepared or updated are as follows:

1. The results of the research show that problem-solving tasks in mathematics textbooks should be more effective. The textbooks should contain more mathematical tasks that will enable the primary school students, who are in the concrete operational stage, to better understand problem-solving steps and instructions. These tasks should not contain abstract data and complex solutions and should support the use of different materials. Also, students should be able to relate them to their everyday life.

2. Textbooks should also include more problem-posing tasks. Besides, the number of structured, unstructured, and free problem-posing tasks for different learning levels should be increased.

3. The higher the grade is, the more topics and learning outcomes are covered in the curriculum. For this reason, the textbooks of higher grades should include more problem-solving & problem-posing tasks.

4. The problem-solving & problem-posing tasks in the textbooks should be equally distributed under each unit & heading.

5. Students should be familiar with all three categories of problem-posing experiences. Therefore, all three problem-posing types should be included in the textbooks. Also, as the grade level increases, the number of these tasks should be increased.

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Notes

Note 1. This study was produced from the doctoral dissertation prepared by Ramazan DİVRİK.

Note 2. A certain portion of this study has been presented in V INES Human and Civilization Congress from Past to Future in 17-21 April 2019, Antalya-Turkey.