

PROBLEM TASKS IN MATHEMATICS TEXTBOOKS

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Abstract

Mathematics is an important discipline in education which provides a basis for problem solving, critical thinking and analytical skills. Textbooks are as important for mathematics as they are for other subjects. Problem posing is one of the important activities in mathematics education. The purpose of this study is to analyze the activities of problem presentation in the mathematics' textbooks of primary schools from the first to the fifth grade provide by the Ministry of Education and Science. For this purpose, five elementary school mathematics' texts were analyzed with the method of analysis, educational fields and types of problem presentation. The results show that in the textbooks of the subject of mathematics from the first to the fifth grade, excluding the mathematics book for the third grade, they are presented in total 20%, 29%, 34% and 37%, respectively, problem tasks have been presented. From the results, it is considered necessary to increase the number of problem activities in textbooks, their application in everyday life and to diversify the type of problem presentation.

Keywords: Mathematics, primary school mathematics texts, problem statement, application in everyday life.

Introduction

Mathematics is a rich and powerful subject, with wide and varied imprints on education, science, culture and indeed throughout human history. Both the academic world and society in the major chord mathematics have a high status as both an art and a queen of sciences. Mathematics is arguably the most generally applicable of all areas of human knowledge, and many, if not most, of the good qualities of modern life depend on it (Ernest, 2018). Qualitative research can be defined as research in which qualitative methods of data collection, such as observation, interview and document analysis, are used and a qualitative process is followed to present perceptions and events in a realistic and holistic way. (Akay and all 2006).

Learning materials are important for teachers and students. The learning environment and learning materials are as important as the influence of teachers, students and parents in the teaching process. The most important and basic means of learning and teaching used at the primary education level covering the age of 6-14 are textbooks. The textbook is a material that can help students and teachers. Textbooks allow students to supplement their prior knowledge and to anticipate and prepare for the activities to be performed. Since the active participation of students in learning eliminates many of the disciplinary problems in the living environment, textbooks contribute to the creation of a good learning environment (Kaya & Azar, 2010). According to the Ministry of Education and Science, the Mathematics curriculum emphasizes conceptual understanding and aims to enable students to solve and pose problems related to everyday life by developing a confident approach to mathematical problems as well as a positive attitude to mathematics. One of the important issues in teaching mathematics is the presentation of the problem. Solving a problem means finding a way out of a difficulty, a way around an obstacle, attaining an aim which was not immediately attainable. Solving problems is the specific achievement of intelligence, and intelligence is the specific gift of mankind: solving problems can be regarded as the most characteristically human activity (Doorman and all,

2007). The presentation of the problem can be done in three different ways, unstructured situation, semi-structured situation and structured situation (Stoyanova, 1997, 2003). The suggested steps to approach a problem are carried out in four stages: understanding the problem, analyzing, solving and discussing the problem. There are many reasons why presenting the problem is important. Solving problem activities provide several benefits for both teachers and students. Students who manage to present problems increase sympathy, are not afraid and do not raise a problem in their eyes (Altun, 2001). In many studies, it has been pointed out that the problem setting is at the center of mathematical activities and an important component of the mathematics curriculum (Cai & Jiang, 2017). Problem formulation is the treatment of problem solving in a different way and is very important in this aspect (Çarkçı, İ, 2016). Problem posing is considered a very important component in the nature of critical thinking because it provides mathematical reasoning and is a good way to identify different perspectives of students and how do they think (Akay and all, 2006, Cai, 2003). It enables teachers to gain knowledge about students' understanding of mathematical concepts and processes (English, 1998). The ability to pose a problem gives students the ability to learn mathematical reasoning, to explore mathematical situations, and to express mathematical situations appropriately orally or in writing. The purpose of this research is to examine problem tasks in mathematics textbooks from the first grade to the fifth grade, except the third grade. During the research, all the textbooks were examined separately in the program areas provided by the Ministry of Education and Science.

Methodology

This research is planned according to qualitative research and is built according to content analysis, which is one of the techniques of qualitative research. "Qualitative research can be defined as research in which qualitative methods are used to collect data, such as observation, interview and document analysis, and a qualitative process is followed to present perceptions and events in a realistic and holistic way" (Yıldırım & Şimşek, 2006). Data summarized and interpreted by descriptive analysis are subjected to a process of content and concept analysis, and themes that cannot be observed by a descriptive approach are revealed as a result of this analysis (Yıldırım & Şimşek, 2006). Since content analysis is an analysis of unobservable topics, this method is believed to be suitable for examining problem tasks in mathematics textbooks. It is thought that the research model supports the research problem, because the general purpose of the research is to examine problem tasks in primary school textbooks.

Results

The number of problem tasks in the mathematics textbooks provided by the Ministry for use were examined and included in the research after being divided into grade levels. The findings of the problem tasks in the mathematics textbooks from the first, second, fourth and fifth grades are given in the following tables.

Table 1. Problem tasks in mathematics from the first grade

No.	Areas in the curriculum	Problem task	Unproblematic task	In total	The percentage
1	Numbers and counting	8	29	37	21.6%
2	Geometry	1	6	7	14.3%

3	Operations with numbers	26	73	99	26.3%
4	Measurements	7	25	32	21.9%
5	Working with data	2	7	9	22.2%
	In total	44	140	184	21.26%

From Table 1, we notice that the number of problem tasks in the field “Numbers and counting” is 8 out of a total of 37, from the field “Geometry” we have only 1 problem task out of a total of 37, from “Number operations” 26 problem tasks out of a total of 32 and from “Working with data” 2 problem tasks out of a total of 9. The total number of problem tasks in the field grade is 44 or 21.26% of the total of 184.

Table 2. Problem tasks in mathematics from the second grade

No.	Areas in the curriculum	Problem task	Unproblematic task	In total	The percentage
1	Numbers and counting	10	41	51	19.6%
2	Geometry	8	33	41	19.51%
3	Operations with numbers	72	110	182	39.56%
4	Measurements	11	25	36	30.56%
5	Working with data	6	12	18	33.33%
	In total	107	221	328	28.5%

From Table 2 we notice that in the program field “Numbers and counting” we have 10 problem tasks out of a total of 51, from the program field “Geometry” we have 8 problem tasks out of a total of 33, from “Number operations” we have 72 problem tasks out of a total 182, from ‘Measurements’ we have 11 problem tasks out of a total of 36 and from “Working with data” we have 6 problem tasks out of a total of 18. Thus, in the second grade mathematics textbook we have 107 problem tasks or 28.5% of the total 328.

Table 3. Problem tasks in mathematics from the fourth grade

No.	Areas in the curriculum	Problem tasks	Unproblematic task	In total	The percentage
1	Numbers and counting	27	113	140	19.29%
2	Geometry	18	68	86	20.93%
3	Operations with numbers	129	136	265	48.68%
4	Measurements	31	36	67	46.27%
5	Working with data	10	16	26	38.46%
	In total	215	369	584	34.73%

From Table 3 we notice that in the areas “Numbers and counting” we have 27 problem tasks out of a total of 140, from the program field “Geometry” we have 18 problem tasks out of a total of 86, from “Number operations” we have 129 problem tasks out of a total 265, from

“Measurements” we have 31 problem tasks out of a total of 67 and from “Working with data” we have 10 problem tasks out of a total of 26. Thus, in the fourth grade mathematics textbook we have 215 problem tasks or 34.73% of total 584.

Table 4. Problem tasks in mathematics from the fifth grade

No.	Areas in the curriculum	Problem tasks	Unproblematic task	In total	The percentage
1	Numbers and counting	28	125	153	18.3%
2	Geometry	17	71	88	19.32%
3	Operations with numbers	196	225	421	46.56%
4	Measurements	56	50	106	52.83%
5	Working with data	10	13	23	43.48%
	In total	307	484	791	36.098%

From Table 4 we notice that in the field “Numbers and counting” we have 28 problem tasks out of a total of 153, from the field “Geometry” we have 17 problem tasks out of a total of 88, from “Number operations” we have 196 problem tasks out of a total 421, from “Measurements” we have 56 problem tasks out of a total of 106 and from “Working with data” we have 10 problem tasks out of a total of 23. Thus, in the fifth grade mathematics textbook we have 307 problem tasks or 36.098% of 791 in total.

Discussion and conclusion

While government and industry continue to praise mathematics for its benefits and importance in life, it can be difficult for children to understand how equations, functions or geometric shapes can help them in everyday life. And along with its difficulties, this may be one of the reasons why mathematics is so disliked among many students (Legner, 2013).

We live in a mathematized social world. The immense utility of mathematics must be acknowledged as a great strength and virtue. Without it, not only would we have to give up the tools we rely on as individuals and societies, but many of the necessities of life we enjoy and much of our prosperity would disappear (Ernest, 2018). So by focusing more on problem solving and “mathematical thinking” or mathematical intuition and real-life situations, and focusing less on memorizing formulas and simply applying them, we do a great job in education (Legner, 2013). Textbooks play a very important step in learning mathematics. A good textbook must meet a number of pedagogical, psychological, scientific, aesthetic and other requirements. In the mathematics book from the first grade we notice that we have a small number of problem tasks, which are important for stimulating and enabling students to think. Also, from Table 1, we notice that from the field “Geometry” we have a small number or almost no problem tasks distributed throughout the school year, which is contrary to the curriculum provided by the Ministry of Education and Science, according to which in the curriculum included with the field of Mathematics and Natural Sciences from the national standards, it is emphasized that “the student can or is capable of analyzing 2D shapes by combining rotation, translation, axial symmetry and similarity”.

From Table 2, we notice that in every program area we have problem tasks, but it would be good to have a larger number of them in order for students to be able to connect them with problems from everyday life. In the textbooks for the fourth and fifth grade, it is worth noting that in each program area we have a significant number of problem tasks, which include tasks from everyday life. This means that students, depending on the data they have, they are able to

solve them themselves. Also, we notice that as the level of education increases, so does the number of problem tasks.

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