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BASIC PROBLEM-SOLVING-POSITIONING SKILLS OF STUDENTS STARTING FIRST GRADE IN PRIMARY SCHOOL DURING THE COVID-19 PANDEMIC

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ABSTRACT

In the study, it was aimed to determine the students' basic mathematical problem-solving skills according to the problem-solving stages of Polya and the effectiveness of preschool education in problem solving. Besides, in the study, it was specified that the problem posing skill levels of the students were determined according to the definition made by Stoyanova and Ellerton. The study group of the research consists of students who had to take a break from pre-school education for a while due to the Covid-19 pandemic that emerged at the beginning of 2020 in Turkey, and who completed the second education-teaching period remotely and started the first grade in primary school. Descriptive scanning and clinical interview methods were used to determine problem solving and setting approaches. Within the scope of the study, the answers given to ten different basic problem types to determine the basic mathematical concepts and skills that children should acquire for mathematical development in early childhood and the problems which they posed like these problems were analysed. In addition, the opinions of three classroom teachers related to the subject were presented. According to the results obtained, the performance of the students who started the 1st grade during the pandemic period was determined to be low in the stages of problem solving, understanding the problem, preparing a plan, implementing the plan, and evaluating it. The most successful problem type of the students was the separation problem and the most difficult one was the division problem in the form of sharing equally due to incomplete concept knowledge. It has also been observed that students who have difficulty in understanding long and multi-stage problems cannot pose similar problems to problems they do not understand. The number of problems posed for the semi-structured problem posing situation was high. Interviewed teachers stated that students who started primary school during the pandemic were more anxious and shyer. Teachers made suggestions in the context of families to increase family participation in mathematics education and make the lessons more efficient.

Keywords: Covid-19 pandemic, basic problems, problem solving, primary school first grade

INTRODUCTION

Due to the Covid-19 pandemic that started at the end of 2019, pre-school education was interrupted for a while, along with all educational institutions in Turkey, as in other countries. The Ministry of National Education (MEB) notified the institutions about the measures to be taken and allowed pre-school education institutions to resume education as of June 1, 2020 (MEB, 2020). Schools have completed the necessary preparations and opened their doors for education. However, in the process called "New Normal", some schools could not adapt to

the new situation and either closed or parents did not send their children, especially in the pre-school period, to school. (İnci Kuzu, 2020a).

Mathematics education aims to give children a positive attitude towards mathematics, to develop children's problem-solving skills, to help them establish cause-effect relationships, and to improve their mathematical language skills (MEB, 2013). Development is very rapid in the pre-school period, the basic concepts, and skills that children acquire in this period form the basis of mathematical knowledge and concepts in school life when they start formal education (Karakuş & Akman, 2016). Schools are responsible for planning and implementing activities that will support children's mathematical thinking skills in the preschool period. They should create new learning opportunities that support the child to develop their existing abilities, acquire new skills and serve as a good model for the child (Kandır & Orçan Kaçan 2010). The basic mathematical concepts and skills that should be acquired for the mathematical development of children in early childhood include matching, classification, comparison, ordering, grouping, sharing, number and operation concepts. (Aktaş-Arnas, 2013; Charlesworth & Lind, 2009). In addition, among the pre-school learning outcomes, *"Achievement 19: Generates solutions to problem situations. (Indicators: Tells the problem. Suggests various solutions to the problem. They choose one of the solution ways. They tell the reason for the solution they choose. Tries the solution they choose. When they cannot find a solution, they choose a new solution. Suggests creative solutions to the problem.) Explanations: In children's daily lives, they are expected to develop ideas on the instant problems they encounter. In addition, they can be expected to develop suggestions for the problem by presenting possible problem situations. Children should be encouraged to share each other's suggestions for solving problems. By creating various problem situations, children are expected to propose original solutions, try them out, and explain by considering the cause-effect relationship. It should be modelled if necessary, to suggest increasingly original solutions while solving the problem.*" statement is included (MEB, 2020). Studies have revealed that the mathematical concepts, skills, and knowledge that children encounter, experience, and acquire in the pre-school period significantly affect their mathematical success in their later education (Ali & Mukhtar, 2017; Aquino et al., 2019; Claessens & Engel, 2013; Clements & Sarama, 2009; Griffin, 2004; LeFevre et al., 2010; Ompok et al., 2018). However, one of the main goals of pre-school education is to enable individuals to produce solutions to problems they will encounter throughout their lives. For this reason, it is important for teachers to teach in a way that encourages problem solving. The development of problem-solving skills, which is of great importance, requires working in a programmed way in a long process (Karataş & Güven, 2003). The problems prepared in the education process should basically benefit mathematical thinking. For this reason, research on elementary mathematics programs and mathematics course assessment standards focuses on developing mathematical problem-solving skills and positive attitudes towards mathematics and emphasizes their adaptation to the solution of real-life problems (Verschaffel et al., 1999).

The better problem solvers are, the more successful individuals become in life (Gür, 2006). Especially young students form mathematical knowledge with their own experiences (Aydoğdu & Ayaz, 2008). In this context, the problem-solving skills of 1st grade students are based on their experiences and their understanding and comprehension capacities. Students in this period try to reach the right result by using their experiences while finding solutions to problems. While students are solving problems, they can be observed and their approach to problem solving can be defined. In this process, students can be asked questions such as what you understood from the problem, how did you solve it, how can you check the result, can

you create a similar problem, and information about their solutions can be obtained (Aydoğdu & Ayaz, 2008). When the literature is examined, it is seen that many studies involving problem solving skills have been made. There are many studies conducted especially with primary school students (Arsal, 2009; Olkun et al., 2009; Soylu & Soylu, 2006; Yazgan, 2007; Jitendra et al., 2007; Kayan & Çakiroğlu, 2008; Greiff et al., 2013; van Merriënboer, 2013; Loğoğlu, 2016; İnci Kuzu, 2020b).

It is seen that addition and subtraction of natural numbers are included in the 1st grade primary school mathematics curriculum, and problem solving and constructing gains are directly involved in the learning areas. In the Primary Education Mathematics Curriculum, the achievements related to problem solving and setting of the 1st grade are given in Table 1.

Table 1
Learning Outcomes Related to Problem Solving and Posing at the 1st Grade Level in the Program

Learning Areas	Sub-Learning Areas	Gains
Numbers and Operations	Addition of natural numbers	Solves problems that require addition with natural numbers. (Works on problem solving are also included.)
	Subtraction in natural numbers	Solves problems that require addition with natural numbers. (Works on problem solving are also included.)

Polya's studies revealed that there are four stages in solving mathematical problems. These stages are to understand the problem, to plan for the solution of the problem, to implement the solution plan and to check whether the result is correct (Baykul, 2016). The most striking aspect of these stages, explained by Polya, is that they are generalizable. These stages can be used in many different problems, both in exercises based on simple calculations and in complex problems with several stages (Van de Walle et al., 2013).

Since problem solving and posing are at the core of the mathematics program, it has led researchers working in mathematics education to give importance to these subjects. In recent years, problem posing has received a special attention in studies on mathematics education. Because there is a common link between problem posing and solving in the cognitive context (Tertemiz & Sulak, 2013). The focus of this interest is the contribution of problem posing to problem solving in mathematics education. It has been stated that students with high problem-solving skills have higher problem posing skills than others (Cai, 2003). The fact that problem solving requires high-level thinking skills plays a major role in this regard (Mestre, 1991). For example, although "problem posing" has been popular in mathematics courses for a long time in Japan, more attention has been given to this concept recently (Salman, 2012). The concept of problem posing came to the forefront mostly with Gonzales. Problem posing strategies are classified into three types as free, semi-structured and structured (Stoyanova & Ellerton, 1996; Stoyanova, 2003). Free Problem Posing: It is the type of problem posing that is as creative as possible without any rule restrictions. Semi-structured problem posing: It is a type of problem posing based on a predetermined event, story, figure, or result. It is in this kind of problem posing similar to a problem. Problem Posing: Adding and changing different data to a determined problem, changing the conditions in the problem, or posing a new problem by reversing the given ones (Kılıç, 2012). In recent years, studies on mathematics education have shown that activating classroom environments and developing high-level cognitive problems play an important role in developing mathematical skills (Knott, 2010). When the literature is examined, it is seen that many

studies have been conducted, especially with primary school students, on problem posing skills (Arıkan & Ünal, 2013; Cankoy & Darbaz, 2010; Tertemiz & Sulak, 2013).

In studies conducted for many years, it has been determined that most of the primary school students are not successful in solving mathematical problems. (Higgins 1997; Holton et al., 1999; İnci Kuzu 2020b). In addition to teaching students the right approaches in problem solving, it is also necessary to determine at what level students have these skills. In order to evaluate these skills correctly, besides having an idea about the mathematical knowledge levels of the students, information that can guide the teaching programs is also obtained (Karakaş, 2002). Therefore, the correct assessment of students' problem-solving skills is an important field of study for mathematics educators. In this context, the evaluation of the problems solved and posed by primary school first grade students who have completed their pre-school education incomplete or remotely during the pandemic period will enable to determine the possible deficiencies of the students at the semantic and conceptual level. In addition, it is thought that the research findings will contribute to the determination of student difficulties in this process and the development of pedagogical content knowledge of teachers and experts involved in planning the teaching process. In this context, in the study, the approaches of students who started the first grade of primary school during the pandemic period to solve and set up fundamental mathematical problems were examined. In addition, despite all the adverse effects of the Covid-19 pandemic, the opinions of primary school first-grade teachers, who carried out face-to-face education activities together with distance education activities for about eight weeks (21 September-13 November), were received about students who started first grade before completing their pre-school education. The study aims to reveal the problems experienced in this process and the differences between the educational activities of the process and the pre-pandemic period. At the same time, it is aimed to reveal the opinions of teachers about the arrangements that can be made to increase the efficiency of education in pandemic conditions. In this context, answers to the following questions were sought;

(i) What are the levels of students who start the first grade of primary school during the pandemic period on realizing critical behaviours determined for the problem stages including the basic mathematical concepts and skills that students should acquire for the development of mathematics in early childhood?
(ii) What is the nature of the problems created by the students who started the first grade of primary school during the pandemic period?
(iii) What are the opinions of primary school 1st grade teachers, who carry out educational activities during the pandemic period, about the students who started the first grade without completing their pre-school education and the process?

METHODOLOGY

Model of the Research

Clinical interview and descriptive survey methods were used in the study. It has been stated that standardized tests only serve to determine the number of correct or incorrect questions that students make, and they do not determine the reasons why students make mistakes and how they should approach the path to the right (Frederiksen et al., 1990). Clinical interviews differ from standardized tests in this respect. In the scanning method, the situation, individual or object that is the subject of the research is tried to be defined directly on its own terms. It is

important to be able to "observe" the current situation appropriately (Karasar, 2002). For this reason, the descriptive survey model and clinical interview methods, in which no intervention was made and the students were able to observe the problem solving-posing processes in detail and realize the strategies they used and the reasons for making mistakes when they did it correctly, were used together to determine the answer for the question "How are the primary school first-grade students' approaches to solving and posing basic problems?"

Universe and Sample

The research universe consists of first-year students studying in 3 public schools in a province of the Western Black Sea Region in the 2020-2021 academic year and three primary school teachers who taught the first grades of primary school before and taught the first grades during the pandemic period. Since it is very difficult to interview all the students, the study group was formed by using the proportional cluster sampling method. When it is not possible to select all the elements of the universe in the study group, it is the best method to choose a study group using the sampling method (Karasar, 2002). To divide the universe of the study into sub-populations while creating the proportional cluster sampling, the highest rate of students who were able to read and write at the end of the fall semester was taken as a criterion. Taking the literacy rate as a criterion is that there is no other criterion that can categorize it in terms of success for primary school first graders. In this context, to select the sample, the success rates of schools in literacy were determined by interviewing each of the eight first grade branch teachers of three state schools. The findings are given in Table 2.

Table 2
Frequency-Percentage Distribution Table of Schools' Literacy Achievement

	1. School		2. School			3.School		
Branches	A	B	A	B	C	A	B	C
The number present (f)	20	23	35	34	34	27	25	25
Student who is literate (f)	20	23	33	29	31	23	22	20
student who is literate (%)	100	100	94,28	85,29	91,17	85,18	88	80

When Table 2 is examined, both branches of the 1st school have 100% success rate. As a result, a sample consisting of 3 schools, 8 branches and 211 primary school 1st grade students was reached. The study group selected for the clinical interview method consisted of 5 girls and 5 boys, a total of 10 students from a branch with the highest literacy rate, who were determined to have the best mathematical processing skills with the two-week mental math problem solving practices given by the classroom teachers at the end of the 2020-2021 fall semester. With the participant number given to each of the students participating in the study, female students were coded as G1, G2, G3, G4, and G5 for male students as B1, B2, B3, B4, B5 within the framework of research ethics. In addition, a structured interview was held with three classroom teachers regarding the education of the pandemic period. The teachers whose opinions were taken in the study were coded as T1, T2, and T3.

Information on Demographic Characteristics of the Sample

In this section, the frequency distribution results obtained from the Information Form developed by the researchers to reveal the demographic characteristics of the students in the sample were given. The demographic characteristics of the students in the sample of the study were given in Table 3.

Table 3
Demographic Characteristics of the Children and Their Families Participating in the Study

Distribution of Children Participating in the Study and Their Families by Demographic Characteristics		
		f
Gender	Girl	5
	Boy	5
Ages of students (month)	72-76	2
	76-80	1
	80-84	5
	Over 84	2
Pre-school education period	Never trained	1
	1 semester	2
	2 semesters	1
	3 semesters	5
	3+	1
First encounter with math	TV, tablet, mobile phone…	1
	Family	5
	Preschool	4
	Primary school	-
Mother's Education Level	Illiterate	-
	Primary school	1
	Middle School	-
	High school	1
	University	8
Father's Education Level	Illiterate	-
	Primary school	-
	Middle School	1
	High school	2
	University	7

Data Collection Tools

In the research, a ten-question basic problem test was created to determine the skills of solving and posing basic problems of primary school first-grade students during the pandemic

period. In preparing the questions, a literature review was done, and the opinions of a classroom teacher and a preschool teacher were taken. The questions in the test include matching, classification, comparison, ordering, grouping, sharing, number and operation concepts, which are the basic mathematical concepts and skills that children should acquire for mathematical development in early childhood, in accordance with the cognitive development acquisitions in the preschool and primary school first-grade program. It has been determined in the literature that different researchers use similar questions about problem-solving (Altun et al., 2004). The interview questions were applied to 2 randomly selected students who were not included in the study group after passing the expert control. A pilot interview was applied to these two students. After the interview, the questions that the researcher would ask during the clinical interview were revised again, following the purpose, by taking expert opinion. The first question of the basic problem test form (TPT) was a split problem by simple sharing, the second question was a separation problem, the third question was a multiplication problem, the fourth question was a merge problem, the fifth question was a division problem in the form of grouping, the sixth question was a comparison problem, the seventh question was a splitting problem in the form of sharing, the eighth question was a non-routine problem, the ninth question was a multi-step problem, and the tenth question was a non-routine division problem with remainder.

In the interviews with the teachers, the class teachers were asked, "Is there a difference between the students who left their pre-school education unfinished during the pandemic period and started the first-year of primary school and the first-year students they taught before?" question was posed.

Data Collection and Analysis

Ethics committee permission was first obtained to conduct research, and then the necessary official permissions were obtained from the Provincial Directorate of National Education to start working in schools. With the start of face-to-face training for the 2020-2021 spring semester, necessary precautions were taken, and interviews were started. The Classroom Teacher introduced the researchers to the students participating in the research, and the students were informed about what to do. Within the scope of the study, firstly, problem solving teaching was carried out according to the problem-solving stages of Polya during two course hours. The applications were made on different days to make the students feel comfortable and, questions were asked one-to-one. After the problem-solving instruction, the problems were asked to the students one by one, both verbally and in writing. Students were asked to solve these problems according to the problem-solving stages of Polya and students were given an abacus, counting sticks and 15 pieces of small size toys that they could use as materials. The students were given clues by the researchers about what they could do with the material only in the questions they had difficulty. There was no time limit for the interviews and the interview with each student lasted an average of 1 hour and 15 minutes. Because a student was very excited, a half-hour break was interrupted, and the interview was continued from where it left off. Data in clinical interviews were collected by video recording and observer note studies. The answers given by the students for posing similar problems were coded according to the categories of problem, unrelated problem, not a problem and blank. Similarly, this coding has been used by researchers (Leung, 2013; Silver & Cai, 2005). Thus, it was aimed to distinguish the sentences that go out of the semi-structured problem, that are a problem but cannot be associated with daily life situations or that are not a question root. In the group coded as not a problem, there were sentences in which only the definition was

made and a few sentences that were not question sentences are expressed. The interviews were carried out by taking notes and reported by researcher and the classroom teacher. The answers given by the students to each problem in the test were classified separately by the researcher and the classroom teacher, and any inconsistency or disagreement regarding the classification was discussed, and a final decision was made. The wrong answers given by the students for each problem were also divided into categories according to their similarities and differences.

RESULTS

In this section, the data obtained during the data collection process were presented. Findings were described separately for each question. All the students participating in the study tried to understand the problem, and they read the questions again and asked the teacher to read them again. The students expressed that they visualized the problem in their minds without writing the data, except for the questions they solved by drawing a picture, and immediately put it into practice.

Table 4
Distributions of Problem-Solving Stages and Problem Posing for the Solutions of the Questions in TPT

Stages	Student Statuses	1 f	2 f	3 f	4 f	5 f	6 f	7 f	8 f	9 f	10 f	$\bar{X}$ f	$\bar{X}$ %
Understanding the Problem	Complete understanding of the problem (to be able to express the problem in one's own words)	10	10	4	3	6	5	2	1	1	2	44	44
	Understanding part of the problem	0	0	4	2	1	4	4	6	4	4	29	29
	Inability to understand the problem	0	0	2	4	2	1	3	3	5	4	24	24
	Failure to try to understand the problem	0	0	0	1	1	0	1	0	0	0	3	3
Plan Preparation	Determining the appropriate strategy for the solution	5	10	4	3	3	7	5	6	3	5	51	51
	Choosing part of the appropriate strategy for the solution	1	0	4	2	3	1	1	1	2	1	16	16
	Choosing an inappropriate strategy	1	0	2	2	2	2	2	3	5	4	23	23
	Not choosing a strategy	3	0	0	3	2	0	2	0	0	0	10	10
Executing the Plan	Making the right solution	4	10	4	3	7	7	5	6	4	5	53	53
	Making a solution that is partly true	1	0	2	1	2	1	0	1	3	2	13	13
	Making the wrong solution	1	0	1	3	1	2	3	3	3	3	20	20
	Failure to find a solution	4	0	3	3	2	0	2	0	0	0	14	14
Checking the solution	Checking the accuracy of the results	1	0	0	0	0	0	0	0	0	0	1	1
	Logical check of results	4	6	4	1	2	5	3	2	2	4	33	33
	Partial checking of results	1	4	2	3	1	2	2	3	1	2	21	21
	Not knowing how to check the result	4	0	4	6	7	3	5	5	7	4	45	45
The semi-	Problem	7	7	6	4	5	7	2	0	2	0	40	40

structured	Unrelated problem	1	0	1	2	2	1	4	4	5	6	26	26
problem posing	Not a problem statement	0	0	2	1	3	2	1	0	1	1	11	11
situation	Blank	2	3	1	3	0	0	3	6	2	3	23	23

The distributions, frequency, and percentage values of problem-posing and problem-solving stages of the answers given to the questions in the TPT, which was created to find answers to the research problems of the study were shown in Table 4.

When Table 4 is examined, a total of 100 answers for ten TPT questions were obtained from ten first-year students at the problem understanding stage. In the evaluation, the problem was fully understood by the students in 44 (44%) of the 100 answers, that is, they could express the problem in their own words, in 29 (29%) of the answers the problem was partially understood by the students, in 24 (24%) the students did not understand the problem and in 3 (3%) no effort was made to understand the problem (leaving it blank). However, it was determined that all the students tried to understand the problem. At the stage of preparing the plan, it was determined that the appropriate strategy was chosen for the solution in 51 (51%) of the 100 solutions. It was assayed that only a partly suitable strategy was chosen for the solution in 16 (16%), an unsuitable strategy was chosen for the solution in 23 (23%) and a strategy was not chosen for the solution in 10 (10%). It was determined that the correct solutions were reached in 53 (53%) of the 100 solutions, the partially correct solution was reached in 13 (13%) of the solutions, the wrong strategy was chosen in 20 (20%) of the solution and, 14 (14%) solutions were not made at the stage of execution of the plan. In the stage of providing the solution; Out of 100 solutions, 1 (1%) of the problem's results were checked for accuracy, 33 (33%) were logically checked, 21 (21%) were partially checked, and that in 45 (45%) of the answers, it was not known how the accuracy control of the result was done. Besides, it has been specified that the level of realization of behaviours related to each stage of the problem-solving process was generally at a low level.

In addition, in the first question of TPT, the simple division problem in the form of sharing, it was determined that 7 of the students did not know what the concept of half was, and after the definition of the concept of equal, 4 more of the students solved the question correctly.

Problem Solving Ways of the Students Participating in the Study

Four of the students participating in the study answered the multiplication problem correctly. They found the correct result by counting the operations of G4 and B1 mentally, B2 painting and G1 fingers counting two by two. G3, who got the question wrong, tried to count by twos in mind but got confused and forgot how much to count.

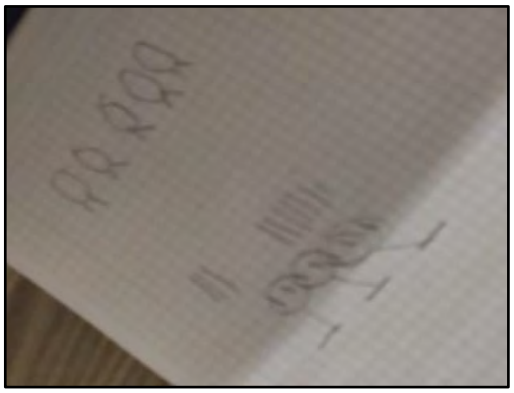

Figure 1. Example drawing of a student solving the multiplication problem correctly.

Three of the students who participated in the study gave the correct answer to the merging problem. Four students (G4, G5, B1, B2, B3) left the problem blank because they did not understand it, while G2 did the addition process as 4+7 and found the wrong result. Students G1 made the subtraction with their fingers, B1 with the mind, and B4 with the abacus.

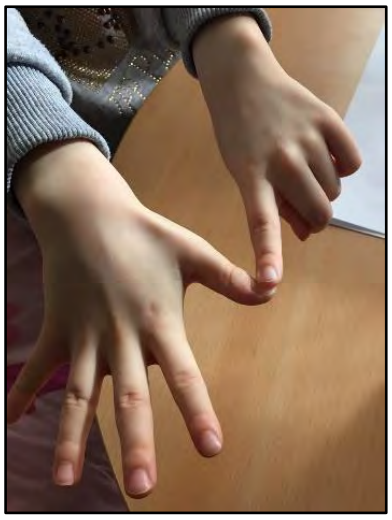

Figure 2. Example modelling of a student using her fingers to solve the merging problem correctly.

Seven students answered the grouping problem correctly. In order to solve the problem, three students (G3, G4, B5) used their fingers, K1 toys, two students (B3, B4) pens, two students (G5, B2) counting sticks. B1 tried to solve the problem mentally. The students changed the type of material to be shared and re-established the problem with the same values. The wrong solution of B1, who solved the grouping problem wrong, was 8-2=6.

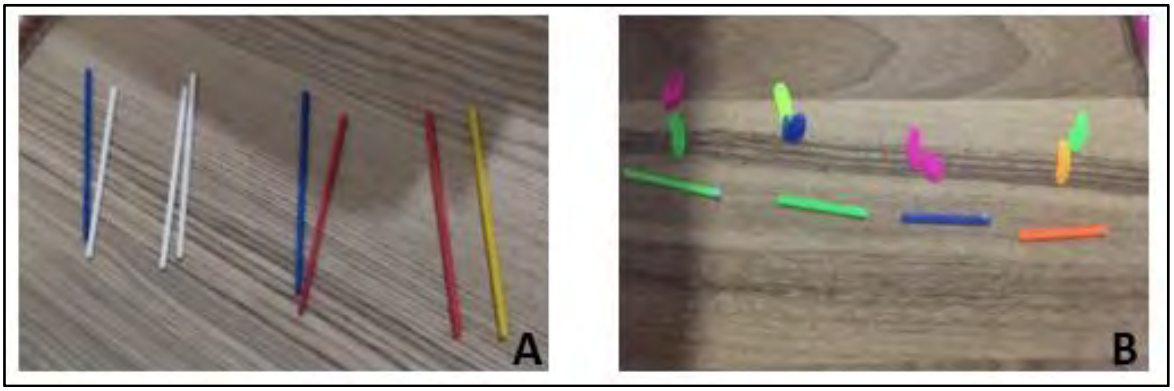

Figure 3. Example models of two students who correctly solved the division problem in the form of grouping.

Six of the students participating in the study answered the comparison problem correctly. B4 understood the problem as to what is the youngest age and answered, "5 is less", that is, he made a mistake because he could not understand the problem. Among the students, G1 tried to do the operation with a toy, four students (G2, G3, G4, G5, B3) with their fingers, and four students (B1, B2, B4, B5) tried to do it with the mind. All of the students who could pose a problem kept the situation stable and changed their names and ages, and posed a new problem.

Figure 4. Example modelling of a student who correctly solved the comparison problem.

There were six students who answered the non-routine problem correctly. The students could not understand the problem in the first reading and read it several times. Operations were done by two students with a toy, by two students with a pencil, by one student with a counting stick, by one student with a number bean. Only one student (P1) was able to summarize the problem correctly, and no student could pose a similar problem. In this problem, students had difficulties in using the language.

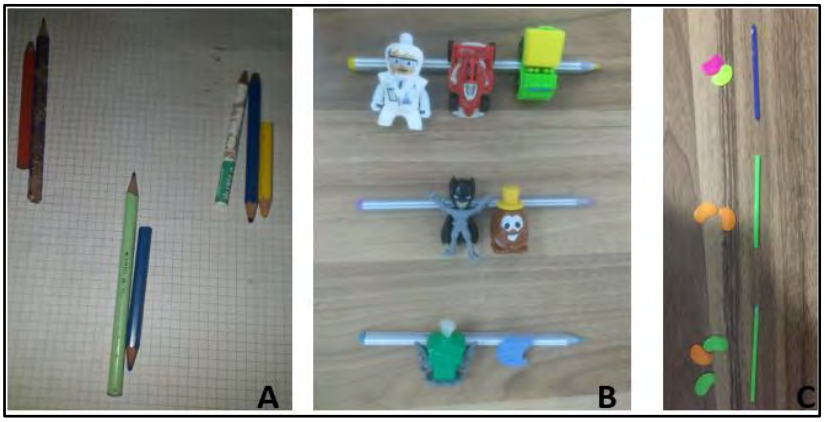

Figure 5. Sample models of three students who correctly solved the non-routine problem.

There were five students who answered the non-routine division problem with remainders correctly, two students who made a mistake due to an operation error, and three students who could not do it due to not understanding the problem. Although there were two students who were able to summarize the problem correctly, there were no students who posed similar problems. Students who pose unrelated problems posed addition or subtraction problems. The students had difficulties in using the language.

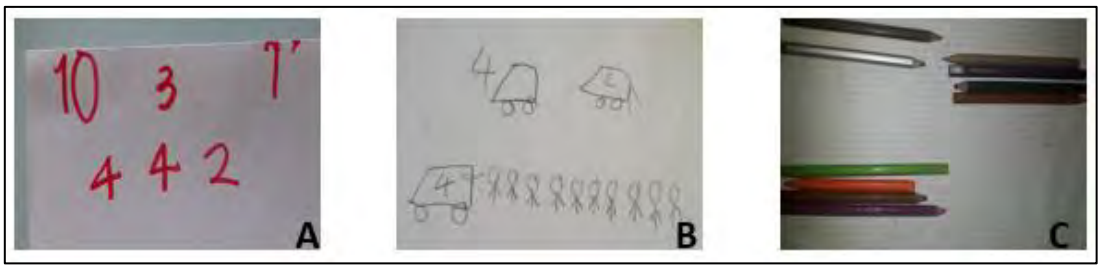

Figure 6. Example models of three students who correctly solved the non-routine division problem with remainder.

Problem Posing Levels of the Students Participating in the Study

It was determined that 39 (39%) of the 100 problems posed during the semi-structured problem posing phase had problem characteristics, 27 were unrelated problems, 11 (11%) did not have problem characteristics, and 23 (23%) were left blank. In the semi-structured problem posing phase, it was determined that most of the answers had problem characteristics. Some examples of problems posed by students were presented below.

(i) The unrelated problem that G2 posed for question 1: There are 12 birds in the tree. There are 5 more next to it. Then how many was his number?
(ii) The problem B5 posed for Question 2: There were 8 birds in the tree. Four of them have escaped, how many birds remain?
(iii) The unrelated problem B2 posed for Question 3: There were 5 men in a house. How do we count men's feet?
(iv) The problem G4 poses for the 3rd question: There are 6 rabbits in a zoo. What is the total number of feet of these rabbits?

(v) Similar problem that G3 poses for Question 4: Ayşe has 5 plates. How many plates does it take to complete them to 9?
(vi) The unrelated problem that G2 posed for Question 4: Ayşe had 10 pencils. How many pencils will she have if she adds 6 more?
(vii) The problem G3 posed for Question 5: Ayşe has 8 babies. She wants to put them in boxes in twos. How many boxes does she need?
(viii) Problem posed by B2 for Question 6: Zeynep is 6 years old, Ayşe is 9 years old. How many years is Zeynep younger than Ayşe?
(ix) The unrelated problem G5 poses for Question 7: Ahmet has 9 sharpeners. His mother gave him 3 gifts. How many sharpeners did he have?
(x) Three of the students posed an addition problem in the category of unrelated problems.
(xi) G4's problem for Question 7: There are 6 strawberries in a bucket. How many of these strawberries can we place equally in 3 baskets?
(xii) The problem G1 poses for Question 7: If 9 toys are placed in three baskets in equal numbers, how many toys are placed in each basket?
(xiii) G4's unrelated problem for Question 8: There are 6 children and 3 benches in a garden. How many people can sit in groups equal to the benches?
(xiv) G4's unrelated problem for Question 9: Elif has 8 corns. If he gives 3 of these 8 corns to his brother, how many corns will he have left?
(xv) Unrelated problem posed by G2 for Question 10: Kerem had 10 balls. How many balls will he have left if his brother pops 4 of them?
(xvi) The problem B5 poses for Question 10: 20 children will go to school. Two children will ride each bus. How many buses are needed?

Problem Solving-Posing Skills of the Students Participating in the Study According to Their Gender

In the scope of the study, when the problem solving-posing skills were examined depending on the gender variable, it was determined that the number of correct answers of female students was 31, the number of correct summaries was 23, the number of similar problems which they can pose was 22, and the number of correct answers of male students was 29, the number of correct summaries was 21, and the number of similar problems which they can pose was 18. The data obtained are given in Table 5.

Table 5
Frequency Distribution of Problem Solving-Summarizing-Similar Problem Posing Skills According to Gender Variable

Gender	Total number of correct answers (f)	Total number of correct abstracts (f)	Total number of similar problems (f)
Female Students	31	23	22
Male students	29	21	18

Opinions of Classroom Teachers Participating in the Study

Within the scope of the research, the teachers expressed the following views regarding the students who started the first grade during the pandemic period.

T1: *"Yes, there was a very distinct difference. Due to the pandemic, children are already anxious. They have not left the house for a long time and have not communicated with their peers. This situation caused them to start 1-0 behind. Although I did not feel a significant difference when teaching reading and writing, I felt that they were more difficult, especially in mathematics. They lacked the mathematical concepts that they would normally need to know. We tried to complete them. I had many students who could not even count backwards from 10. During this period, we quickly recovered our shortcomings with the support of the families."*

T2: *"We are going through challenging days. As our students, parents and teachers, we had to put in more effort than ever before this year. The distance education and the situation of leaving pre-school education, which is your subject of study, required us to work much more than usual. Before that, I taught first grade for two years, I do not remember much, but it was as if the students of this semester were behind, especially in terms of using the language. I had a tough time in problem-solving. My students, whose families took care of at home during the pandemic period, were in the lead by far. I think this shows the importance of both family support and pre-school education."*

T3: *"So there is no difference? And how it was. Once the students were unhappy, their energy was low, and we tried to motivate them with their families. I had to give much homework to make up for the deficiencies. Especially mothers tried very hard. We had difficulties in mathematics; maybe we were a little behind, especially I did not have the opportunity to solve many problems.*"

DISCUSSION AND IMPLICATIONS

The aim of the research is to examine the basic mathematical problem-solving approaches of the students who completed their preschool education with distance education and started the first grade of primary school during the Covid-19 pandemic period, according to the stages of Polya, and to determine the deficiencies. In addition, it was aimed to determine problem posing skills in the research.

According to the findings of the study, it was determined that the rate of correctly answering the first question of TPT, the division problem in the form of simple sharing, was quite low due to the lack of concept knowledge, and 70% of the students did not know what the concept of half meant. The 15th achievement of the preschool program is the student's understanding of the part-whole relationship (Indicators: Says the parts of a whole. Shows the whole and half. Divides a whole into parts. By combining the parts, a whole is obtained) (MEB 2013). It is thought that this situation is caused by the interruption of pre-school education during the pandemic period. The results obtained from the interviews with the students for questions 2-9 were given in Table 6 compared with the results of the part related to the first-year students of the research conducted by Altun et al. (2004).

Table 6
Comparison with the Study by Altun et al. (2004)

	Altun et al. (%)	Current Research (%)
Separation problem	92	100
Multiplication problem	70	40
Merge problem	59	30
Division problem in the form of grouping	81	70
Comparison problem	39	70
Splitting problem in the form of sharing	83	50
Non-routine problem	87	60
Multi-step problem	71	40
Non-routine division problem with remainder	76	50
Total	86	57

According to these results, the average number of correct solutions for all problems was 86% and 57%, with a difference of 29%. From this, it is understood that students do not have a full knowledge of problem solving informally. It was thought that the source of this decline could be the disruption of schools during the pandemic period. In this context, the importance of pre-school mathematics education emerges. Supporting the results of our study, Özyürek et al. (2018) emphasized the importance of the education given by the teacher at school in problem solving skills in their study to examine the Problem-solving Skills of Preschool Children in terms of Some Variables. Developing problem solving skills starting from an early age requires working in a programmed way over a long period of time (Karataş & Güven, 2003). However, there are also studies in the literature that contradict our findings. For example, whether the students received kindergarten education was examined and it was investigated whether it was effective on the scales. According to the results obtained, it was determined that the problem-solving skills of the students did not change according to whether they received kindergarten education or not (Çağatay, 2020). In addition, it was thought that the reason for the decrease in the problem-solving levels of first-grade students was less than expected despite the interruption of the schools, because the parents of the students participating in the study, especially the mothers, had a high education level and started mathematics education at an early age. In a way that supports the results we have obtained, the studies conducted by İnci Kuzu (2020a), Ural and Çınar (2013) have concluded that as the education level of the mother and father, especially the mother, increases, the success of the students also increases.

According to the results of the study, it can be said that the performance of the students who started the first grade of primary school during the pandemic period is low in understanding the problem, preparing a plan, and executing the plan for the general problems, and the performance is very low in the checking the solution stage. It was determined that the students who performed one of the first two stages of understanding the problem were able to reach the correct solution. The students who have the concepts and skills (matching, classification, comparison, sorting, grouping, sharing, number and operation concepts) that should be acquired in early childhood can understand the problem, choose the appropriate strategy, and reach the right solution, but cannot check the correctness of the right solution,

that is, in the problem-solving stages, the students in the evaluation part success were found to be very low. Dölek (2018), in her study on primary school fourth grade students, similarly stated that the problem-solving skills of the students were low, and there were almost no students who can make assessments during the evaluation phase.

When examined in terms of items, the biggest difference was seen in non-routine problems and comparison problems, and all the students within the scope of our research solved the separation problem correctly. In the eighth, ninth and tenth questions of the research, it was determined that the students had difficulty in understanding the problems due to the length of the questions and their multi-level nature and, the number of correct answers was low. In addition, the rate of students to summarize the multi-step question was determined to be low. The result obtained here was that "Students make more mistakes in problems that require multi-step operations". Similar findings were also obtained in the study conducted by Soylu and Soylu (2006). It was determined that the students could not correctly summarize every problem they solved correctly. It shows that the person who can solve the problem does not always mean that he fully understands it. In order to understand the problem more deeply, it is important to establish problems that can be solved by the problem-solving method of the problem.

Also, it was observed that in the problems that the students were asked to pose with the semi-structured problem-posing technique, they were mostly unable to pose a problem suitable for the desired situation and, they experienced difficulties such as not being able to pose a problem different from the problem given as a prototype. It was determined that they forgot the problem and could not use the language well. In addition, students mainly set up addition-subtraction problems in the unrelated problem category. It is thought that this situation may be due to the readiness levels of the students. Findings showed that students' experiences positively benefited their problem posing skills. Similarly, Arıkan and Ünal (2013) and Tertemiz (2017) stated that in parallel with this study conducted in their studies, primary school students had difficulty in posing problems, they could not go beyond the given event, and they were more unsuccessful in posing problems for addition-subtraction compared to the problems they set up in multiplication-division in problem posing. According to the results of the research, it was determined that first-year students mostly did not change the conditions and situation while posing problems, but only changed the values given, and students who could solve problems were more successful in problem posing.

The study determined that primary school first-grade students mostly used counting forwards and backwards with their fingers and used the modelling strategy in basic problem-solving. It has been observed that they can develop original solutions for basic problems and that students' problem-solving strategies are pretty like each other. Similar to our study, Altun et al. (2004) also stated that the modelling strategy and material use have significant power in making the right solution and in explaining the students' thoughts for these age groups.

The learning processes of individuals are in continuity and the impact of a quality education life on this is quite large. It is thought that the interruption of this process due to unavoidable reasons will adversely affect the next period. In the 2005-2006 academic year, the primary education mathematics curriculum was rearranged according to the constructivist learning approach by the Ministry of National Education. With the organized program, it is aimed that students make sense of mathematical concepts, determine the relationship between them, and relate what they learn to their lives. In the researches conducted on the new curriculums put into practice in Turkey, teachers' opinions such as the lack of materials

related to the curriculum and the problems in the implementation of the programs due to insufficient classrooms are encountered (Kalender, 2006; Duru & Korkmaz, 2010; Güven, 2016; İnci Kuzu and Uras, 2019). In this context, it is thought that the use of materials in school curriculum is necessary (Kaplan et al., 2013). Particular attention should be paid to teaching preschool and primary school students using materials in the lessons.

Finally, the study determined that the correct answer numbers of female and male students were almost the same. In addition, it was observed that the skills of first-year students in free, semi-structured problem-posing situations were at the same level according to gender. When the literature is examined, many similar conclusions have been reached (Cankoy & Darbaz, 2010; Salman, 2012).

In the interviews with the teachers within the scope of the research, the teachers emphasized that the students who started school during the pandemic period were shy and anxious and that they had deficiencies in mathematics compared to other years. In addition, teachers drew attention to the importance of family support in this period. Eastman (1988) concluded that school success is higher in children of families with a supportive approach in terms of education. As the child starts primary education, the environmental factors that play a role in the student's school success expand to a broader segment of the society. However, the family effect does not disappear completely. Considering the number of school hours during the day, it becomes clear that more than half of a child's life is spent in the family during this period. This situation shows the importance of child-family interaction during school years as well. In a way, parents are the people closest to their children in fulfilling all their needs and their first teachers in the 0-6 age period. In this context, especially during the pandemic period, families have a great responsibility.

CONCLUSION

The results of the study were obtained from the answers given to the ten basic problem questions prepared for the basic problem-solving skills of the students who started the first grade of primary school during the pandemic period. However, it is seen that the studies to be carried out with more samples and other classes may enable the determination of other possible deficiencies. The deficiencies identified in the study can be eliminated by guiding the students correctly and by identifying their misconceptions. Possible deficiencies in students point to lack of conceptual knowledge and deficiencies in verbal language skills. In this context, such situations can be resolved through interviews in different studies to be carried out. It is thought that the results obtained in such studies may also benefit the planning of teaching processes for problem solving in the preschool period. The main task of teaching should be the formalization of children's informal knowledge and the development of problem-solving skills. With this study, it is concluded that the importance of getting pre-school education before starting primary school and that problem-solving teaching should be started in a programmed way in pre-school education institutions at much earlier ages and it is important at every grade level. In the distance education process, families and teachers should exchange information incoordination, and information should be shared about what is done with the student in the home and school environment. Distance education content for unexpected situations should attract students' attention and be understood by students. Teachers can shoot asynchronous videos for students during the home-schooling process. Shaping the activities to be done at home for pre-school students according to the materials at home will facilitate the supply of materials to the families and will ensure that the activities

are carried out by all children in the class. Considering these and similar research results, mathematics teaching programs should be developed. Children's appropriate ages and levels should be followed carefully, and teaching should be done at the appropriate time. Conducting similar studies is important in terms of the accuracy of the measures to be taken in this regard.

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