



Error Analysis In Solving Fpb And KPK Story Questions Based On Polya Procedures For Fourth Grade Elementary School Students

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ABSTRAK

Matematika merupakan salah satu mata pelajaran yang memiliki peran yang sangat penting dalam dunia pendidikan, hal ini dikarenakan matematika adalah ilmu dasar yang digunakan secara luas dalam berbagai bidang kehidupan. Namun pada kenyataannya masih banyak siswa yang mengalami kesalahan saat mengerjakan soal matematika khususnya soal cerita yang berkaitan dengan materi KPK dan FPB. Sehingga ini bertujuan untuk menganalisis jenis-jenis kesalahan siswa dalam menyelesaikan soal cerita materi FPB dan KPK serta bertujuan untuk mendeskripsikan kemungkinan faktor penyebab terjadinya kesalahan yang dilakukan siswa kelas IV sekolah dasar dalam menyelesaikan soal cerita FPB dan KPK berdasarkan langkah penyelesaian Polya. Sehingga jenis penelitian yang digunakan adalah penelitian jenis penelitian deskriptif kualitatif dengan jumlah sampel sebanyak 4 orang (2 orang siswa perempuan dan 2 orang siswa laki-laki). Analisis data dalam penelitian ini dilakukan dengan teknik reduksi data, penyajian data, dan penarikan kesimpulan. Adapun hasil penelitian yang dilakukan menunjukkan bahwa terdapat empat jenis kesalahan siswa kelas IV sekolah dasar dalam menyelesaikan soal cerita materi FPB dan

KPK berdasarkan langkah penyelesaian Polya yaitu kesalahan memahami soal, kesalahan menyusun rencana, kesalahan melaksanakan rencana, dan kesalahan memeriksa kembali solusi yang diperoleh.

ABSTRACT

This research was conducted based on the existing problems, the student's lack of ability when solving math story questions about FPB and KPK material. This study analyzes the types of student's mistakes in solving the FPB and KPK material story questions. In addition, it also aims to describe the possible causes of errors made by fourth-grade elementary school students in solving FPB and KPK story questions based on Polya's completion steps. Completing a story-based problem consists of four stages: understanding the problem, compiling a plan, implementing the plan, and re-checking the solution obtained. The research uses a qualitative approach with descriptive research. The method used is the method of testing and documentation. The results of the study show that there are four types of errors of fourth-grade elementary school students in solving the FPB dan KPK material story questions based on Polya's solving steps, errors in understanding the questions, errors in planning, errors in implementing the plans, and errors in checking the solutions obtained. The possibility of students making mistakes in solving story problems is due to internal factors (within the students themselves), including haste and inaccuracy of students in the process.

1. Introduction

Mathematics is one of the important subjects in education because mathematics is a basic science that is widely used in various fields of life (Pravitasari, 2020). In Indonesia's education curriculum, mathematics is one of the subjects taught at the basic education level to the high school level. It is motivated because mathematics subjects are considered capable of providing provisions for students to have the ability to solve problems, think critically, logically, and creatively in facing all kinds of challenges in the era of globalization like today (Dwi Ariyanti et al., 2019; Wulandari et al., 2020). Permendikbud nomor 58 about Guidelines for Mathematics Subjects and Permendikbud nomor 21 about Standard Content, states that there are various benefits from learning mathematics, especially in elementary

schools: 1) to help students use thinking and reasoning skills in problem-solving, 2) to communicate ideas effectively, 3) to have attitudes and behaviors that are following mathematical values, such as obeying principles, being consistent, upholding agreements, respecting differences of opinion, being conscientious, creative, and open. (Firdaus et al., 2019).

Learning mathematics in elementary schools is a subject that can provide learning experiences for children in terms of mathematics according to their developmental stages, which are integrated into two categories, low class and high class. In low-class mathematics, learning is integrated into thematic learning, which is linked to other relevant subjects. In high-class mathematics, subjects are presented separately (Widyastuti & Pujiastuti, 2014). One of the activities in learning mathematics is solving story questions. According to Raharjo et al., (2009), story questions are presented in a short story. The story that is told can represent everyday life problems or other problems (Ifanali, 2014). Giving math questions in the form of stories provides experiences for students to solve math problems by describing the relationship of these problems in everyday life (Saputri, 2019). This story problem can be related to various problems.

Much material is included in the scope of numbers, including material on the KPK and FPB. KPK and FPB learning is useful in everyday problems. An example of KPK material in everyday life is when determining the concurrent time between activities. Examples of FPB material in everyday life are usually used to solve cases, such as determining how many bags or bags are needed to wrap a package and the greatest value that can be got. The learning materials for the Corruption Eradication Commission and the FPB have similarities. At the beginning of the solution, they determine the multiplication score to prime numbers' powers using a factor tree. This similarity makes FPB and KPK materials taught in a series (Rodliyah et al., 2018).

However, in reality, students can still not solve story questions related to the KPK and FPB properly at the elementary school level. It is based on observations made during apprenticeship activities in two different elementary schools. The results of observations in two different schools showed the same result is the lack of students' ability to solve math story questions about FPB and KPK material. Students feel that the story about FPB and KPK material is difficult. When solving FPB and KPK story questions, mistakes are often found. Suppose the mistakes experienced by students are allowed to drag on. In that case, it will cause low student learning outcomes in the KPK and FPB material. Besides, that students will also have difficulties in applying teaching material at school in their daily life. One of the procedures used in solving the KPK and FPB story questions is the Polya procedure. Polya procedure is a problem-solving procedure that is carried out to find a way out of a difficulty, achieving a goal that cannot be achieved immediately (Ifanali, 2014). The problem-solving stage using the polya procedure consists of 1) identifying the problem, 2) preparing the completion plan, 3) the implementation stage of the completion plan, 4) evaluating the results and solutions. The use of polya procedures in solving story problems related to the KPK and FPB does not rule out students' problems in the learning process. It is necessary to analyze student errors on KPK and FPB story questions, considering that mathematics education itself has a role to play. It is very important because mathematics is a basic science widely used in various fields, including the Corruption Eradication Commission and the FPB, which is useful in daily problems and the relevance of FPB KPK materials next level of education.

The research that will be carried out is relevant to several previous studies, such as research conducted by Wulandari et al., (2020), which states that there are various kinds of problems experienced by students during the learning process of mathematics, such as feeling bored and afraid when learning mathematics and the low learning outcomes of students' mathematics. Next is the research conducted by Panggabean & Tamba (2020), which states that students experience problems with the initial knowledge so that learning difficulties occur when there is a conflict between the initial knowledge and the knowledge to be learned. Research conducted by Pradini (2019) where the results of his research show that errors occur at every indicator of Polya's problem-solving stage. Students' types of errors are fact errors, procedural errors, and mistakes due to carelessness. The causes of these errors include students' limited reading comprehension skills, students have not been able to identify relevant information in story problems, students are not used to working on story problems, time management is not good, and students have not mastered the math material needed to solve story problems properly.

Based on the description of mathematics learning and its pattern of procedures, this study aims to determine the types of errors made by students and determine possible factors that cause students to make mistakes. To facilitate the analysis of students' mistakes in solving story problems, the researcher used the error classification based on the George Polya resolution procedure. The results of this analysis research can illustrate the mistakes made by students in solving FPB and KPK story questions based on polya procedures so that educators can find the right solution to overcome the mistakes made by students so that the learning process can run optimally. The relevant research that supports this research is

research conducted by Nur Rofi'ah (Rofi'ah et al., 2019) to analyze students' errors in solving math story problems based on the steps to solve the pattern.

2. Method

This study aims to determine students' errors and determine the possible factors that cause students to make mistakes. The type of research used is descriptive research using a qualitative approach. According to Creswell (Murpratiwi, 2016), qualitative research aims to reveal a problem and develop it in detail to understand the phenomenon center of a problem. This study revealed students' mistakes in solving the KPK and FPB story questions. Students selected as research subjects were fourth-grade students, four students, two male students, and two female students. According to Polya's criteria, the subject's determination was based on students who were identified as having errors in solving math problems on FPB and KPK material.

This study's data collection methods included: (1) the main method in the form of tests. The researchers gave the test time to students for three days on 22 April - 25 April 2020. The questions were 30 questions, but in the distribution, each student does ten questions consisting of 5 FPB story questions and 5 KPK story questions, so each student works on a different question but with the same type of question. The indicator is solving FPB and KPK story questions related to everyday life. The test analyzes students' mistakes in solving FPB and KPK story questions based on Polya's procedures. (2) According to (Sugiyono, 2016), documentation can be in the form of writings, drawings, or monumental works of a person. In this study, the documentation used was all archives in the form of answer sheets in solving questions that students had worked on regarding FPB and KPK story questions.

Furthermore, this study's data analysis techniques were: (1) data reduction, which means selecting the main things and focusing on the important things. (2) data presentation, by displaying the data, it will be easier to understand what happened and plan the next work based on what has been understood. (3) drawing conclusions, answering problem formulations that were formulated from the start (Sugiyono, 2016).

3. Result and Discussion

This study analyzes the problems experienced by elementary school students with errors in solving FPB and KPK story questions based on Polya's procedures. Based on the results of tests that have been carried out on students, students' types of errors based on the polya procedure can be seen in table 1.

Table 1. Types of Student Error Based on Polya Procedure.

No.	Polya Procedure	Students Error	Students name
1.	<i>understanding problem</i>	a) Students make mistakes in understanding the meaning of the reading, which results in the students being wrong in determining what numbers the FPB and KPK should look for, b) Students do not write down the complete data that is known or asked in the questions.	Ninda, Brilly, Andin
2.	<i>devising a plan</i>	a) Students made mistakes in determining the strategy used to have used the KPK strategy but were resolved with the FPB strategy. b) Students made mistakes in determining the strategy used to have used the FPB strategy but were resolved with the KPK strategy. c) Students do not determine the strategy used. d) Many students made mistakes in determining strategies in the variation of FPB questions that divided equally.	Arya, Brilly, Andin, Ninda

No.	Polya Procedure	Students Error	Students name
3.	carrying out the plan	a) Students determine the FPB score with the KPK procedure. b) Error in performing the division count operation.	Arya, Andin
4.	looking back	a) They do not continue his work to write the conclusion sentence obtained from the completion of the problem that has been done	Arya, Brilly, Ninda

Based on table 1. it can be seen that in solving story questions related to the KPK and FPB there are still many errors experienced by students based on their polya procedures. It can be seen at the stages of each of the existing procedures. First, at the stage of understanding the problem, students still make mistakes in understanding the meaning of the reading, resulting in the students being wrong in determining what numbers the FPB and KPK have to look for, and students do not write complete data, which is known or asked in the question. Second, at the planning stage, there were about four mistakes made by students, such as wrong in determining the strategy used where the KPK strategy should be used, but it was resolved with the FPB strategy, wrong in determining the strategy used which should use the FPB strategy but resolved with the KPK strategy. Students do not determine the strategy used and mistakes in determining the strategy in the variation of FPB questions that divide equally. There were two mistakes in the three stages of carrying out a problem-solving plan: errors in using procedures (the product used was reversed) and errors in carrying out the division calculation operation. The fourth stage is the reexamination stage. At this stage, students tend not to continue their work to write the conclusion sentences obtained from completing the questions that have been done.

Problem analysis was carried out by analyzing each variation of the questions carried out by students. In this study, there were eight different variations of the questions. In the first variation of questions, the FPB and KPK material questions are presented with the following variations:

1. Fourth Grade students consist of 12 male students and 18 female students. The class will be formed into several groups, with each group consisting of as many male and female students. What groups can be formed?
2. The futsal groups of fourth-grade and fifth-grade students practice on the same court. Fourth-grade futsal groups practice every six days, while fifth-grade futsal groups practice every four days. If on 7 February 2016 they train together in the same field, what date will they train together again?

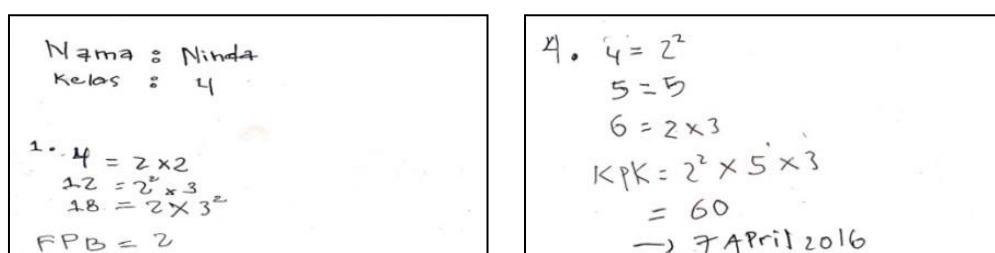


Figure 1. Ninda's answer for Number 1 and Number 4

In figure 1. it can be seen that the student named Ninda made a mistake in understanding the meaning of the reading of the story problem that was presented and did not write down the information that was known in the story problem. However, Ninda was correct that Figure 1 could be solved by looking for the biggest common factor (FPB). In contrast, Figure 2 can be solved by looking for the smallest association multiple (KPK). In Figure 1, it can be seen in the results of the student's work named Ninda, who was fooled by the number 4, which was written at the beginning of the sentence, so that Ninda wrote down the numbers 4, 12, and 18 to then look for the greatest common factor (FPB). In contrast, in number 4, it can be seen that Ninda was fooled on number 5 so that Ninda writes down all the numbers contained in the story problem 4, 5, and 6 to then look for the multiples of the smallest association (KPK), this causes the final answer that is not correct in solving the story problem. In line with the results of research conducted by (Tobondo, 2014), the student has understood the concept that he must use to answer but is still wrong in determining what numbers the KPK and FPB should look for presented in the form of a story.

Not only did Ninda not complete the complete data that was known or asked about in the story questions presented. Other students named Brilly and Andin did not include what information was known or asked in the questions. The student named Arya wrote down in full what information was known and asked, but only two numbers. The difference in data presentation between one student and another is due to these students' low interest and reading ability. According to research by Tuohimaa, Aunola, and Nurmi (Putri, 2017) It is explained that the students' low reading ability affects students' understanding of the story problem, thus causing the final answer that is not correct in solving the story problem. According to (Untari & Saputra, 2016), the reader's intellectual level is another factor influencing reading comprehension. Putri (2017) explained that students are said to understand the problem characterized by the student's ability to explain the questions' content, such as the known information and what is asked in the questions. Suppose students cannot state what information is in the questions and what is being asked. In that case, the student is said to have made a mistake in understanding the problem. Next, Nurussafa'at et al., (2016) state that the factors that cause student errors in language include: (a) assuming that writing what is known is not very important because it is clear what is being asked in the questions, (b) considers that writing what is being asked will waste time and be more concise if not written, (c) not being careful and hasty in reading the questions, resulting in mistakes in writing what is known. In addition, according to the research results (Komarudin, 2016) The factors that cause students to make mistakes in understanding this problem are students who are not used to writing the information contained in the questions, students do not understand how to interpret information on questions in the form of operational mathematics. It happens because students cannot understand the meaning of the questions, so they cannot translate the questions into their own sentences.

Variations of the second question are presented with story questions with the KPK material as follows:

- Two students are running on a circular track. The first student can complete 1 round in 50 seconds, while the second student can complete 1 round in 60 seconds. They start running from the starting point at the same time. At what second did the two students meet again at the starting point for the second time?

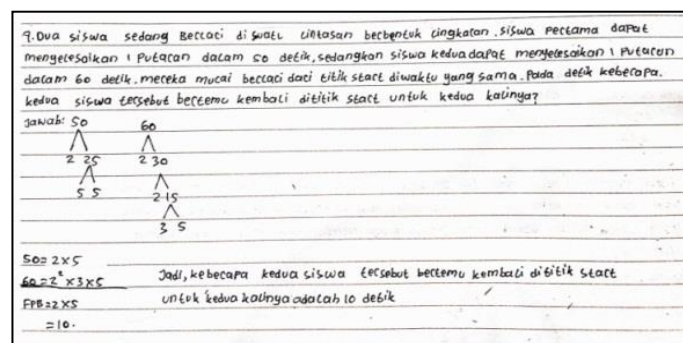


Figure 2. Andin's Answer for Number 4

In Figure 2. you can see the error in planning the problem. A student named Andin made a mistake in planning a math problem, determining the strategy or method to be used. This problem should be solved by using the smallest multiple of associations (KPK). It can be seen from the results of student work that Andin did not write down what information he knew and asked. Instead, he answered the questions directly after that Andin used the factor tree to determine the prime factorization of 50 seconds and 60 seconds. After obtaining the prime factorization, Andin converts it into the multiplication of prime number exponents. Then Andin determines the FPB score by determining the same number with small power and then multiplying it. The number is 2 x 5 the result is 10. If you pay attention, Andin's questions and answers in Figure 3, presented, have an error in determining the strategy or method used. However, in the settlement procedure, determining the greatest common factor (FPB) score is correct. Errors in determining the strategy or method used to lead to incorrect final answers in solving story problems.

In the third variation of the questions, FPB material questions are presented with the same variations, but the problems are different:

4. Brother has 28 stems of roses and 35 stalks of chrysanthemums. The flowers will be arranged in the same number of flower vases. (a) How many vases do you need? (b) How many roses and chrysanthemums are in each vase?
5. Bibi bought 15 apples and 20 mangosteens. The fruit will be served on the plate in equal quantities. (a) How many plates are needed to serve the fruits? (b) How many apples and mangosteen are in each plate?

6) $28 \begin{matrix} \wedge \\ 2 & 14 \\ & \wedge \\ & 2 & 7 \end{matrix}$ $35 \begin{matrix} \wedge \\ 5 & 7 \end{matrix}$ FP $28 = 2^2 \times 7$
 $35 = 5 \times 7$
 FPB = 7
 B = 7

6) $28 \begin{matrix} \wedge \\ 2 & 14 \\ & \wedge \\ & 2 & 7 \end{matrix}$ $35 \begin{matrix} \wedge \\ 5 & 7 \end{matrix}$ FP $28 = 2^2 \times 7$
 $35 = 5 \times 7$
 KPK = $2^2 \times 5 \times 7$
 $= 4 \times 5 \times 7$
 $= 20 \times 7$
 $= 140$
 A = 140

Figure 3. Brilly's Answer for Number 6.

7. $15 \begin{matrix} \wedge \\ 3 & 5 \end{matrix}$ $20 \begin{matrix} \wedge \\ 2 & 10 \\ & \wedge \\ & 2 & 5 \end{matrix}$ FP
 $15 = 3 \times 5$
 $20 = 2^2 \times 5$
 @KPK = $3 \times 2^2 \times 5 =$
 @FPB = $2^2 = 4$

Figure 4. Arya's Answer for Number 7

Students' answers to questions number 6 and 7 in the third variation found errors made by students named Brilly and Arya. Brilly and Arya made a mistake in planning a math problem, determining the strategy or method to be used. In line with the research results (Murpratiwi, 2016), there were student errors in determining problem-solving. The questions should have been solved using FPB, but students instead finished using the KPK strategy. In question number 6 (a), which Brilly worked on, asked about the number of vases your brother needed. In number 7 (a) Arya asked about the number of apples and mangosteen in each plate, it should be in question number 6 (a), or 7 (a) is solved using the greatest common factor (FPB). However, Brilly and Arya solve it using the KPK strategy. In the work results, Brilly and Arya did not write down what was known and what was asked in the question but instead answered the question directly. After that, Brilly used the factor tree to determine the prime factorization of 28 rosebuds and 35 chrysanthemums. Arya used the factor tree to determine the prime factorization of 15 apples and 20 mangosteens. After obtaining the prime factorization Brilly and Aryan convert it to a multiplication of prime numbers exponentially. Then Brilly and Arya determine the LCM score by

multiplying all numbers. If there are numbers that are the same, then a greater power is sought. The number Brilly wrote down is $2^2 \times 5 \times 7$, the result is 140, while the number written Arya is $3 \times 22 \times 5$ the result is not written. If you pay attention, Brilly and Arya's questions and answers in Figure 4 and Figure 5 are presented with errors in determining the strategy or method used. However, in the settlement procedure, determining the multiple of the greatest association (KPK) is correct. Errors in determining the strategy or method used to lead to incorrect final answers in solving story problems. In addition, Brilly and Arya also made mistakes in determining the strategy or method used. In problem number 6 (b), which Brilly did, and question number 7 (b), which was done by Arya, the strategy or method used by Brilly and Arya was to find the greatest common factor (FPB). The strategies or methods used in questions 6 (a) and 6 (b) as well as in questions 7 (a) and 7 (b) are interrelated. In solving problem 6 (b) and solving problems in 7 (b), the FPB should be sought as in questions 6 (a) and 7 (a) the FPB results from 28 rose stalks and 35 chrysanthemum flowers, as well as the FPB, results from 15 apples, and 20 mangosteens were used as dividers to determine the number of roses and chrysanthemums in each vase and to determine the number of apples and mangosteen in each plate. If errors in planning strategies have been made in numbers 6 (a) and 7 (a), then questions number 6 (b) and 7 (b) will also be wrong.

In the variation of the questions, the four students named Ninda also made mistakes in planning problems. Ninda was unable to determine the advanced strategy used in solving the story problems so that the questions presented were not worked on. The FPB questions were presented with the following variations:

6. Father bought 12 shirts and eight pants. The items will be given to orphaned children. Each child receives the same number of T-shirts and pants. (a) How many children will receive a gift from Father? (b) How many T-shirts and pants does each child receive?
7. Bibi bought 15 apples and 20 mangosteens. The fruit will be served on the plate in equal quantities. (a) How many plates are needed to serve the fruits? (b) How many apples and mangosteen are on each plate?

3. $12 = 2^2 \times 3$
 (A) $8 = 2^3$
 FPB = 2^2
 $= 4$
 (B)

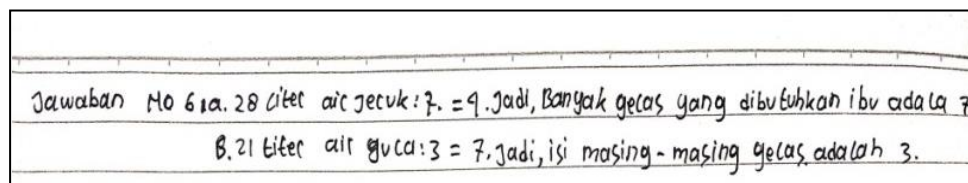
Figure 5. Ninda's answer for Number 3.

7. $15 = 3 \times 5$ (B)
 (A) $20 = 2^2 \times 5$
 FPB = 5

Figure 6. Ninda's answer for Number 7

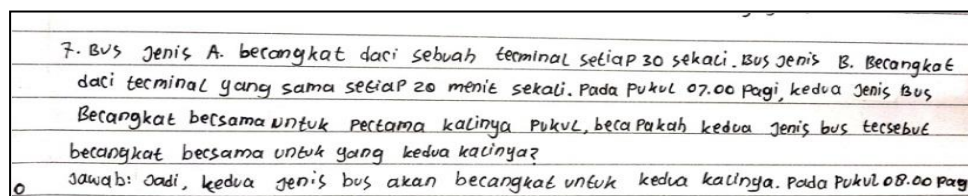
Figures 5 and 6 show that Ninda's answer is correct in determining the strategy used in questions number 3 (a) and 7 (a). In question 3 (b) what is asked is the number of shirts and pants received by each child, while the question asked in 7 (b) is the number of apples and mangosteen on each plate. In this case, Ninda cannot determine what strategy is used, so Ninda does not do it. Furthermore, at the stage of planning the problem, the student named Andin also made a mistake in determining what strategy or method was used in the fifth variation question number 6 and 7, but the answer was straightforward. In the fifth variation, the FPB and KPK questions are presented as follows:

8. The mother will mix 28 liters of orange juice and 21 liters of sugar water in glasses to serve evenly. How many glasses do you need? How many liters does each glass contain?
9. Bus type A departs from a terminal every 30 minutes. Bus type B departs from the same terminal every 20 minutes. At 07:00 a.m., the two types of buses depart together for the first time. At what time did the two types of buses depart together for the second time?



Jawaban No 6 a. 28 liter air jeruk : 7 = 4. Jadi, banyak gelas yang dibutuhkan ibu adalah 7.
b. 21 liter air gula : 3 = 7. Jadi, isi masing-masing gelas adalah 3.

Figure 7. Andin's Answer for Number 6



7. Bus jenis A berangkat dari sebuah terminal setiap 30 sekali. Bus jenis B. Berangkat dari terminal yang sama setiap 20 menit sekali. Pada pukul 07.00 pagi, kedua jenis bus berangkat bersama untuk pertama kalinya. Pukul berapa kedua jenis bus tersebut berangkat bersama untuk yang kedua kalinya?
Jawab: Jadi, kedua jenis bus akan berangkat untuk kedua kalinya pada pukul 08.00 pagi.

Figure 8. Andin's answer for Number 7

In line with research conducted by (Mamay Meilani, 2019), students were still confused in planning to solve questions, whether to use FPB or the KPK. There are still students who have not been able to or have forgotten how to determine the KPK and FPB. According to Wade and Travis (Murpratiwi, 2016) states that in psychology, forgetting due to similarities is an interference. The theory of interference states that the cause of memory loss is interference between objects of similar information, both in the storage process and in the recall process. The factors that cause student errors in planning problem solving are students find it difficult to understand the concept. Often students are given formulas. Students can use these formulas if the questions are presented in mathematical form (Tobondo, 2014). Meanwhile, when the questions were presented in the form of a story, most students found it difficult to understand the concepts used in their completion. The factor that causes errors in the planning step for problem-solving is a lack of accuracy and knowledge of the prerequisite materials related to the problems provided (Rofi'ah et al., 2019). The sixth variation is presented about FPB with the following variations:

10. Mom has 24 cheesecakes and 30 donuts. The cookies will be put into boxes. If each box contains the same number of cheesecakes and donuts, how many squares do you need?
 11. Nugi has 28 red marbles, 30 blue marbles, and 50 green marbles. He kept the marbles in equal parts tins. How many cans does Nugi need to store the marbles?
- A student named Arya made a mistake in carrying out the planning in questions 6 and 10.

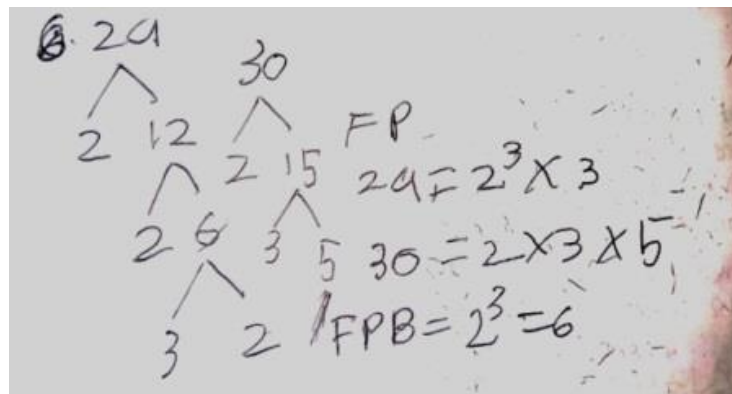


Figure 9. Arya's Answer for Number 6.

In Figure 9, it can be seen that the error in carrying out the planning in questions 6 and 10 was carried out by a student named Arya. In Arya's work, it is appropriate to use a strategy or method of the greatest common factor (FPB). However, in determining the FPB score in question number 6 Arya made a mistake in determining the same number with large power, 23. In addition, Arya also did not write the same number. It can be seen from Arya's prime factorization besides number 2. There are also numbers 3. As explained by (Pujiati, 2011) To determine the FPB with a prime factorization of several numbers, it can be done by multiplying the same prime factors of these numbers and the least power. The FPB in this question should be $2 \times 3 = 6$. Errors in determining the same numbers and their ranks can affect the final incorrect answer in solving the story problem.

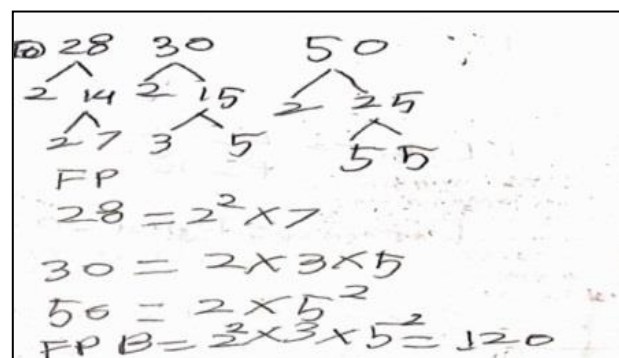


Figure 10. Arya's Answer for Number 10

Furthermore, in question number 10 Arya was correct in determining the problem-solving plan. The strategy used to solve the problem was to find the greatest common factor (FPB). The mistake Arya made was an error in implementing the problem-solving plan. It can be seen from the results of Arya's work, after obtaining the prime factorization, Arya converts it into the multiplication of rank prime numbers then Arya determines the score of FPB using the KPK settlement procedure. According to (Pujiati, 2011) In determining the KPK by using prime factorization, it can be done by multiplying the different factors. If there are common factors, the largest rank is taken. The FPB written by Arya is $2^2 \times 3 \times 5^2$. In determining FPB according to (Pujiati, 2011) with a prime factorization of several numbers, it can be done by multiplying the prime factors of the same numbers and the least power. The correct FPB is 2. In line with the research results (Murpratiwi, 2016), some students determine the score of FPB with the KPK procedure and determine the KPK with the FPB procedure. A variation of the seventh question is presented on the FPB question with the following variations:

12. Ibu Siti bought 70 pens, 60 picture books, and 90 notebooks. These items were distributed to several students. If each student gets the same share in both number and type, how many students get the most items?

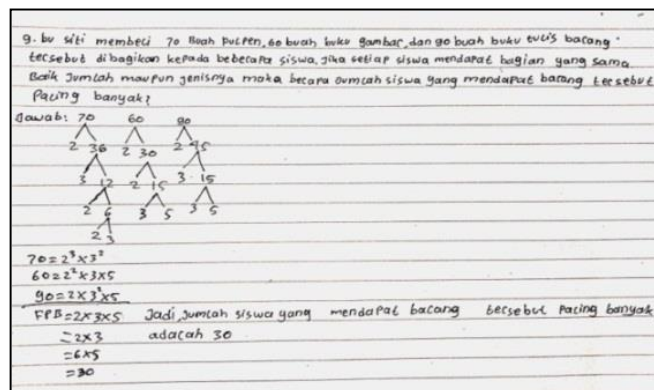


Figure 11. Andin's answer for Number 10

In Figure 11, it can be seen that for question number 10, Andin was correct in determining the problem-solving plan. The strategy used to solve this problem was to find the greatest common factor (FPB). The mistakes made by Andin were errors in implementing the problem-solving plan in carrying out the division count operation and using the wrong FPB settlement procedure. Andin uses the factor tree to find the prime factorization of 70, 60, and 90. It can be seen that in the factor tree 70 Andin does the wrong division operation. It should be $70 : 2 = 35$, while Andin writes $70 : 2 = 36$. It can affect the error of the answer to the final result. In addition, Andin also made a mistake in using the FPB settlement procedure. In Figure 11, after obtaining prime factorization, Andin converts it to a multiplication of exponential prime numbers. Andin determines the score of FPB by determining the number with small power. The error in the FPB settlement procedure, in this case, is that Andin multiplies different factors, determining the FPB according to (Pujiati, 2011) is done by multiplying the equal prime factors of these numbers and the least power. The FPB written in Andin's answer is $2 \times 3 \times 5 = 30$, while the correct FPB should be $2 \times 3 = 6$.

Factors that cause student errors in the step of implementing the problem-solving plan according to (Andita & Putri, 2018): a) students are less careful in the calculation process, b) students' hasty attitude in doing, c) students' confusion in doing it, because of the impact of the wrong student work from the start. This is due to the lack of understanding of students on other material related to calculations, students tend to rush in solving problems. Runtukahu and Kandou (Rofi'ah et al., 2019) state that students' early mathematical abilities in the form of counting skills, students' initial knowledge of the concept of addition, and so on, should have since the age before school, which plays an important role in students' ability to complete planning. Error in rechecking step. The analysis results in this study, the mistakes that were still mostly made by students, were not writing the conclusion sentence obtained from solving the questions that had been done. It happens because of an error in including what was asked to understand the problem, so it causes an error in the problem-solving step, especially the degree of checking again. Student errors in the previous steps also affect errors at this stage, so that students draw wrong conclusions. The following is an example of one of Arya's, Brilly, Ninda's jobs, which did not write down the concluding sentences obtained from the completion of the questions that had been worked out, which were presented in the sixth variation of the questions, as for the FPB and KPK questions as follows:

4. Ani and Desi tutoring math in the same place. Ani tutoring every three days and Desi tutoring every 4 days. If today they are tutoring together, when will they be tutoring together again next?
8. Two decorative lights in green and blue in a garden are installed with different lighting times. The green light flashes every 4 seconds, and the blue light lights up every 5 seconds. If at 10:00 o'clock the two lamps were lit simultaneously for the first time, what time did the two lamps turn on together again for the second time?
9. There are two different lengths of rope that will be cut into equal lengths. The length of the first rope is 8m, and the second rope is 12m. What is the longest piece of rope that can be obtained from the two ropes?
10. Pak Ahmad has 15kg of rice, 60 eggs, and 45 packs of noodles. These foodstuffs will be distributed to neighbors in the same amount and type. How many neighbors get the most food from Pak Ahmad?

Handwritten work for Figure 12:

$$\begin{array}{l}
 5 \cdot 4 \\
 \wedge \\
 2 \quad 2
 \end{array}
 \quad
 \begin{array}{l}
 3 \\
 \wedge \\
 1 \quad 3
 \end{array}
 \quad
 \begin{array}{l}
 FP \\
 4 = 2^2 \\
 3 = 1 \times 3 \\
 KPK = 2^2 \times 1 \times 3 = 12
 \end{array}$$

Figure 12. Arya's Answer for Number 5.

Handwritten work for Figure 13:

$$\begin{array}{l}
 8 \cdot 4 = 2^2 \\
 5 = 5 \\
 KPK = 2^2 \times 5 \\
 = 20 \\
 \rightarrow 10.00 + 20 = 10.20
 \end{array}$$

Figure 13. Ninda's Answer for Number 8.

Handwritten work for Figure 14:

$$\begin{array}{l}
 8 \quad 12 \\
 \wedge \quad \wedge \\
 2 \quad 2 \quad 2 \\
 \wedge \quad \wedge \\
 2 \quad 3
 \end{array}
 \quad
 \begin{array}{l}
 FP \ 8 = 2^3 \\
 12 = 2^2 \times 3 \\
 FPB = 2^2 \\
 = 4
 \end{array}$$

$$\begin{array}{l}
 15 \quad 60 \quad 45 \\
 \wedge \quad \wedge \quad \wedge \\
 3 \quad 2 \quad 3 \quad 15 \\
 \wedge \quad \wedge \quad \wedge \\
 2 \quad 3 \quad 3 \quad 5 \\
 \wedge \quad \wedge \\
 2 \quad 3
 \end{array}
 \quad
 \begin{array}{l}
 FP \ 15 = 3 \times 5 \\
 60 = 3 \times 2^2 \times 5 \\
 45 = 3^2 \times 5 \\
 FPB = 3 \times 5 \\
 = 15
 \end{array}$$

Figure 14. Brilly's Answers for number 9 & 10.

Based on figures 12, 13, and 14, it can be seen that Arya, Ninda, Brilly are correct in finding the score of FPB and KPK from two numbers. They are also correct in using FPB and KPK procedures. The mistakes made by them were only up to the process of finding FPB and KPK and not continuing their work to write down the concluding sentences that were obtained from the completion of the questions that had been done. It happens because of an error in including what was asked in the step of understanding the problem. In line with the research results (Nurul Farida, 2015), almost some students did not write conclusions. According to (Hartini, 2008) the factors that cause errors in this step are a) the student feels quite familiar with what he is writing so that he does not write complete information in the conclusion of the answer, b) the student's inaccuracy in observing what is being asked in the question he is trying to solve, c) the student is in a hurry in solving questions, d) students' difficulties in solving and finding answers to questions. According to (Nurul Farida, 2015), In this step, the cause of the mistakes made by students is that students tend to want to abbreviate answers and are not used to writing conclusions from an answer.

Based on the analysis of students' errors in solving story problems using the polya procedure, an appropriate solution is needed. Students' mistakes are not repeated in the following questions. One

solution that can be used to minimize student errors in solving math story problems is remedial teaching. According to (Ridha, 2014) remedial teaching is a form of healing, correcting, or making it good. In remedial teaching, students who experience difficulties causing errors in solving story problems can be healed, corrected, or corrected to achieve the expected results according to their abilities. The healing or repair process can be prolonged or short. In addition to remedial teaching, minimize student errors in solving math story problems by providing independent problem exercises. Giving questions for students at home or homework aims so that students want to learn independently. They are overcoming student laziness and so that students are willing to practice. Apart from that, it is also to teach responsibility for students. Giving homework to students directly to hone students' memory, so they don't immediately forget the material they have just learned. Another solution can be done by paying special attention to students who have difficulty providing guidance or approaching students. Students are invited to a discussion to make it easier to determine what difficulties students are experiencing to be given input or given teaching to solve them.

4. Conclusion

In general, it can be concluded that fourth-grade students' form of errors in solving the FPB and KPK material story questions based on Polya's procedures: 1) errors in understanding the problem. Students make mistakes in understanding the meaning of the reading, resulting in the students being mistaken in determining what numbers the FPB and the KPK must look for. Students do not write down the complete data that is known or asked in the questions. 2) errors in planning problem solving (devising a plan); students made mistakes in determining the strategy used, which should have used the KPK strategy but was resolved with the FPB strategy, students made mistakes in determining the strategy used which should use the FPB strategy but resolved with the KPK strategy, students do not determine the strategy used but just answer it directly, and many students make mistakes in determining strategies in variations of FPB questions that share equally. 3) errors in carrying out the problem-solving plan (carrying out the plan): students determine the score of FPB using the KPK procedure and errors in carrying out the division calculation operation. 4) errors in checking back (looking back): not continuing his work to write down the concluding sentences obtained from completing the questions that have been done. Internal factors are the possible causes for students to make mistakes in solving story problems, including students' haste in understanding the questions, students' inaccuracy in the calculation process, and a lack of knowledge about prerequisite material related to the problems provided. Solutions that can minimize student errors in solving math story problems are remedial teaching, providing independent question exercises, and giving special attention to students who have difficulty providing guidance or approaching students.

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