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Analysis Of Misconceptions In Fpb And Kpk Material For Students

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ABSTRAK
Siswa mengalami kesalahan pada penguasaan konsep meliputi tidak lengkap dalam menuliskan penyelesaian dan ketidakmampuan siswa untuk mengingat konsep sehingga siswa tidak menulis konsep yang digunakan dalam menyelesaikan soal FPB dan KPK. Tujuan penelitian ini adalah menganalisis mengenai jenis miskonsepsi dan penyebab miskonsepsi dalam materi FPB dan KPK pada siswa kelas IV. Jenis penelitian yang digunakan adalah kualitatif dengan pendekatan deskriptif dengan subjek penelitian yang diteliti adalah siswa kelas IV Sekolah Dasar. Jenis pengumpulan data yang digunakan adalah tes tertulis, wawancara dan dokumentasi. Hasil analisis mengenai miskonsepsi yang terjadi dalam materi FPB dan KPK pada siswa kelas IV sekolah dasar menyatakan bahwa siswa mengalami miskonsepsi terjemahan, miskonsepsi tanda, miskonsepsi hitung, miskonsepsi sistematik, miskonsepsi konsep dan miskonsepsi operasi. Adapun penyebab terjadinya miskonsepsi karena faktor dari siswa yang berkaitan dengan minat belajar karena sudah menganggap bahwa matematika merupakan pelajaran yang rumit, faktor dari guru yang tidak memberikan penjelasan secara mendalam terkait dengan materi FPB dan KPK, kondisi atau situasi didalam kelas yang menyebabkan subjek tidak bisa berkonsentrasi dan memperhatikan guru ketika memberikan penjelasan mengenai materi FPB dan KPK, pemahaman konsep siswa mengenai materi FPB dan KPK masih rendah serta prakonsepsi yang salah. Berdasarkan hasil penelitian, dapat disimpulkan bahwa jenis miskonsepsi yang terjadi pada siswa kelas IV adalah miskonsepsi terjemahan, miskonsepsi tanda, miskonsepsi hitung, miskonsepsi sistematik, miskonsepsi konsep, dan miskonsepsi operasi.

ABSTRACT
Students experience errors in the mastery of concepts, including incomplete writing solutions and students' inability to remember concepts. Students do not write the concepts used in solving FPB and KPK questions. This study aimed to analyze the types of misconceptions and causes of misconceptions in FPB and KPK material for grade IV students. This type of research is qualitative with a descriptive approach, with the research subject being fourth-grade elementary school students. Types of data collection used are written tests, interviews, and documentation. The analysis results regarding the misconceptions that occur in FPB and KPK material for fourth-grade elementary school students state that students experience translation misconceptions, sign misconceptions, arithmetic misconceptions, and systematic concept misconceptions, and operation misconceptions. The causes of misconceptions are due to factors from students related to interest in learning because they already think that mathematics is a complicated subject, factors from teachers who do not provide in-depth explanations related to FPB and KPK material, conditions or situations in the classroom that cause the subject to be unable to concentrate and pay attention to the teacher when giving explanations about FPB and KPK material, students' understanding of the FPB and KPK material is still low and wrong preconceptions. Based on the research results, it can be concluded that the types of misconceptions that occur in grade IV students are translation misconceptions, sign misconceptions, arithmetic misconceptions, systematic misconceptions, concept misconceptions, and operation misconceptions.

1. Introduction

Education has a very important role in individual self-development, nation, and state development. Efforts in education to obtain quality human resources are through mathematics education, provision of mathematics subjects in elementary schools intended to recognize, respond to and appreciate science and technology, and instill habits of critical, creative, and independent thinking and scientific behavior (Ariestika et al., 2015; Hignasari & Mardiki, 2020; Jatmiko, 2015). Mathematics

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learning is a teaching and learning process that the teacher builds to develop students' creative thinking (Cahyono et al., 2018; Retnowati & Aqiila, 2017; Sari et al., 2020).

Mathematics consists of facts, skills, concepts, and principles connected. Learning mathematics must have a strong basic concept so that the learning process at the next grade level becomes easier (Asnita, 2016; Ningsih, 2016; Rizta & Antari, 2018). Understanding concepts can be defined as students' ability to understand scientifically, theoretically, and their application in everyday life (Ariswati, 2018; Hafriani, 2019; Saraswati et al., 2013).

One of the mathematical concepts taught in elementary schools is related to Faktor Persekutuan Besar (FPB) dan Kelipatan Persekutuan Kecil (KPK). However, it is considered difficult in mathematics and wants to be avoided (Fitri, 2020; Pramana et al., 2014; Yulianto et al., 2020). Mathematics is a difficult subject. Most students do not understand the concepts in the material being taught (Harsanti, 2018; Krisnayanti et al., 2017; Rahmadani et al., 2018).

The initial observation proved this on March 17 2020 at one of the State Elementary Schools located in Sukorejo District in the fourth grade. Researchers saw student learning outcomes in mathematics. Some students had not met the minimum completeness criteria set by the school, namely 70.00. Researchers found 19 out of 28 fourth-grade students who scored less than the KKM when evaluating FPB and KPK material in mathematics subjects. In addition, the results of interviews with fourth-grade teachers stated that the causes of evaluation scores that did not meet the KKM scores included a lack of conceptual understanding of FPB and KPK material. In addition, in working on the questions, students experienced errors in the calculation procedure and process. Some students still have difficulty determining a number because they cannot memorize the multiplication, so that these students have difficulty determining the KPK and FPB from a number.

Fatal if the student, especially the teacher, has a wrong or inaccurate understanding of a certain mathematical concept or a misconception. Misconceptions are wrong concepts, wrong classification of examples, the chaos of different concepts, and hierarchical relationships of incorrect concepts that someone understands. It happens because students experience concept mastery errors, including incomplete writing solutions and students' inability to remember concepts. Students do not write the concepts used in solving FPB and KPK questions (Fais et al., 2019; Priyanti et al., 2016; Rustinah, 2016).

Misconceptions that occur are influenced by habits in cases, the influence of preconceptions (which are mostly based on the meaning of everyday language), and also wrong learning resources. Efforts to tackle misconceptions of mathematics at the elementary school level are urgently needed because mathematical concepts at the elementary school level are fundamental concepts for learning various concepts in the next material or mathematics at the next level. It is expressed by (Irni, 2016; Sardin & Rajab, 2017; Yensy, 2020) that ongoing misconceptions, if not handled properly and resolved as early as possible, will cause problems in further learning. Therefore, researchers researched to analyze FPB and KPK material misconceptions during the mathematics learning process.

This research is supported by several relevant studies such as (1) research conducted by (Irni, 2016), the results of the research that the use of simple materials as a teaching aid for the basket of factors affected improving mathematics learning outcomes on FPB and KPK material; (2) research conducted by (Sardin & Rajab, 2017), the results of the research that the problem-solving approach to students could improve the mathematics learning outcomes of the KPK and FPB material; (3) research conducted by (Yensy, 2020), research results that the use of props affects determining the KPK and FPB of an integer.

The purpose of this research is to analyze the types of misconceptions and causes of misconceptions in Faktor Persekutuan Besar (FPB) and Kelipatan Persekutuan Kecil (KPK) in fourth-grade students at SD Negeri 1 Sukorejo.

2. Method

This study uses a qualitative approach with descriptive methods. The place where the research was carried out was SD Negeri 1 Sukorejo. This research aims to analyze the types of misconceptions and causes of misconceptions in FPB and KPK material for fourth-grade students.

Subjects used in this study amounted to 28 students who took the test and selected seven student subjects who were interviewed and analyzed their work results. Interview activities are carried out to obtain verbal statements about students' results or answers regarding the given test.

Data collection techniques in this study are observation, test data, and interviews. This technique was implemented to collect data on the types of misconceptions and causes of misconceptions in FPB and KPK material for fourth-grade students at SD Negeri 1 Sukorejo.

The data analysis techniques used were data reduction, data presentation, and conclusion drawing. In this study, the researcher described what had been researched, namely the criteria and causes of misconceptions in fourth-grade students of SD Negeri 1 Sukorejo on FPB and KPK material.

3. Result and Discussion

The research results on fourth-grade elementary school students obtained an average score that is still below the KKM. From the 28 students, ten students fulfilled the KKM, which 18 students did not reach the KKM. The average result of the students' test scores if they were accumulated in one class was 62.64, and these results still did not meet the minimum completeness criteria. Researchers chose seven students subjected to be interviewed and viewed the work data of students who had errors. The interview subjects in this study are presented in Table 1.

Table 1. Subjects for the interview

Student Code	Score
S27	30
S6	20
S20	20
S19	40
S18	38
S7	34
S24	50

Regarding the results of the analysis of misconceptions or errors experienced by seven selected subjects, six types of misconceptions were found, namely translation misconceptions, sign misconceptions, arithmetic misconceptions, systematic misconceptions, concept misconceptions, and surgery misconceptions. The indicators of misconception can be seen in Table 2.

Table 2. Types of Misconceptions

Types of Misconception	Misconception Indicators
Misconceptions of translation	Students have an error converting information into mathematical expressions.
Misconception of signs	Students experience errors in giving or writing signs, operations, or notations.
Misconception of arithmetic	Students calculate errors in mathematical arithmetic operations such as addition, subtraction, multiplication, and division operations
Systematic Misconceptions	Students experience errors and are incomplete in writing down the steps in solving problems.
Misconceptions of Concepts	Students are not able to connect the concept of material that should be used.
Operation Misconceptions	Students make mistakes in writing mathematical operations.

The analysis results that had been carried out on the seven subjects showed that the distribution of misconceptions occurred in each of the questions given. The results of the analysis of misconceptions for each question are presented in Table 3.

Table 3. Analysis of types of misconceptions on FPB and KPK material.

Question Number	Question indicator	Types of Misconception
1.	Determine the factor of a number	Systematic Misconceptions, Translation Misconceptions, Sign Misconceptions and Concept Misconceptions
2.	Find the common factor of two numbers.	Concept Misconceptions, Translation Misconceptions and Sign Misconceptions

Question Number	Question indicator	Types of Misconception
3.	Identifies prime numbers from a set of numbers.	Misconceptions of Concepts and Misconceptions of Translation
4.	Determine the prime numbers from the set of numbers.	
5.	Determine the Kelipatan Persekutuan Kecil (KPK) of two numbers.	Misconceptions of Concepts and Misconceptions of Translation
6.	Faktor Persekutuan Besar (FPB) of two numbers.	Systematic Misconceptions and Count Misconceptions
7.	Faktor Persekutun Besar (FPB) of two numbers.	Systematic Misconceptions, Calculation Misconceptions and Operation Misconceptions
8.	Determine the Small Guild Multiplier (LCM) of two numbers.	Systematic Misconceptions, Calculation Misconceptions and Operation Misconceptions
9.	Solve story questions related to FPB.	Systematic Misconceptions, Calculation Misconceptions and Operation Misconceptions
10.	Solve story problems related to the KPK.	Systematic Misconceptions, Calculation Misconceptions and Operation Misconceptions

The data source for the fourth-grade students of SD Negeri 1 Sukorejo, the misconceptions experienced by seven subjects occurred in all concepts of FPB and KPK material, namely the concept of determining the factors of a number, prime number, the Faktor Persekutuan Besar (FPB) and the Kelipatan Persekutuan Kecil (KPK). Misconceptions are found in each mathematics learning concept.

First, determining the factor of a number, it is found that the concept misconception that occurs in questions 1 and 2 can be seen in Figure 1.

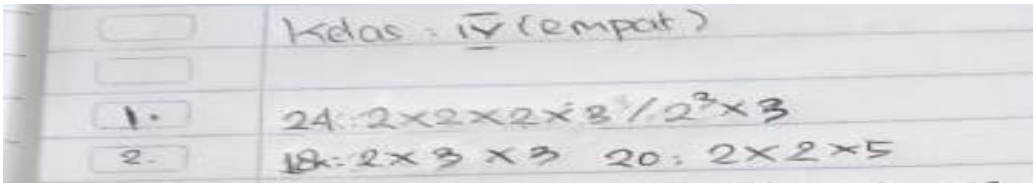

Figure1. Concept misconceptions that occur in questions 1 and 2

Figure 1 shows that there is a misconception in the factor material of a number. The factor of a number is a number that can evenly divide that number. The question that represents this concept is question number 1. Systematic misconceptions occur in S20 subjects who do not completely write down the factors of the numbers requested. The subject S6 also experienced a systematic misconception because S6 only wrote a factor of 24, which is 1,2,3,4. Subject S27 experienced concept misconceptions and translation misconceptions in question number 1. Subject S27 wrote the factor of 24 as 2 x 2 x 2 x 2 x 3 or 2^3 x 3, which is written S27 is not a factor of a number but prime factorization. Conceptually correct factors of 24 are 1, 2, 3, 4, 6, 8, 12, 24.

Problem number 2 presents two numbers, namely 18 and 20. The subject is asked to write down the factors of these numbers. Conceptually the factor 18 is 1, 2, 3, 6, 9, 18 and the factor 20 is 1, 2, 4, 5, 10, 20. Misconceptions of concepts and re-translation occur in question number 2, Subject S27 writes answer 18 = 2 x 3 x 3 and 20 = 2 x 2 x 5. The answer written by subject S27 is the prime factorization. Subject S6 wrote down the answers 1,2,3, and 1,2,4. The answer written on the subject S6 is vague and imprecise. Subject S19 answered 18 = 2 x 3 x 3 = 2 x 3^2 and 20 = 2 x 2 x 5 = 2 x 2 x 5 = 2^2 x 5. This answer is a prime factorization. Subject S18 answered with an incorrect answer because it only wrote the factors 18 and 20 = 2. The misconception of signs also occurred because the subject had an error writing a sign or an operation that should have used a comma. Second, there is a misconception in determining prime numbers in questions 3 and 4. It can be seen in Figure 2.

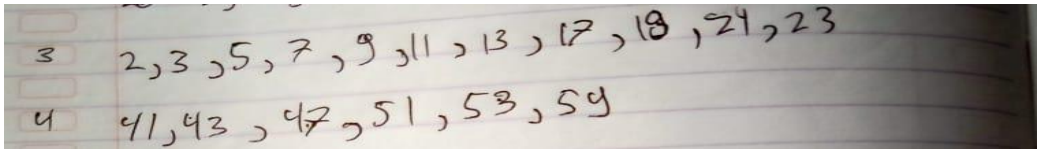

Figure 2. Misconceptions that occur in questions 3 and 4

The questions that represent this concept are numbers 3 and 4. In Figure 2, question number 3, students are asked to identify prime numbers from a collection of numbers 1-30. According to the concept of prime numbers in question is 2,3,5,7,11,13,17,19,23,29. Subjects S7, S20, S24, S6, S27 experience a misconception because they write numbers not included in prime numbers. Misconceptions of translation also occur in this number problem because they experience errors in translating in mathematical form.

Concept misconceptions also occur in question number 4, Subject S7, S18, S20, S24, S6, S27 write numbers that are not included in prime numbers. Prime numbers have a value of more than 1 and have 2 divisors, namely 1 and the number itself, so if there is an original number with more than two factors, it is not included in prime numbers.

Third, determine the Faktor Persekutuan Besar (FPB), for questions 6, 7 and 9 are questions that represent the concept of the Faktor Persekutuan Besar (FPB). FPB is the common factor of the numbers with the greatest value. When determining FPB, there was a misconception in questions 6 and 7, as shown in Figure 3.

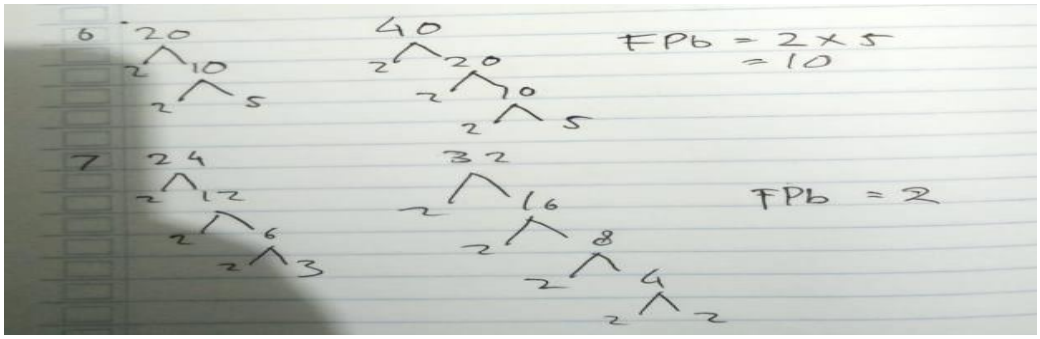

Figure 3. Misconceptions that occur in questions 6 and 7

Figure 3 shows that the subject has written the completion steps using the factor tree. The steps have not been written completely, and the subject also experienced errors in determining the FPB. It proves that the subject experienced systematic misconceptions and operational misconceptions in questions number 6 and 7. Questions number 6 and number 7 subject experienced systematic misconceptions because S7, S18, S20, S6, S27, S19 did not write down the complete completion steps and right. The misconception of counting and operations also occurs in questions 6 and 7 because the subject has written down the work steps, but in the final calculation, there is an error.

Problem number 9 is presented with a story question whose solution uses the FPB concept. Students also experienced misconceptions of translation and conceptual misconceptions in this number. Subject S7, S18, S20, S24, S6, S27, S19 did not write down incomplete and correct completion steps. Can be seen in Figure 4.

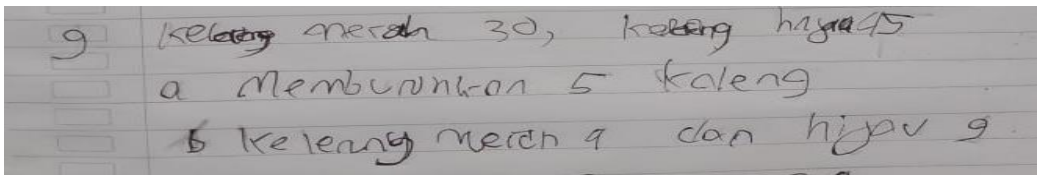

Figure 4. Misconceptions that occur in question number 9

Figure 4 above shows that the subject did not write down the complete steps for determining FPB, and when confirmed through the interview, the subject did not know the steps to solve it. Fourth, when calculating the Kelipatan Persekutuan Kecil (KPK), there is a misconception of the operation in question number 8, as shown in Figure 5.

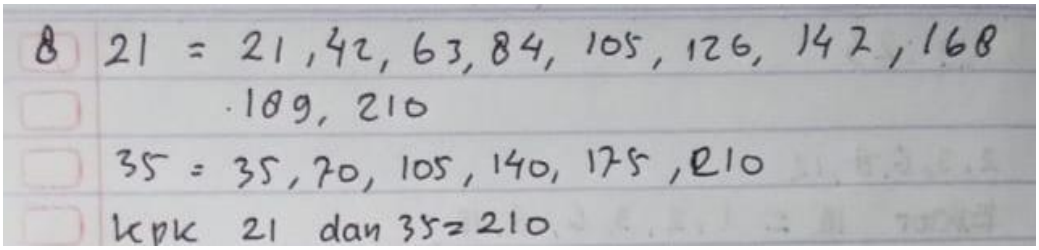

Figure 5. The operation misconception that occurs in question number 8

Figure 5 above shows the subject experiencing a misconception of operations in question number 8. Questions 5, 8, and 10 are questions representing the Kelipatan Persekutuan Kecil (KPK) concept is the common multiple of numbers with the smallest value. The subject has written the steps by sorting multiples of numbers from the specified questions, namely 21 and 35, but in determining the final result of the Corruption Eradication Commission, subject S24 experienced an error by writing down the KPK from 21 and 35 is 210. In determining the KPK, the smallest or lowest multiple of results was taken, namely 105. Subjects S7, S20, S6, S27, S19 experienced systematic misconceptions in questions number 5 and 8 because they did not write down the complete and correct completion steps. Subjects S18 and S24 experienced misconceptions of operations and misconceptions of counting because they had written the work steps, but in the final calculation, they experienced errors.

Problem number 10, the concept of multiples of the small group (KPK), was developed into a story problem. There were subjects S7, S18, S20, S24, S6, S27, S19 who experienced systematic misconceptions because they did not write complete and correct settlement steps, and when confirmed through interviews, the subject does not know how to proceed. Students usually experience this misconception because they do not understand the initial concept of the teacher's material. The misconceptions that occur in question number 10 can be seen in Figure 6.

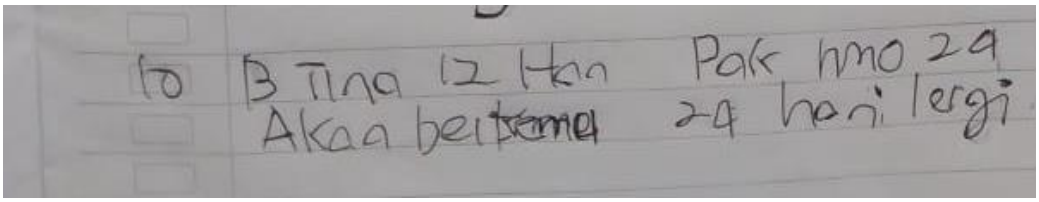

Figure 6. Misconceptions that occur in question number 10

Misconceptions are caused by several factors, namely factors from students, factors from teachers, and other factors, namely student learning environment. The results of the interviews conducted with seven subjects found that the student factors were: (1) students considered mathematics to be a difficult and boring subject to learn so that the material presented by the teacher was not fully understood; (2) students consider the FPB and KPK material to be complicated material to study, this causes the students' understanding of the FPB and KPK material to be low and wrong preconceptions arise. Apart from that, the teacher's factors were: (1) the learning process was not varied so that sometimes students tended to be bored; (2) teachers who do not provide in-depth explanations related to FPB and KPK material. As Hendikawati said (Retnowati & Aqiila, 2017; Rizta & Antari, 2018; Sari et al., 2020), the teacher as a facilitator is obliged to deliver the subject matter that is easily understood by students and can be conveyed in a fun way. Factors that can influence are parents or study companions who also affect students' learning process at home. One of the subjects said that when he got an assignment from the teacher, he only got the results without explaining the steps. According to (Ariswati, 2018; Krisnayanti et al., 2017; Rahmadani et al., 2018), a teacher should motivate students to be more

enthusiastic about learning both at school and home. Colleagues who like to joke make students unable to fully concentrate and pay attention to the teacher when explaining FPB and KPK material.

Constructivist learning can also be used to minimize misconceptions. The constructivism approach is considered effective because it can improve mathematical understanding, so students can easily learn mathematical material at the next level (Fais et al., 2019; Pramana et al., 2014; Rustinah, 2016). Elementary school students should have good mathematical connection skills so that mastery of mathematical concepts between one material and another is excellent, can solve mathematics problems, and appreciate mathematics in real life. To be able to increase the learning activities and creativity of students in elementary school mathematics, problem-solving learning is needed so that students are actively involved in learning activities and can think creatively in solving existing problems (Kuswari & Resiman, 2019; Purwanti, 2017; Rahmadani et al., 2018).

This research is supported by several relevant studies such as (1) research conducted by (Irni, 2016), the results of the research that the use of simple materials as a teaching aid for the basket of factors affected improving mathematics learning outcomes in FPB and KPK material; (2) research conducted by (Sardin & Rajab, 2017), the results of the research that the problem-solving approach to students could improve the mathematics learning outcomes of the KPK and FPB material; (3) research conducted by (Yensy, 2020), research results that the use of props affects determining the KPK and FPB of an integer.

4. Conclusion

This research concludes that the types of misconceptions that occur in fourth-grade students of SD Negeri 1 Sukorejo are translation misconceptions, sign misconceptions, arithmetic misconceptions, systematic misconceptions, misconceptions of operations, and causes of misconceptions in fourth-grade students of SD Negeri 1 Sukorejo, namely the lack of in-depth explanation related to FPB and KPK material, conditions or situations in the classroom that cause the subject to not concentrate so that students' conceptual understanding of FPB and KPK material is still low and wrong preconceptions.

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