Jurnal Ilmiah Mandala Education (JIME)
Vol 10 No. 4 Oktober 2024
p-ISSN : 2442-9511, e-2656-5862
DOI: *10.58258/jime.v10i4.7586/http://ejournal.mandalanursa.org/index.php/JIME*

Analysis Of Misconceptions In Mathematical Problem Solving Integer Counting Operations Class Iv Students Of SDN 3 Lape Sumbawa

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Article Info
Article history:
Accepted: 21 Oktober 2024
Publish: 25 Oktober 2024

Keywords:
Media Learning
Poerpoint Interactive
Anerstanding Concept
Mathematic

Abstract
This research aims to describe and analyze students' misconceptions in mathematics subjects, material for counting whole number operations, Class IV SDN 3 Lape Sumbawa. The type of research used is descriptive qualitative research. The research was conducted in class IV of SDN 3 Lape Sumbawa with a population of 25 students. The subjects consisted of 2 students randomly sumpling. The instruments used in this research were test questions, interview guidelines and also wide range of observations. The data analysis techniques in this research are as follows: 1) data reduction; 2) data presentation; and 3) withdrawal. The results of the research are that students' misconceptions are different in each question number. In Figure 1 there are misconceptions in grouping and performing arithmetic operations on multiplication. In Figure 2 there is an error in the concept of calculating addition and subtraction. In Figure 3, students have misconceptions about the concept of mixed multiplication calculation operations which are operated with repetition calculation operations. In Figure 4, students' misconceptions regarding multiplication calculation operations are students' misconceptions regarding the operation of multiplication and subtraction calculation operations. Misconceptions occur due to two factors; 1) The first factor is because students interpret new experiences or concepts, 2) The second is because of the emotional and intellectual feelings that have been attached to students, so students find it difficult to accept new concepts that are different from students' understanding.

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1. INTRODUCTION

Education is one aspect of national development in making the nation's life more intelligent, the success of implementing education cannot be separated from the success of educational staff in implementing educational activities. The aim of education in general is to direct students to be independent in living their lives. Students are able to understand scientific concepts and are able to apply their knowledge in life, which is one of the learning objectives. One field of study that has an important role in the world of education is mathematics. Especially on mathematical concepts. Mathematics has been used in everyday life to solve problems in life, but it is not uncommon for students to still find it difficult [1] in understanding mathematical concepts, this gives rise to students' misconceptions because mathematical material is usually interconnected. Students' misconceptions about previously discussed topics should be dispelled before introducing new topics [2]. Misconceptions are systematic errors that lead students to correct results in previous situations, but lead students to wrong solutions in the future [3] Lack of concept learning can also cause difficulties in learning concepts, students who have not been able to organize their knowledge well will find it difficult to learn new knowledge. Students can make mistakes that give rise to misconceptions about students' mathematics subjects [4]

Developments related to children's mathematical understanding have been considerable over the past few decades. Knowledge of understanding mathematical concepts has been enriched by a combination of research. Students experience difficulty in understanding the abstract nature of mathematics, resulting in the emergence of misconceptions about the material being studied. so that it can hinder their motivation and performance in these subjects [5] Students who experience misconceptions make it more difficult for students to accept new lessons [6]. Student misconceptions can be identified by interpreting questions asked by students or answers [7]. This requires teachers to be able to interpret student answers well and identify misconceptions. Determining misconceptions by asking quality questions. Teachers who have the skills to pay

attention to students' misconceptions can manage the educational process better [8]. Misconceptions result from a lack of understanding or in many cases misapplication of mathematical 'rules' or generalizations [9] The learning that occurs is one-way learning, where students construct their knowledge only from what they hear and see from one source. Students cannot check again if there is an error in the concept conveyed by the teacher because of the limited learning resources they have. This is one source of student misconceptions.

Misconceptions among students occur due to various things, such as; errors originating from the students themselves, the text textbooks used, teachers who teach not according to the context of the material and educators' way of teaching which has not been able to hinder the mastery of subsequent material concepts [10] so it is difficult for them to accept new conceptions because misconceptions are resistant to the entry of new, more scientific ideas which ultimately hinder the achievement of understanding the material. [11] Misconceptions are still a problem in learning at school [12] Misconceptions can hinder the process of accepting and assimilating new knowledge within students which has an impact on student success in the world of education. Misconceptions for students are very dangerous because they will give students continuous thoughts and feelings of guilt in understanding the concept so that there is a barrier to understanding between the previous wrong concept and the new concept . Misconceptions can continue until the next lesson if one misunderstands the concepts taught by the teacher, the errors experienced result in unclear knowledge because students have an incorrect understanding of certain concepts. Students' understanding of concepts will be hampered by misconceptions in students' mathematical solutions. It is necessary for teachers to deal with misconceptions that occur so that they do not affect subsequent understanding of the material.

Students' mathematical problem solving in Indonesia is classified as very low [13]. Problem solving abilities are very important for every student because (a) problem solving is the general goal of teaching mathematics, (b) problem solving which includes methods, procedures and strategies is the core and main process in the mathematics curriculum, and (c) problem solving is an ability basic in learning mathematics Problem solving is a thinking ability that requires a stage of thinking. Students are required to have the ability to combine rules and concepts that have been obtained previously. Problem solving is the focus of mathematics learning. In order to improve problem solving abilities, it is necessary to develop skills in understanding problems, creating mathematical models, solving problems, interpreting solutions. Mathematics learning should begin with the introduction of problems that are appropriate to the situation (contextual problems). By posing contextual problems, students are gradually guided to master mathematical concepts [14].

According to Polya, there are four aspects of problem-solving ability as follows:

1. Understanding the problem. The aspect of understanding the problem involves deepening the problem situation, sorting the facts, determining the relationship between the facts and formulating problem questions. Every written problem, even the easiest one, must be read several times and the information contained in the problem studied carefully.

2. Create a problem solving plan. The solution plan is built by considering the structure of the problem and the questions that must be answered. In the problem solving learning process, students are conditioned to have experience applying various kinds of problem solving strategies

3. Implement a problem solving plan. To find the right solution, the plan that has been made must be implemented carefully. Diagrams, tables or sequences are constructed carefully so that the problem solver will not be confused. If inconsistencies arise when implementing the plan, the process must be reviewed to find the source of the problem.

4. Look (check) again. During checking, solutions to the problem must be considered. The solution must still be suitable [15]

Previous research conducted by the first researcher showed the results that 3 selected students had misconceptions about quadratic equations with a percentage of misconceptions for students with high abilities (KT) being 17%, including the low category, misconceptions for students with medium abilities (KS) 27% including the medium category, and 41% of students with low ability (KR) have misconceptions in the high category of misconceptions. The location of the misconceptions experienced by students is in restating concepts, classifying objects according to certain properties in accordance with the concept, giving examples of a concept, using and exploiting and choosing certain procedures or operations and applying concepts or algorithms to problem solving. Next, research is related to misconceptions [16] revealed that students experienced misconceptions about algebraic forms. Next, these misconceptions are overcome by using analogy strategies and guided discovery methods. This method is adapted to the misconceptions experienced by each student. After the misconceptions were overcome, students were given written algebraic tests and interviews and the results were that students did not experience any more misconceptions about algebraic forms. As well as [17] shows that: (1) the percentage of students who understand the concept is 42.664%, the percentage of students who have misconceptions is 43.996%, and the percentage of students who do not know the concept is 13.328%, (2) the types of misconceptions that occur among students in solving problems in the material Algebraic arithmetic operations are as follows: Misconceptions of concepts, Misconceptions of strategy, Misconceptions of systematics, and Misconceptions of arithmetic.

Misconceptions about arithmetic occur in integer arithmetic operations. This research explains students' misconceptions in performing whole number calculation operations. Integers consist of negative numbers, 0 and positive numbers. There are two misconceptions; 1) misconceptions in interpreting terms, concepts and principles. Indicators of misconceptions are the following, theorems, or definitions that do not comply with the prerequisite conditions for the application of the formula, theorem, or definition. a) Do not write formulas, theorems or definitions to answer a problem. (2) Procedural errors are errors in arranging systematic hierarchical steps to answer a problem. Indicators of procedural errors according to Kastolan are as follows: b) Non-hierarchy of steps in solving problems, c) Errors or inability to manipulate steps to answer a problem

Based on the results of interviews and initial observations with class VI IV teachers at SDN 3 Lape Sumbawa, they said that when students studied mathematics, the material for counting whole number operations, students still experienced conceptual errors. This can be seen from the results of interviews between teachers and several students. By paying attention to the results of initial observations and various differences in the results of previous research, the researcher is interested in conducting research regarding the analysis of students' misconceptions in mathematics subjects, material for calculating integer operations, Class IV SDN 3 Lape Sumbawa..

2. RESEARCH METHODS

This research aims to describe and analyze students' misconceptions in mathematics subjects, material for counting whole number operations, Class IV SDN 3 Lape Sumbawa. The type of research used is descriptive qualitative research. The research was conducted in class IV of SDN 3 Lape Sumbawa with a population of 25 students. The subjects in this research were 2 students selected by random sumpling. The instruments used in this research were the researchers themselves as the main instrument and the supporting instruments were tests, interview guidelines and also wide range of observations. Interview guidelines are used to find out what is not directly visible, to reveal hidden things that the audience does not know. In this research, the interviews used were unstructured interviews. The data analysis techniques in this research are as follows: 1) data reduction; 2) data presentation; and 3) drawing conclusions

3. RESULTS AND DISCUSSION

This research aims to analyze the misconceptions made by students in solving mathematical problems regarding integers. The data that will be presented includes test results, interviews and observations. The results of the research conducted contained students who had misconceptions. Lack of mastery of basic mathematics. In this case, especially the concept of integers, the material for integer counting operations. Such as operations on addition, subtraction and multiplication. For example, placing a negative sign still makes students feel wrong in solving it. The following is a question about the arithmetic operation of multiplying negative numbers: - 9 x -9 = 81 which makes students think that if a negative number is combined with a negative number then the result is positive.

3.1 RESULTS

a. Misconceptions in Test Question number 1

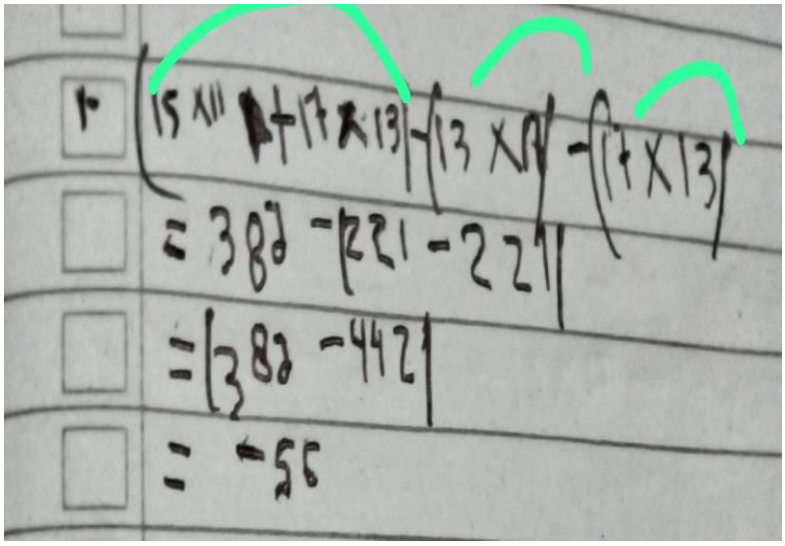

Figure 1. Mathematical problem solving carried out by C1

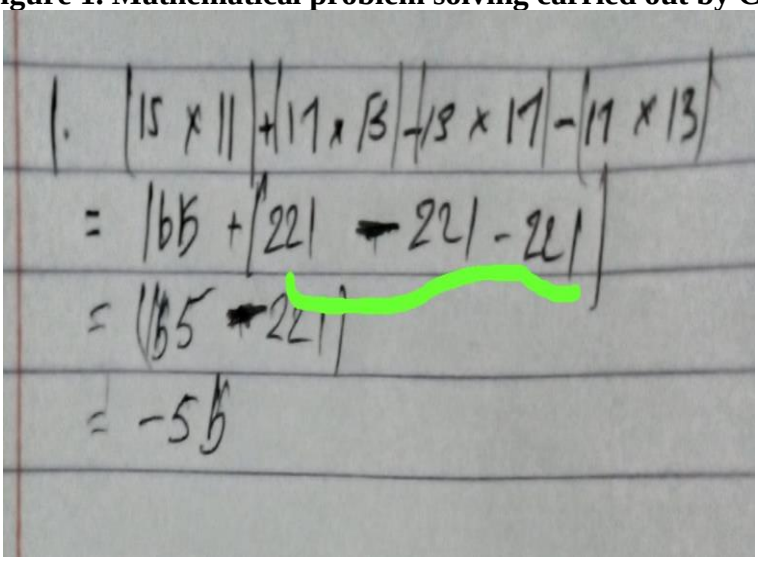

Figure 2. Mathematical problem solving carried out by C2

Students who are selected as subjects to know creative thinking abilities are coded with capital letters, namely subject one (C1) and subject two (C2).

• Results of interviews conducted at CI

Q : Do you understand question number 1?

C1: Yes ma'am, I understand

Q : Explain how you solve problems?

C1: I looked at the problem first because this is a teacher, I looked at it then I did 15x11+17x13 and combined it

Q : Why combined?

C1: That's the teacher first. Grouped, then do something else

• Results of interviews conducted at C2

Q: Do you understand question number 1?

C2: Yes ma'am, I understand a little

Q: Explain how you solve problems?

C1: I pay attention to multiplication first, then addition, then subtraction, ma'am. I did the multiplication first. I grouped the ones first

Q: Why combined?

C1: Because multiplication is stronger, Mom, so I multiplied everything first. I just added and subtracted. Well, finally I got the results, Mom

b. Misconceptions in Test Question number 2

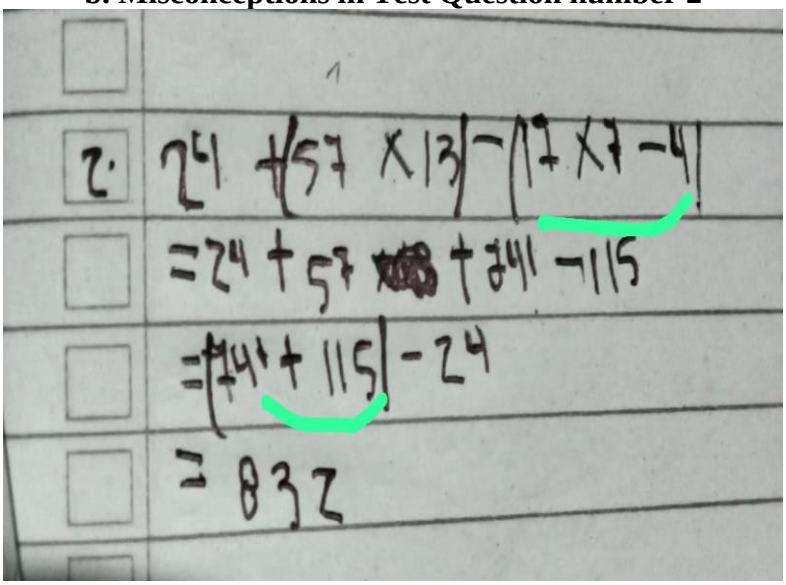

Figure 3. Mathematical problem solving carried out by C1

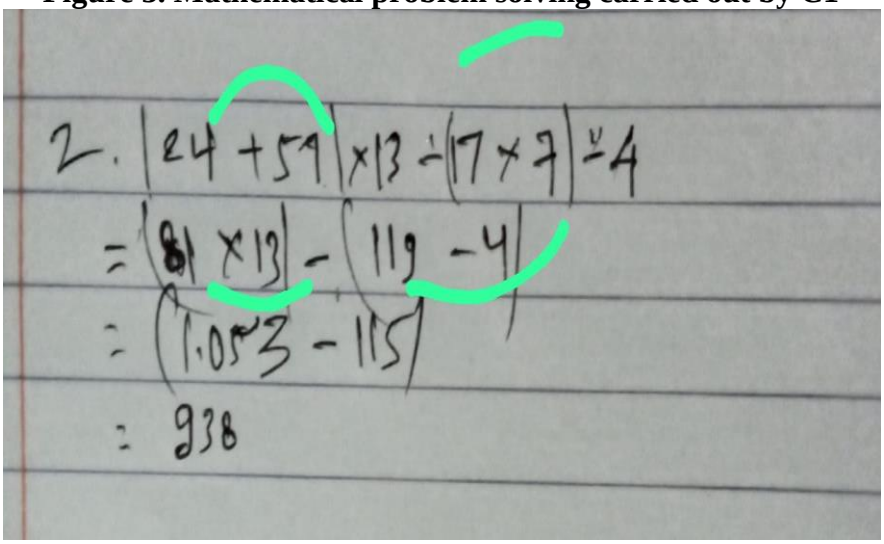

Figure 4. Mathematical problem solving carried out by C2

• Results of interviews conducted at CI

Q: Do you understand question number 2?

C1 : Yes ma'am, I understand

Q: Explain how you solve problems?

C1: I put them together, combine the same ones ma'am, I do the combined multiplication first, namely (57x13) then I do (17x7-4)

Q: Why combined?

C1: Because I look at the multiplication first, then I do the one next to it. Basically, multiplication is stronger, teacher, then addition and subtraction

• Results of interviews conducted at C2

Q: Do you understand question number 1?

C2: Understand a little, mother

Q: Explain how you solve problems?

C1: What is done first is the number that is combined, the one with the curly braces ma'am. Combine it into several parts. Adjacent numbers

Q: Why combined?

C1: Because that's what I understand, ma'am. So I worked on the new group I worked on. Pay attention first and complete what is combined.

3.2 DISCUSSION

Misconceptions are also interpretations of concepts in a statement that are unacceptable. Misconceptions are inaccurate understanding of concepts, use of wrong concepts, incorrect classification of examples, confusion of different concepts and incorrect hierarchical relationships of concepts. Misconceptions are very disturbing in learning because they will cause misunderstandings. The low quality of learning in general is caused by students' misconceptions and learning conditions that do not pay attention to students' preconceptions. Misconceptions greatly influence the learning process so teachers need to diagnose students' misconceptions so that teachers do not misinterpret students' misconceptions. Student misconceptions must be immediately identified and teachers must reconfirm the concepts that have been given so that misunderstandings do not occur again which will hinder the student's learning process.

Based on the explanation regarding the results, students' misconceptions are different in each question number. In Figure 1, there is a solution which is the first step in correct student work, namely by grouping and carrying out arithmetic operations on multiplication. In the second step, students made mistakes in the concept of mixed arithmetic operations, addition, subtraction. Where students group the numbers 221-221, even though the students' overall answers are correct, the students' understanding of the concept of mixed arithmetic operations is wrong. In Figure 2 there is an error in the concept of calculating addition and subtraction. Where students group and operate previous subtractions and then add them up, even though they find the final or correct value. In Figure 3, students have misconceptions about the concept of mixed multiplication calculation operations which are operated with repetition calculation operations.

In the final stage, students' misconceptions are that they operate or group additions first and then repeat them, which should not need to be grouped. Because the arithmetic operations of addition and repetition have the same strength with the assumption that addition and subtraction are equally strong. The student's argument is correct but students need to pay attention that when operated together with other forms of operations, addition and subtraction. In Figure 4, students' misconceptions about the multiplication arithmetic operation, where multiplication has more power than the arithmetic operations of addition and subtraction. However, in Figure 4, students first carry out arithmetic operations on addition, without paying attention to multiplication. Miss students' conception of the operation of multiplication and subtraction arithmetic operations. This is in line with the statement that the cause of misconceptions originating from students is caused by students who are still incorrect in assimilating and accommodating a concept.

1) Factors causing misconceptions originating from context are students' lack of learning experience in working on similar questions and students' feelings of fear/uncomfortability.
2) Coming from teachers, not mastering the material or not being competent, communication between students and teachers not going well, not graduates from the field of mathematics, not allowing students to express ideas. 2) From students, humanistic thinking, wrong intuition, students' cognitive development stage, incomplete/wrong reasoning, students' preconceptions or initial concepts, associative thinking, students' abilities, and students' interest in learning. 3) context, wrong discussion partners, wrong explanations from parents/other people, students' learning experiences, everyday language that is different from students' life contexts and feelings of happiness/displeasure, freedom or pressure 4). The causes of misconceptions originating from textbooks include incorrect explanations, students not knowing how to read textbooks correctly, writing formulas incorrectly, the difficulty level of writing books is too high for students. Other factors include misconceptions originating from teaching methods, including teaching methods that only involve lectures and asking children to take notes, providing material directly in the form of formulas without starting with how to get them, not revealing possible misconceptions that may occur in the material to be taught, and not correcting students' answers. Wrong.

Misconceptions occur due to two factors; 1) The first factor is because students interpret new experiences or concepts, 2) The second is because of the emotional and intellectual feelings that have been attached to students, so students find it difficult to accept new concepts that are different from their understanding. There are several causes of misconceptions in mathematics learning as follows. 1) Just learn simple numbers and shapes; 2) Students are not ready to receive mathematics material; 3) Computers cannot be used in mathematics-based learning 4) Mathematics is only intended for children with mathematical talents; 5) Just learn simple numbers and shapes; 6) Mathematics should not be taught as an independent subject; 7) Math assessments are not relevant to children; 8) Learning language and literacy is more important than learning mathematics; 9) Teachers must provide a quality learning environment; 10) Children learn mathematics only with concrete objects,

4. CONCLUSION

Students often misunderstand a concept or material in mathematics learning. Student misconceptions are different for each question number. In Figure 1 there are misconceptions in grouping and performing arithmetic operations on multiplication. In the second step, students made mistakes in the concept of mixed arithmetic operations, addition, subtraction. In Figure 2 there is an error in the concept of calculating addition and subtraction. In Figure 3, students have misconceptions about the concept of mixed multiplication calculation operations which are operated with repetition calculation operations. In Figure 4, students' misconceptions regarding multiplication calculation operations are students' misconceptions regarding the operation of multiplication and subtraction calculation operations. This is in line with the statement that the cause of misconceptions originating from students is caused by students who are still incorrect in assimilating and accommodating a concept.

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5. ACKNOWLEDGMENTS

Praise be to the presence of Allah SWT who has given us His mercy and grace so that this article can be prepared on time. Next, I would like to thank my supervisor and my beloved family, children and husband who I love who always provide endless support. Colleagues and my deepest thanks to the students and the school where I serve who helped make the completion of this article a success.

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