Research Article

Identification of the Difficulties of Middle School Students in Understanding the Mixed Operations of Integer

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Abstract.
The difference between the students' conceptions and the conceptual substance has led to a misconception regarding the mixed arithmetic operation on integers. This study aims to describe students' understanding and to identify learning difficulties related to the mixed operation of integers. This study was a qualitative study with a case study design. The subjects of the study were the students of grade VII of a junior high school in Bandung. The data collection was done through tests, interviews, and curriculum documents. Data analysis is descriptive in general by reposing data, presenting data, and drawing conclusions. From the results of the study, it can be concluded that students have difficulties in understanding the concept of integers and their operation, especially those related to the mixed operations of integers. Based on the data analysis, it can be shown that some students recognize numbers only as a formal symbol in mathematics. Numbers for them are something abstract so they have difficulty when they present these numbers in concrete. Another result is students have difficulty in using mixed operations of integers.

Keywords: difficulties of middle school students, mixed operations of integer, understanding.

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1. INTRODUCTION

Mathematics is one of the compulsory subjects of primary and secondary education. As listed in article 37 of the 2003 national education system, primary and secondary education should include: religious education, civic, language, mathematics, natural science, social sciences, cultural arts, physical education and exercise. Vocational training and local cargo. Math is also one of the subjects taught intensively, compared with other subjects in much more hours. Math, however, has become a subject that students do not like, and students tend to think of mathematics as a difficult subject. Moreover, Indonesia's mathematical achievements are still alarming. The quality of education in mathematics and science in Indonesia remains at a lower level [1].

At a moderate level, students have the ability to apply basic knowledge directly in various situations. The characteristic of the high-level student is that the student can use his understanding and knowledge in a variety of relatively complex situations. On the next level, students have characteristics capable of organizing information and drawing conclusions from it, generalizing and solving nonroutine problems. Indonesia's average value of only 386 is already ata lower level. Indonesia's low average score of mathematics shows that mathematical understanding of students is still low. This may indicate that math is not currently effective [1].

The learning difficulties a student faces may be caused by many factors [2]. Three factors cause learning difficulties (learning comprehension), which are ontogeni (mental readiness of learning), disabilities (resulting from teacher teaching) and epistemology (student knowledge that has a limited application context). In this case because of the epistemologists, students will experience learning difficulties, because students understand only the material given by the teacher, but do not understand the basic concept of the material, so students' knowledge is limited to what the teacher wrote [3]. This type of difficulty on the epistemological ological ological is more due to the limited context used at the time a concept was first studied [3].

Numbers are the principal concepts in math study [4]. The importance of the concept of Numbers shows that "number was believed in all forms of mathematics" [5]. This causes the concept of Numbers to be introduced and taught to students at an early age. One concept of Numbers to be taught is the concept of integer. In basic education, summation and round-number reduction are among the standards of ability students should possess [6]. On the next step, the concept of integer number will be taught back in seventh class vii with a competence for the properties of numbering operations and its use in problem solving [6].

Studies indicate that it is vital for students to master the concept of integer. The student who mastered integer material gained confidence in studying mathematics [7]. The concept of inteism also became the student's primary capital for better understanding other concepts like arithmetic and algebra [8]. If the student does not master the concept of integer, then the student will have difficulty on the next crane mathematics [9]. Students' ability and understanding of integers can be measured and evaluated in various ways, one with a written assessment (paper and pencil test) [10].

Written assessments are done by asking students a few questions so that students can write the answers to the question according to his or her ability to resolve the problem. Teachers can evaluate and analyze a student's answers so that teachers can draw conclusions about the student's ability and act on them[11].

The basic concepts under oath by students can influence to understand a higher level of abstraction. Research on learning difficulties experienced by students will provide a foundational picture in developing effective interventions in order to improve the quality of school teaching and mathematics, as well as for the development of science itself [12].

The importance of identifying students' difficulties especially in understanding the concept of mixed operations in this round number is expected to be a model for effective learning situations. As for the purpose of this study: 1) learning students' understanding of the meaning of a mixed number operation. 2) identifying students' difficulties in understanding the concept of a mixed number operation.

2. RESEARCH METHOD

The method of research used was qualitative work, while the design used was case studies. The design of this case study was the study of the complexity and complexity of one case, which later understood its activities in important circumstances. Like other qualitative research methods, case studies give a holistic view of the context. Case studies employ various qualitative research methods, such as test documents, interviews, and curriculum [13]. The subject of this study is 10 seventh graders. Researchers tried to delve into the student's difficulty from the concept understanding aspect because of the mixed operations materials of integer Numbers.

The study used the three-dimensional concept of negative Numbers as a guide to determining various indicators of difficulty [14] show in Table 1. These questions are designed to know the difficulties of the student interviewed in understanding negative Numbers, including prerequisite knowledge, spherical concept, the operating procedure for calculating integer Numbers, doctrinal understanding, and problem solving adapted from diagnostic instruments for difficulty learning mathematics [15].

3. RESULT AND DISCUSSION

Introducing whole Numbers to students requires them to alter a deep-rooted conception of previously awakened Numbers on the elementary school cranes [16]. When negative matter is given, there is a conceptual and procedural change involving knowledge, which involves less than zero. Most children who previously knew Numbers as being real to him would experience guilguiltions or imbalances in his cognitive thinking.

TABLE 1: Presentation of possible difficulties faced by students.

Source of Problem	Indicator
Prerequisite Knowledge	Unable to distinguish the type of set of numbers (natural numbers and whole numbers)
	Unable to distinguish between positive and negative integers
	Cannot perform simple arithmetic operations on integers
Understanding the concept of numbers	Unable to distinguish activities that represent integers from non-integers
	Cannot determine a number greater than two integers
	Unable to sort numbers and place numbers on the number line
	Cannot write the sign of the relationship between two numbers correctly
	Cannot represent integers in a context
	Unable to provide context examples representing integers
Operation procedure	Cannot perform arithmetic addition operations with integers
Mixed operations of integers	Don't understand the concept of inverse in addition
	Unable to determine unknown value in arithmetic operation
	Unable to perform arithmetic subtraction operations with integers
Principle understanding	Cannot express the difference between two integers
	Cannot determine the position of an object as a result of a count operation
	Cannot use the properties of integer arithmetic operations
Solution to problem	Unable to present a problem in everyday life in the form of mixed arithmetic operations and the right strategy to solve it

The study results of students' difficulty in understanding the mixed operations of the integer, there is a learning barrier that the respondents have on every aspect. The most common obstacle to the concept of a round number joint operation. Most respondents knew Numbers only as a formal symbol of mathematics but did not realize that daily activities are a manifestation of the number itself. The possible learning block is that the respondents are not accustomed to the context of revealing and interpreting integers in daily life. Numbers are abstract to them, so that when they reveal these Numbers in concrete, they will find a problem in translating them [17].

Over 50% of respondents can't represent negative Numbers in a context. This is because during this time students have been introducing the concept of Numbers as a real thing. The mark on the joint operation of the integer is a different negative and

positive number, which the student cannot imagine. The problem arises in understanding the symbol of Numbers in determining the strategy used to solve the problem, for the opposite symbol is more complex than the same symbol [18].

The arithmetic surgery process has the highest Numbers to cause problems. In this case, 95% of respondents can't complete the negative Numbers arithmetic reduction. Because their perception of teacher's explanation is an $a + (-b)$ this misconception is likely to be an $a - b$, The respondents translate positive and negative Numbers side by side, and the results are negative. The same $a - (-b)$. This false perception became a major problem in the arithmetic surgery of the person interviewed [19].

More than 85% of respondents have difficulty solving problems. The drawback was that the respondents could not translate the information in the matter so that they did not understand the correct arithmetic operating procedure to describe the problem. When they can understand the meaning, the main difficulty is determining the right strategy for solving the problem. The problem is most students cannot use a reduced operation to change context into negative Numbers. The student's obstacle to studying the mixed operation of a round number is their inability to manipulate and interpret negative Numbers because the number of objects around it is said to be positive numbers [20]. When students are faced with a integer operation involving negative Numbers, this is a cause for roadblock. The results of this study further demonstrate that, at 60.4% of respondents had difficulty providing a context example of a mixed number of operations.

When the problem solving strategy falls out of context, the respondents will choose the wrong procedure. Some students who can turn the problem into a suitable model may be wrong in determining a problem solution. Students' knowledge of arithmetic operations is limited, and the skill for applying the basic calculating process to a new problem is a reason why students cannot solve the problem [21]. Some studies carried out in Indonesia indicate that students' understanding of Numbers is still very low, especially in the calculating process [22].

This 11-year-old child has undergone the transition from concrete thought to abstract thought. As piaget points out, at this age children can begin symbolic operations, enhance abstract thinking, and have the intellectual potential for formal reasoning. Class student. The school is also undergoing a transition from an elementary school to a high school student. The student who initially thought arithmetic at this period now began to understand the concept of algebra by thinking more abstruse. Not surprisingly, understanding the abstract concept of a round - number operation became an obstacle

to students in itself. The process of building a bridge between these two will greatly help students to minimize the difficulties.

It is important for math teachers to understand the history of the mixed operating barriers of integer history to a better understanding of the student barrier in studying the concept. Identify students' learning difficulties in understanding the mixed operations of the integer, and let the teacher design the mixed operating learning of the integer as a follow-up through the correct teaching situation.

4. CONCLUSION

Judging from studies of student difficulties in understanding arithmetic mixed Numbers, the interviewed respondents had a learning disability in all aspects. A major obstacle arose in the concept of a round - sum operation. Most people interviewed simply consider Numbers as symbols in mathematics, and do not realize that everyday activities are themselves Numbers. The signs in the operation of the mixed integer are distinct negative and positive Numbers, which the students cannot imagine. The problem that arises when understanding the symbol of Numbers plays a role in determining the strategy used to solve the problem, since the opposite symbol is more complex than the same symbol. Such mistaken perceptions are a major problem in the arithmetic operation of the person interviewed.

The problem was that the respondents could not translate the information in the question, so they could not understand the correct arithmetic procedure to describe the situation. The problem is most students cannot use a arithmetic reduction operation to turn the context into a negative number. When students are faced with a integer operation involving negative Numbers, this is a cause for roadblock. Understandably, understanding the abstract concept of negative Numbers is an isolated obstacle for students. The process of building a bridge between these two will greatly help students minimize any difficulties that arise. Find out the students' learning difficulties in understanding the mixed integer operation, and let the teacher design a mixed integer operating learning as further learning through appropriate teaching situations.

Acknowledgments

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