THE ANALYSIS OF STUDENT'S MISCONCEPTION OF ALGEBRA OPERATION OF 8TH STUDENT OF SMP N 2 BANTUL BY USING CERTAINTY OF RESPONSE INDEX (CRI)

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ABSTRACT

The misconception is a condition where a student has a misunderstanding in comprehending a particular concept of what is meant to be. It raised when a student was gaining a new concept, namely in learning math, specifically in algebra operation. To know the misconceptions can be detected by using the Certainty of Response Index (CRI). This study aims to know the students' misconceptions and their causes in algebra operation of the 8^{th} grade of SMP N 2 Bantul. This study is qualitative research. The subject of the study is the 8^{th} grade of class C in SMP N 2 Bantul 2016/2017. The object of the study is the student's misconceptions in algebra operation. The data collection technique is in the form of a test based on the CRI and an interview. The data analysis used reduction, data presentation, and data inversion and verification. The results show that 53% of the students know the concept of algebra operation, 20% of the students only guesting, 15% do not know the concept, and 12% have misconceptions. Within the 12%, the misconceptions can be mention as follows (1) in the concept of formulating simple algebra and fraction algebra into its factors; (2) in the concept of the operation of addition, subtraction, multiplication, and division in the form of simple algebra and fraction algebra. The causes of this misconceptions are (1a) the student's low comprehension, (1b) the student's incomplete information, (1c) the student's low motivation to learn is not fully understood yet; (2a) the wrong intuition or opinion, (2b) The student's cognitive condition that remains in concrete.

Keywords: misconception, algebra operation, Certainty of Response Index (CRI)

INTRODUCTION

Mathematics is one of the subjects tested on the examination of the elementary school, SMP/MTs/equal, and SMA/SMK/MAN/equivalent. Several questions the national exam of mathematics subjects, there were 40 items of multiple choice. The time provided to work on the national exam maths problem is 2 hours or equal to 120 minutes. This means that one math problem must be done for 3 minutes to produce the correct answer. In the educational world, students at each school have different misconceptions. The causes of student misconceptions also vary. The result of the misconception experienced by each student also varies. One that causes students to experience a misconception is that they are less able to receive the teacher's lessons. A teacher should have the ability to explore the ability to understand the concepts each student has.

Students who have not been able to master the basic concepts resulted in mistakes in doing problems. Students who do not master the basic concept of material will do the problem with even a student who does not answer it. The wrong student in working on the question can be because the student does not know the basic concept that has been given or the student is wrong in understanding the basic concepts that have been given. If such a thing is not corrected, then the student will then be wrong in understanding the concept ever given.

Based on the observation conducted on Saturday, 29 October 2016, teachers of mathematics subjects said that grade VIII students in SMP Negeri 2 Bantul felt difficulties understanding the basic concept of algebraic surgery material. Algebraic operation materials are studied, such as addition operations, subtraction, multiplication, division, cogeneration of simple algebraic forms, the fractional form of algebraic and factoring, and simplification of algebraic form. Students feel the difficulty in factoring the algebraic form and simplify the form of algebra. Thus, the student is still wrong in working on the form of algebra and simplifying the algebraic form.

Students' mistakes in working on given problems can also be caused by students not knowing the basic concepts in factoring algebraic forms and simplifying algebraic forms. Mistakes in understanding the concept must be corrected immediately. However, before improving the concept of students in answering questions on algebraic material, especially the factoring algebraic formulas, it is better to know the location of students' misconceptions on the concept of the material. Students' misconceptions can lie in the students themselves and how the teacher explains the factoring material and simplifies the algebraic form.

One way to determine the location of students' misconceptions can be known by analyzing the results of student work using the Certainty of Response Index (CRI). CRI is the level of confidence or confidence in someone working on every question given. CRI is usually based on a scale or index. The scale or index used shows the level of certainty a student has in answering each question. High CRI calculations indicate that the level of confidence in answering questions correctly is also high. Conversely, a low CRI indicates a low level of confidence in answering the question correctly or not knowing the answer.

The appropriate theory of study to identify the students who misconceptions and do not know Hasan's concept, Saleem (1999:294-299), has developed a method to identify the misconception of the Certainty of Response Index (CRI). Calculations using CRI are indicated with a scale between 0 (zero) to 5 (five). The scale of the CRI is, as stated by Hasan, Hasan (1999) presented in the table below:

Table 1. CRI Scale

CRI Scale	Criteria
0	Guessed answer
1	Almost guess
2	Not sure
3	Sure
4	Almost certain
5	Certain

From table 1 above for each CRI scale criteria is replaced with a percentage element of the guess in answering a question, as in the following table 2.

Table 2. Operations of CRI criteria

Cri	Criteria
0	If responding to 100% is guessed
1	If in response to the percentage of elements of guesses 75%-99%
2	If in response to the percentage of the puzzle element 50%-74%
3	If in response to the percentage of the puzzle element 25%-49%
4	If in response to the percentage of the puzzle element 1%-24%
5	If there is no guess at all (0%)

There are four combinations in CRI answers according to Hasan, Saleem (1999) which are presented in the following table 3:

Table 3. Combination of answers according to CRI

	Low CRI <2,5	**High CRI >2,5**
Correct answer	Low CRI value	High CRI value
	Lucky Guess	True concept knowledge
Answer wrong	Low CRI value	High CRI value
	Do not know the concept.	Conception of concepts

The conception of Concepts according To Hasan, Saleem (1999) The calculation of CRI on the concept of understanding can be categorized guessing (G), know the concept (KC), not know the concept

(NKC), and misconceptions (MC). Referring to the correct and incorrect answers of students as well as the classification of CRI can be specified category based on the CRI Calculation category table.

Table 4. CRI Calculation category

Answer	CRI	
	< 2,5	> 2,5
Correct	G	KC
Wrong	NKC	MC

To distinguish students who do not know the concept, misconceptions, and master the concept well, that is by way of answering questions, each respondent is concluded. Each answer question is marked with (0 or 1) for a correct or incorrect answer and CRI price (0 to 5).

Tayubi, Yuyu (2005:7) states that the average CRI for an incorrect answer can be formulated as follows:

$$CRI_{Si} = \frac{\sum_{k=1}^{n} CDI\ answer\ wrong}{\sum_{k=1}^{n}\ respondents\ answered\ wrong}$$

Information:

CRI_s = Average CRI answers wrong
i = Number of items in question
n = Many items

Tayubi, Yuyu (2005:7) states that the average CRI for the correct answer can be formulated as follows:

$$CRI_{bi} = \frac{\sum_{k=1}^{n} CDI\ answer\ correct}{\sum_{k=1}^{n}\ respondents\ answered\ correct}$$

Information:

CRI_b = Average CRI answers correct
i = Number of items in question
n = Many items

Based on the results of CRI calculation research data, to know the percentage of category guessing (G), know the concept (KC), do not know the concept (NKC), and Misconceptions (MC) by using the formula (Sudijono: 2009):

$$p = \frac{f}{n} \times 100\%$$

Information:

p = Percentage of categories (%)
f = Number of students per category
n = Number of samples

METHODS

This research was conducted at SMP Negeri 2 Bantul in the even semester of the 2016/2017 school year. Subjects in this qualitative study were students of class VIII - C, totaling 26 students with 19 female students and seven male students. At the same time, this research's object is the misconception of students of class VIII - C on algebraic operating materials using the Certainty of Response Index (CRI).

In this study, data collection was carried out by the method of testing and unstructured interviews. The test given was in the form of 20 multiple choice questions algebraic operating material. Interviews were conducted after students finished working on the questions, and then the students were grouped into high, medium, and agile groups—interview technique with snowball throwing.

Triangulation is used to see the consistency of the data. According to Moleong, J. Lexy (2013: 330) states that triangulation is a data validity checking technique that utilizes something else. In this qualitative research, technique triangulation is used to collect data from the same source with different techniques. Miles and Huberman (2014:3) stated that The most severe and central difficulty in Using qualitative data is that methods of analysis are not well formulated. Still, Miles and Huberman (2014:16) Qualitative data analysis techniques have 3 data reduction, data display, and withdrawal of conclusions or verification. Here is a description of each step analyzing the data:

1. Data reduction. Data reduction can be interpreted as summarizing, searching for the necessary staples, and removing unnecessary data in analyzing. In the data reduction studies were conducted by grouping data into three groups, namely High Group, medium group, and low group. Data reduction can be made with the help of a computer or specific codes.
2. Data Display or data presentation. The next step after reducing the data is presenting data. In qualitative research to present data can be done with a brief description of the relationship between categories. By presenting the data, it can be easier to understand what happens to each respondent and then plan the next step based on what has been understood.
3. Withdrawal of conclusions and verification

   The next step, after presenting the data, concludes, and verify. Conclusions in qualitative research may answer the issue of problems that are still temporary but may not be able to respond with valid evidence.

RESULTS AND DISCUSSION

The following are presented research results in the form of percentage understanding of student concepts:

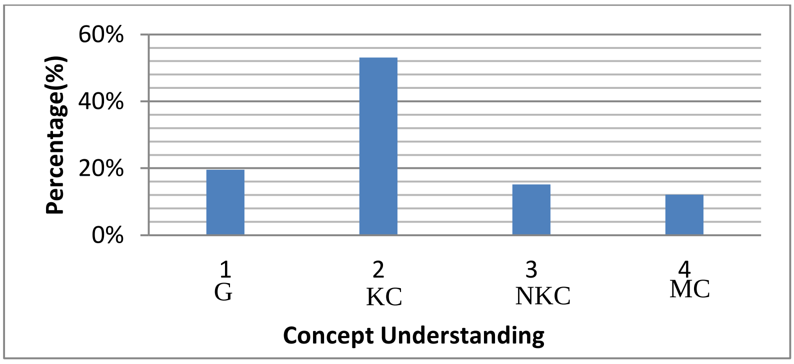

Figure 1. Percentage of Concept Understanding

From the figure 1, based on 20 multiple choice questions and 26 students of class VIII C in SMP N 2 Bantul obtained an average of students in the category of guessing 20%, knowing the concept of 53%, not knowing the concept of 15%, and misconceptions of 12%. The most significant percentage of all students in the category of knowing the concept that is equal to 53%. Based on the research results, it is obtained the percentage of students' misconceptions in algebra material as follows:

Table 5. Percent of Student Misconceptions

Concept	Problem number	Percentage
Add and subtract operations on simple algebraic forms	1, 2	5,9 %
Times and rank operations on simple algebraic forms	3, 4	5,9 %
Add and subtract operations on simple algebraic fractions	5, 6, 7	14,8 %
Operations of times and divide in simple algebraic fractions	8, 9	9,8 %
Mixed operations (+, -, x,:) on algebraic fractions	10, 11, 12	17,6 %
Form simple algebra into its factors	13, 14	7,8 %
Form algebra into peer factors	15, 16	12,7 %
Form simple algebraic fractions into their factors	17, 18	5 %

It forms variations in algebraic fractions into its factors	19, 20	20,5 %

Students of Grade VIII C at SMP Negeri 2 Bantul can already solve the problem well, especially on the concept of additional operations and less on the form of simple algebra, operation times, and the rank in the form of simple algebra, and forming a simple algebraic fraction Into factors. It can be seen from the percentage of students who are experiencing a misconception of less than 7%. On this concept, the misconception can occur due to the cognitive development stage of the student who still thinks real things, real, and visible eyes. The related research was conducted by zulfa, Indana (2013) stating that the location of the misconception experienced by students includes: lack of knowledge, answering correctly with guessing, misconceptions, and well-mastered concepts.

In the concept of operation times and divide the fractional form of simple algebra and form simple algebra into the factors misconceptions experienced by students of class VIII C is relatively low. It can be seen at a percentage of students who have experienced a misconception of between 7% and 10%. In the concept of additional operations and less in the form of simple algebraic fractions and forming algebra into the factors of the conjugation of the misconceptions experienced class VIII C students are. This can be seen from the outcome of the percentage of students who are experiencing a misconception between 10% and 15%.

In the concept of mixed operation (+,-, X,:) on the form of algebraic fraction and form variation of algebraic fraction into the factor-factor of misconceptions that experienced class VIII C students are high. It can be seen from the percentage of students who are experiencing a misconception of more than 15%. This misconception occurs because the students ' ability to understand the material is still low. Another study conducted by Rezki et al. (2014) states that misconceptions occurred due to a lack of understanding of the student's concept of variables as an unknown value.

CONCLUSION

Based on the results of data analysis and discussion, researchers conclude as follows:

1. From the results of research data obtained that understanding the concept of grade VIII students in SMP Negeri 2 Bantul school year, 2016/2017 can be said not all mastered algebraic operation material. According to the results of the calculation, there are 53% of students who know the concept of algebraic surgery materials. The rest are 20% of students who only guess that 15% of students do not know the concept, and 12% of students encountered the concept of mistake.
2. From the results of research data shows that the location of student misconceptions in algebraic material are:
   a. 20.5% in the concept of forming a fractional algebraic variation into Factors,
   b. 17.6% in the concept of mixed operation (+,-, X,:) on the form of an algebraic fraction,
   c. Amounting to 14.8% in the concept of additional operation and less in the form of a simple algebraic fraction,
   d. Amounting to 12.7% in the concept of forming algebra into the factors of the Sekawannya,
   e. amounted to 9.8% on the concept of operation times and divided the fractional form of simple algebra,
   f. By 7.8% in the concept of forming simple algebra into factors,
   g. amounted to 5.9% in the concept of adding and lacking operations on the form of simple algebra and the concept of operation times and for the form of simple algebra,
   h. As well as a 5% on the concept of describing the simple form of fractional allgebra into factor
3. The misconception experienced by students can occur for various reasons. In this research, the causes of student misconceptions in algebraic material are:
   a. Intuition or wrong thinking,
   b. The information that the student receives is incomplete,
   c. The cognitive development of students who still think concrete, tangible, and eye-visible things,
   d. Students ' ability to understand low material,

e. The student's interest in learning the next material and the material that does not understand is still lacking.

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