Misconceptions of Elementary School Students about Fractions

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Abstract. Misconception is a serious problem in the teaching and learning process, misconceptions experienced by students will result in concept errors at a later stage. So it will affect student learning outcomes. The purpose of this study was to determine the type of misconception about fractions experienced by elementary school students. This study involved 11 students in grade IV of SD Negeri 9 Jangka, 2018/2019 school year consisting of 5 boys and 6 girls. Student misconceptions are identified through diagnostic tests that are reinforced by interviews. The results showed the types of misconceptions experienced by students, among about 1) Students compare two fractions by comparing the numerator with the numerator and the denominator with the denominator, in this case students have a tendency to transfer the concept of natural numbers into fractions. 2) Students have a misunderstanding when the teacher represents fractions on the number line, The teacher explains that the fraction that is on the left has a smaller value than the fraction on the right, so students think that the fraction is left on the problem always has a smaller value.

Keywords: misconception, fraction

INTRODUCTION ~ Understanding the concept is the most basic stage that students must reach to make it easier to continue to the next level of understanding. Understanding the concept is very important in the learning process and the concept of mathematics is no exception, because mathematics has a continuous nature, the meaning is interrelated between the previous material with the next material. Fractions are considered as stepping stones which are very important to study mathematics to a higher level. In addition, fractions are often used in daily life. According to Kennedy (1994), the meaning of fractions can arise in situations, including: 1) Fractions can be considered as equal sized parts of a whole, ordinary fractions can be used to express the meaning of each part of a whole. 2) Fractions as part of groups of equal members or also declare division. 3) Fractions as a comparison or ratio.

Learning about fractional material is not only taught in elementary schools but also at junior high, high school and also college levels. This shows that fraction is a fundamental concept in mathematics and will influence other higher concepts.

But in reality, there is still a mathematical misconception about the concept of fractions in elementary school students. One of them is students stating that less than, the reason is because if we take 4 out of 15 is 11, if we take 4 out of 10 is 6, 6 is less than 11 so students conclude less than. Students are mistaken in understanding the true concept of fractions, the concept of fractions used is fractions is the difference between the denominator and the numerator. This gives rise to students' misconceptions in comparing the value of the fraction (Cramer, 2012). In many countries, the average student has never gained

conceptual knowledge about fractions (Fazio & Siegler, 2011). Misconceptions are individual misunderstandings in transferring information obtained into its framework, as well as incorrect explanations and an idea that is not in accordance with scientific understanding (Brown, 1989). The cause of the misconception can be influenced by several things, including from the students themselves who have different thoughts, the way the teacher conveys the lesson, as well as learning resources or books read by students (Suparno, 2013).Misconception becomes a serious problem in the teaching and learning process, which results in concept errors at the next level so that it will affect student learning outcomes. Therefore, the identification of students' misconceptions has become a major problem in research in recent years (Ozmen, 2004).

Research on student misconceptions has been done a lot, such as that conducted by Azizan and Ibrahim (2012), the difficulty of students in comparing fractions occurs due to problems with the basic concept of fractions. Furthermore Dewi (2018) found that misconceptions on fraction material occur in the aspect of recognizing fraction forms, comparing, sorting and carrying out fraction addition and subtraction operations. Misconceptions on fraction material, among others, students have difficulty in showing fractions on the number line (Yanik, 2008). Students think that fractions are always part of 1 and never greater than 1 and use cross multiplication to solve multiplication

problems involving fractions, students who do not understand fractions will use wrong concepts in comparing fractions (Yazan & Runna, 2016).

Then, based on several studies, it is necessary to know the misconceptions experienced by students. This information is needed by the teacher to choose the right strategy in helping students to reduce misconceptions. Based on the background that has been described, then the problem formulation in this study is: "What kind of misconceptions about fractions experienced by elementary school students.

METHOD

This research is a quantitative study, with survey design (survey reseach). The purpose of survey research is to provide a detailed description of the background, characteristics, and characteristics of a case or event that is of a general nature. The study was conducted at the 9 Public Elementary Elementary School, Bireuen Regency. The sample in this study was the fourth grade students of SD Negeri 9 Jangka, Academic year on 2018/2019 consisting of 11 students, 5 boys and 6 girls. The selection of classes at the school, based on classes that have diverse student abilities and have been taught fraction material. Student misconceptions are identified through diagnostic tests (Alexander, 2016) which are reinforced by interviews. Diagnostic tests are made in the form of multiple choice with 10 questions. Diagnostic tests reveal students'

misconceptions related to comparing fractions that students have learned.

RESULTS and DISCUSSIONS

Based on the results of the diagnostic test, it shows that only 3 out of 11 students answered all the questions correctly. Meanwhile, 6 other students gave answers partly right and partly wrong. Furthermore, researchers interviewed 6 students with different answers, based on interviews conducted it was seen that 2 of the 6 students did not understand the concept and 4 others experienced misconceptions. The percentage of students who do not understand the concept, misconception and non-misconception can be seen in table 3.1 below

Table 3.1 Percentage of Student Misconceptions

Total Students	Don't Understand the concept	Misconception	Non-misconception	Percentage of misconceptions
11	2	6	3	**55%**

The question presented about comparing fractions consists of 3 questions namely about the corresponding statement to the comparison of two fractions and the use of appropriate symbols to compare two fractions. In question number six, students are asked to state the comparison of $\frac{1}{8} ... \frac{1}{6}$ by using words. Whereas in question number students were asked to compare two fraction that correspond to fraction $\frac{1}{4} ... \frac{3}{5}$. Problem number eight is the same as problem number two, where students are asked to compare two fractions using symbols that correspond to fractions and. The students 'lack of understanding of the concept of comparing fractions is shown from the students' answers as shown in Figure 1 below
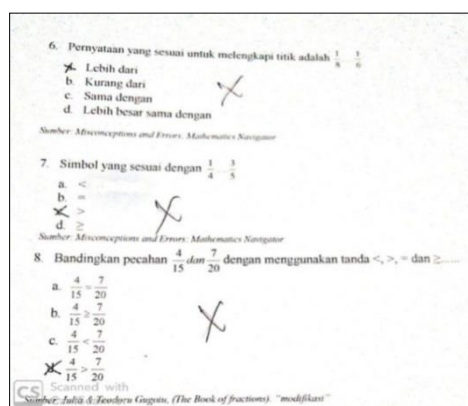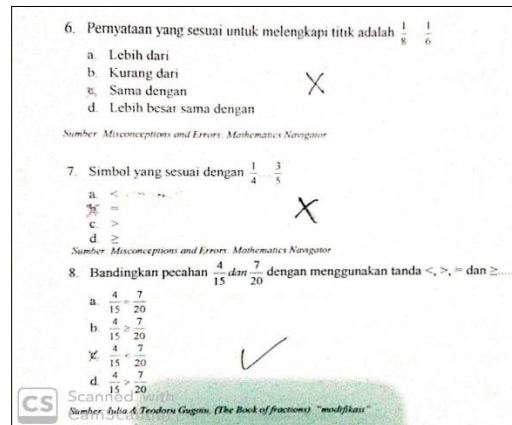

Figure 1a. Student Answers A

Figure 1b. Student Answers B

Based on Figure 1a, student A answers all wrong. Whereas Figure 1b, student B answered one question correctly that was question number eight. From the answers of the two students, the researchers suspected that they did not understand the concept. This is supported by the summary results of interviews on the two subjects, namely student A and student B.

The following is a transcript of the interview:

R   : How do you compare $\frac{1}{8}$....$\frac{1}{6}$?

S   : I don't know, miss.

R   : why on your answer sheet, you answered $\frac{1}{8}$ same with $\frac{1}{6}$?

S   : Because they are both fractions.

Then, six students were categorized as experiencing misconceptions. The misconception experienced by students on the concept of comparing fractions is shown from the answers of students C and students D in questions number six, seven and eight, namely students stating that $\frac{1}{8}$ more than $\frac{1}{6}$, $\frac{1}{4}<\frac{3}{5}$ and $\frac{4}{15}<\frac{7}{20}$. The answers of students C and students D for questions number six $\frac{1}{8}$ more than $\frac{1}{6}$ are false, while the answers for questions number seven and eight are $\frac{1}{4}<\frac{3}{5}$ and $\frac{4}{15}<\frac{7}{20}$ are the correct answers. The answers of students C and students D can be seen in the picture below:
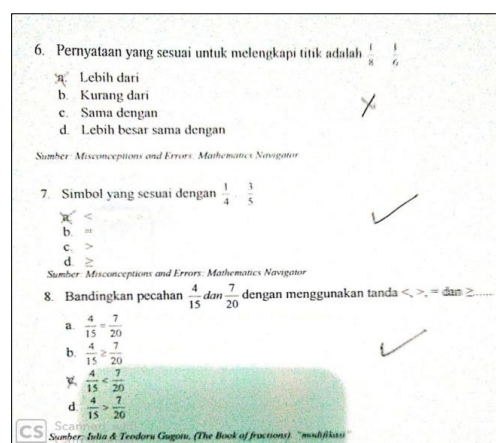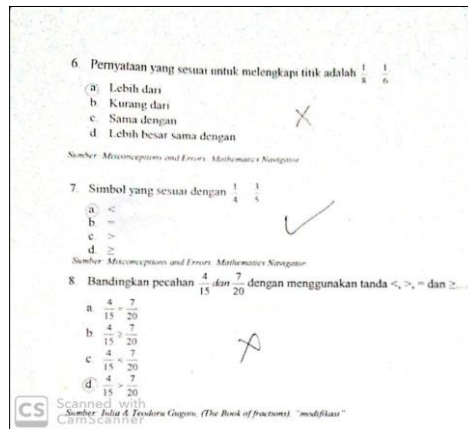

Figure 2c. Student Answers C

Figure 2d. Student Answers D

Seeing the pattern of the three questions and the students' answers in Figure 2 c and 2d, it is assumed that students C and D experienced a misconception in comparing fractions. From the answers of students C and student D on the sheet obtained information that students C and D compare two fractions by comparing the numerator with the numerator and denominator with the denominator, this is reinforced by the results of interviews with students C and student D.

The following is a summary of the researchers' interview interviews:

R : Questions number six, seven and eight about comparing fractions. How do you know that $\frac{1}{8}$ more than $\frac{1}{6}$?

S : Because, $\frac{1}{8}$ greater than $\frac{1}{6}$

R : Why do you think like that? give the reason!

S : Because number 8 is bigger than number 6, miss.

R : Are you sure that is $\frac{1}{8}$ more than $\frac{1}{6}$?

S : Really sure, miss.

The results of the interview show that students compare 8 and 6 which are the denominators of the two fractions and the numerator is one. Two students interviewed answered with confidence. This also applies to problems seven and eight namely 1 less than three, and 4 less than 5, so that $\frac{1}{4}.<\frac{3}{5}$ and for question number eight it also applies like problem number seven. Based on the interview results it is known that the two students experienced misconceptions in comparing fractions, students compared the numerator with the numerator and the denominator with the denominator. Students who compare numerators with numerators and denominators with denominators have a tendency to transfer the concept of natural numbers into fractions. Because of the linkages between this incorrect part and the misconception in comparing fractions, it is certain that the three students experienced a misconception in comparing fractions.

Then the answers of students E and students F to questions number six, seven and eight are the same are $\frac{1}{8}$ less than $\frac{1}{6}$,

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$\frac{1}{4} . < \frac{3}{5}$ and $\frac{4}{15} < \frac{7}{20}$. The answers from the three students can be seen in the picture below:
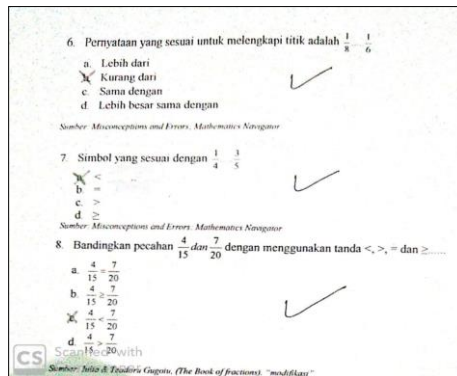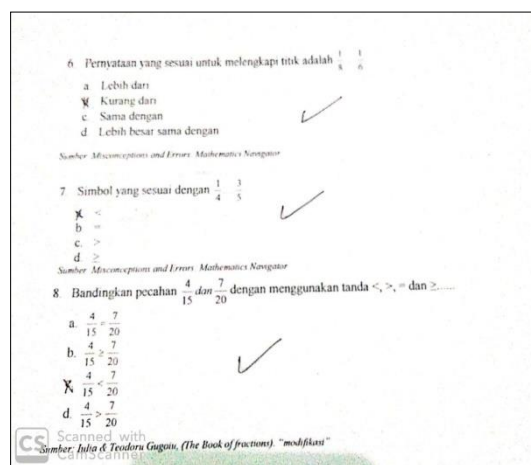

Figure 3e. Student Answers E

Figure 3f. Student Answers F

Based on Figure 3e and Figure 4f, it appears that students E and student F answer all the questions correctly. So, it is suspected that the three students did not experience misconceptions in comparing fractions. But to strengthen the suspicion of researchers, the researchers still conducted interviews with the two students who were the subjects of the study. From the students' answers, it is suspected that the students did not experience misconceptions and understood the concepts correctly. But to obtain in-depth information related to the presence or absence of students' misconceptions in comparing fractions, researchers conducted interviews with research subjects. From the interview results it is known that students experience misconceptions in comparing fractions.

The following is a transcript of the researchers' interview interview with students.

R : Appropriate statement to complete $\frac{1}{8}$ .... $\frac{1}{6}$. Which answer was chosen?

S : $\frac{1}{8}$ less than $\frac{1}{6}$

R : Why did you choose less than? What is the reason!

R : Because $\frac{1}{8}$ it is on the left, the fraction on the left is smaller than the one on the right.

R : If the location of the fraction is reversed to $\frac{1}{8}$ ... $\frac{1}{6}$ What is your answer?

S : $\frac{1}{6}$ less than $\frac{1}{8}$

R : Are you sure that $\frac{1}{6}$ less than $\frac{1}{8}$?

S : Sure, miss

From the interview passage it is known that student H experiences a misconception in comparing fractions, students have a misunderstanding when the teacher represents a fraction on the number line, the teacher explains that the fraction that is on the left has a value smaller than the right fraction, so he thinks fractions the one on the left in the problem always has a smaller value. Because of the interrelationship between this incorrect part and the misconception in comparing fractions, it is certain that the student experiences a misconception in comparing fractions. Types of misconceptions that occur in students can be in the form of a basic error that is students' understanding of the concept is still low so that students do not have knowledge of the procedures used to answer questions. This is in line with research Ozkan (2011) that a low understanding of a concept makes students make their own understanding of the concept.

CONCLUSION

Types of misconceptions experienced by students, among others: 1) Students compare two fractions by comparing the numerator with the numerator and denominator with the denominator, in this case students have a tendency to transfer the concept of original numbers into fractions. 2) Students have a misunderstanding when the teacher represents fractions on the number line, the teacher explains that the fraction that is on the left has a smaller value than the right fraction, so what he thinks is the fraction that is left on the problem always has more values small. In this study, researchers only analyzed about the types of misconceptions experienced by elementary school students about fractions, and it is hoped for further researchers to analyze further about the factors that cause misconceptions. In addition, the next researcher is expected to be able to use scaffolding to reduce student misconceptions. In providing scaffolding, the teacher can do it by helping students for a while, leaving it for a while, then resuming their help, helping students for a while, then asking classmates to help students who are being helped by the teacher by raising their voices, and resuming their help, helping students for a while, leaving it and help students for all classes, the dominant teacher himself answers questions to be informed to students, the teacher respects each student's answer, continues to question each step of student work and

leads students to success, asking questions by asking what is known in the questions only, the teacher directly intervenes with instructing students to continue their work, the teacher silently reads the student's work and immediately checks his understanding (Anwar, 2017).

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