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Analysis of Misconception of Elementary School Teacher Study Program UKI Toraja Lectures about Fraction

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ABSTRAK

Miskonsepsi adalah suatu konsep yang tidak sesuai dengan konsep yang diakui para ahli. Akibat terjadinya miskonsepsi, pengetahuan baru tidak akan terintegrasi dengan benar ke dalam struktur kognitif siswa. Jika seorang siswa memperoleh konsep baru dan mengolahnya ke dalam struktur kognitif siswa, yang bercampur dengan kesalahpahaman, dapat menyebabkan pemahaman yang tidak tepat. Oleh karena itu, miskonsepsi siswa perlu dipahami sebelum dapat ditindaklanjuti. Pemahaman konsep matematika merupakan landasan penting untuk berpikir dalam menyelesaikan permasalahan matematika maupun permasalahan sehari-hari. Dengan pemahaman konsep matematika yang baik, siswa akan mudah mengingat, menggunakan, dan menyusun kembali suatu konsep yang telah dipelajari serta dapat menyelesaikan berbagai variasi soal matematika. Oleh karena itu, pemahaman konsep dijadikan salah satu dari tiga aspek penilaian dalam pembelajaran matematika. Pecahan merupakan materi matematika dasar yang harus dipahami oleh mahasiswa calon guru SD. Rumitnya materi pecahan ini kadang mengakibatkan kesalahan yang bukan hanya terjadi pada siswa, namun juga terjadi pada guru. Penelitian ini dilaksanakan dengan harapan setelah mengetahui miskonsepsi pada mahasiswa PGSD dapat menjadi bahan pertimbangan bagi dosen matematika dalam merancang dan mengelola proses pembelajaran sehingga nantinya dapat meningkatkan pemahaman mahasiswa calon guru SD dalam hal konsep dan strategi sebelum mengajar di sekolah dasar.

Kata kunci: Miskonsepsi, pecahan, sekolah dasar

ABSTRACT

Misconception is a concept that is not in accordance with the concept recognized by experts. As a result of misconceptions, new knowledge will not be properly integrated into students' cognitive structures. If a student learns a new concept and processes it into the student's cognitive structure, which mixes with the concept, it can lead to improper understanding. Therefore, it is the misconception that needs to be understood before it can be acted upon. Understanding mathematical concepts is an important foundation for solving mathematical problems and everyday problems. With a good understanding of mathematical concepts, students will easily remember, use, and rearrange a concept that has been learned and can solve various variations of mathematics. Therefore, understanding the concept is used as one of the three aspects of assessment in learning mathematics. Fractions are basic mathematics material that must be reached by prospective elementary school teacher students. The complexity of this material sometimes results in errors that not only occur to students, but also occur to teachers. This research was conducted with the hope that after knowing the misconceptions of prospective elementary school teacher students, it can be considered for mathematics lecturers in designing and managing the learning process so that later it can improve the understanding of prospective elementary school teacher students in terms of concepts and strategies before teaching in elementary schools.

Keywords: Misconception, fraction, elementary school

INTRODUCTION

Improving the quality of education is a problem facing the world of education today in terms of student achievement [1]. Especially regarding the problem of teaching math, many students have difficulty learning math [2]. One of these involves mastering concepts that affect sailing results. Understanding mathematical concepts requires skill and a high level of abstraction [3]. That is, when studying mathematics, students must first understand the concepts in order to be able to solve problems and apply what they have learned.

Fractions are basic mathematical material that must be understood by prospective primary school teachers. An understanding of the concept of fractions is very necessary as it is very closely related to our daily life [4]. The idea of fractions has its own uniqueness that is very different from other numbers. Fractures are a really complex and challenging material. The complexity of this fractional material sometimes leads to mistakes that happen not only to students but also to teachers [5].

Students with imperfect or incomplete conceptual skills are often referred to as misunderstandings or a concept inconsistent with concepts recognized by experts [6]. Due to misunderstandings, new knowledge is not properly integrated into students' cognitive structures. When a student appropriates a new concept and processes it into a cognitive structure mixed with misunderstanding, misunderstanding can result. Therefore, students' misunderstandings need to be understood before they can be pursued [7].

Several previous researchers have done research on misconceptions such as B. A study conducted [8] which found that there were still misunderstandings among students about fractions in relation to the level of students' math skills. In accordance with research results [9], it is found that misunderstandings also occur among students with different logical-mathematical intelligence. In addition, research [10] states that students experience misunderstandings caused by multiple factors, including students mistaking the value of the numerator and denominator, using addition operations incorrectly, and being unable to relate them in everyday life.

Therefore, any prospective teacher must understand the concept before later serving in the school [11]. Teachers are committed to making quality human beings by practicing pedagogical practices that are not only fun, but efficient and meaningful [5].

METHOD

This study uses a qualitative method with a descriptive approach. Tests and supporting instruments in the form of tests and interview guides are used primarily as survey instruments. The analysis of the fractional test refers to the type of misunderstanding indicator according to Widiasa [12]. This research was conducted on second semester students of the 2021/2022 academic year at the UKI Toraja PGSD study program. The subjects of this study consisted of 3 Class A students who had misconceptions for each of the questions asked. Then, data analysis refers to the phases of qualitative data analysis, namely verifying data, coding data, reducing data, presenting data, checking data validity, analyzing test question filling, interpreting and drawing conclusions [13].

RESULT

This section presents data from the research and discussion of the questions in Chapter I, namely: What factional misunderstandings do PGSD students experience at UKI Toraja and what are the appropriate solutions to overcome the misunderstandings found?

Furthermore, this study aims to provide an overview of the partial misunderstandings experienced by PGSD students at UKI Toraja and provide appropriate solutions to overcome the misunderstandings found.

This research was conducted on June 2, 2022 and started by conducting a sub-test on all even-semester A-class students of the 2021/2022 academic year in the PGSD-UKI-Toraja study program with a total of 36 subjects. The purpose of submitting this test is to select research topics. The data collection system is as follows. First, the subject is given a fraction problem, then he is given time to read the problem and understand the problem. In addition, the subject had 20 minutes to complete the questions. After processing the questions, an interview test follows to dig up more complete information or to check written data from students to get an idea of the misunderstandings that sometimes occurred.

From the results of the tests conducted, it was found that 3 students had misconceptions on each of the questions asked, namely 1 student on the first question, 1 student on the second question, and 1 student on the second question misunderstandings on the third question. The three subjects were chosen not only because of the misunderstandings they experienced, but also because of their willingness to be interviewed.

After recruiting 3 students who meet the criteria for use as research subjects, interviews will be conducted based on the results of the responses they receive. data collection in the form of interviews recorded with a dictaphone. Then the data was transcribed to help analyze the misconceptions experienced by the subject at each stage of problem solving.

1. Subject A in the question 1

An excerpt of the interview result from subject A, who had a wrong idea on the first question.

T : Do you understand about number 1?

1. Pak Hendrik mempunyai sebidang tanah yang luasnya 720 m^2. Tanah tersebut akan diberikan kepada anak pertamanya $\frac{3}{5}$ bagian dan anak keduanya $\frac{1}{4}$ bagian. Hitunglah luas tanah Pak Hendrik setelah dibagi ke kedua anaknya?

S : Yes, I understand

T : After reading question number 1, what information did you get?

S : The known area of the land is 720 m^2. And then the first kid gifted $\frac{3}{5}$ part dan the second kid $\frac{1}{4}$ part.

T : Is the information sufficient to solve the problem?

S : Of course.

T : How to make a mathematical model of problem number 1?

S : 720 - $\frac{3}{5} + \frac{1}{4}$

T : How many operations are used to solve the problem?

S : There are two, subtract then add.

T : How to solve this problem?

S : The land area is reduced by the share of the first and second children.

T : What plan will you use to answer this question?

S : Find the common denominator of the two parcels of land.

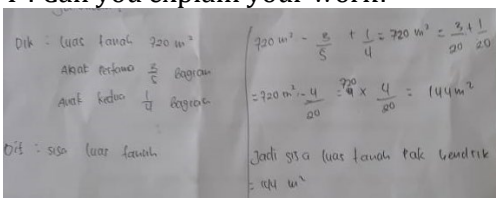
T : Is the method you chose easier? Why?

S : It's easy because it's been taught before in school.

T : Can you explain the steps you used?

S : First write down what is known and asked then answer.

T : Can you explain your work?

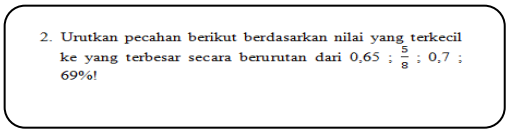


S : Land area 720 m^2 minus $\frac{3}{5}$ and $\frac{1}{4}$ parts then calculate the remainder. Then equate the denominators. Then the result is the remaining 144 m^2.
T : Why did you choose this method?
S : Because that's the only way I think.
T : Apart from the method you used, is there any other method?
S : Nothing.
T : How do you know if your answer is correct?
S : Because it is in accordance with the steps to solve it.

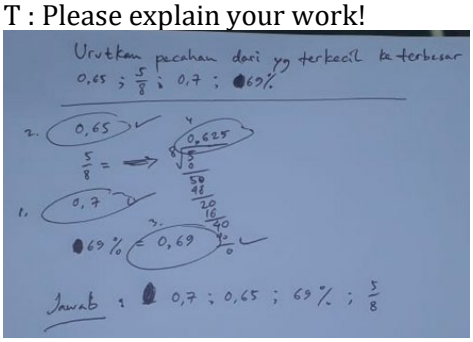
From the interview excerpt, it was revealed that subject A was unable to convert the problem into a mathematical model, made an error in performing calculations or computations. In addition, subject A is also unable to relate the concept of the material that should be used. This can be seen in the results of his work that he made mistakes when making the mathematical model and when he wanted to complete the calculation operation on problem number 1 so that the results were not correct.

2. Subject B in the question 2

A snippet of the interview result of subject B who had a misconception on the second question.
T: Do you understand about question number 2?


2. Urutkan pecahan berikut berdasarkan nilai yang terkecil ke yang terbesar secara berurutan dari 0,65 ; $\frac{5}{8}$; 0,7 ; 69%!

S : Yes I understand.
T : After reading question number 2, what information did you get?
S : Order the fractions from smallest to largest in order.
T : Is the information sufficient to solve the problem?
S : Yes that's enough.
T : How to solve this problem?
S : First convert everything into one type, namely to decimal form, after that it is sorted.
T : Is the method you chose easier? Why?
S : It's easy because it's the same and it's just a matter of determining the order.
T : Can you explain the steps you used?
S : First, pay attention to the problem, then look at the type and then determine how to solve it.
T : Please explain your work!



S : Arranged down the variables one by one and then converted to decimal form all. After that pay attention to the order and determine the results in accordance with the command question.
T : Why did you choose this method?
S : Because this is the easiest way.
T : Apart from the method you used, is there any other method?
S : Yes, you can change it to an ordinary fraction and then sort it all.
T : How do you know if your answer is correct?
S : Because it's in order.

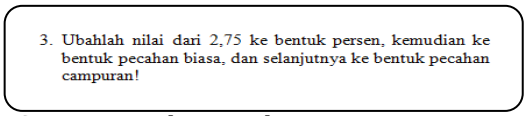
From the interview footage, it was revealed that subject B was unable to consider or experienced an error in writing the appropriate steps in solving the problem. In addition, subject B was also unable to relate the concept of the material that should be used. This can be seen in the results of his work that he made an error when determining the order of fractions from the smallest to the largest where subject B only paid attention to the number of numbers behind the comma without knowing the meaning

of the numbers behind the comma so that the results were wrong.

1. Subject C in the question 3

A snippet of the interview result of subject C who had a misconception on the third question.

T : Do you understand about question number 3?


3. Ubahlah nilai dari 2,75 ke bentuk persen, kemudian ke bentuk pecahan biasa, dan selanjutnya ke bentuk pecahan campuran!

S : Yes, I understand.

T : After reading question number 3, what information did you get?

S : Convert 2.75 to a percent, then to a common fraction and finally to a mixed number.

T : Is the information sufficient to solve the problem?

S : Yes.

:T How to make a mathematical model of problem number 3?

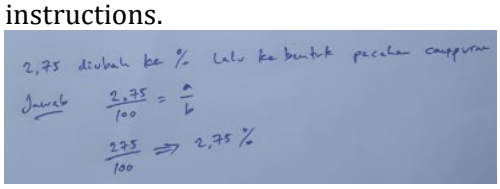
S : The decimal form is converted to a fraction that has a numerator and denominator.

T : How many operations are used to solve the problem??

S : Nothing.

T : How to solve the problem?

S: Work according to the question instructions.



T : What plan will you use to answer this question??

S : As taught.

T : Is the method you chose easier? Why?

S : It's easy enough because it's been taught.

T : Please explain the steps you used?

S : Write down the decimal form first, then the form in question.

T : Please explain your work!

S : 2.75 which was previously a decimal form is then converted to a fraction form $\frac{a}{b}$ and finally the form of percent of your work

T : Why did you choose this method?

S : Because that's the only way I can think of.

T : Apart from the method you used, is there any other way?

S : Already not available.

T : How do you know if your answer is correct??

S : Because it is in accordance with the steps to solve it.

The interview excerpt showed that subject C was unable to translate the problem into the given mathematical model. In addition, Subject C is also unable to account for or experience errors in writing the appropriate problem-solving steps. You can see that in the results of his work, that he made mistakes when converting ordinary fractions into percentages and could not convert ordinary fractions into mixed fractions.

DISCUSSION

Analysis of the research data shows that the students had misconceptions about the three questions asked. The three questions are different or varied types of questions. Starting from the concept of addition and subtraction operations on fractions, sorting fractions from smallest to largest value of different fractions to changing the shape of fractions. With the concept of adding and subtracting fractions in story problems, there are still some students who have misconceptions and the location of misconceptions, which is not being able to create a mathematical model and not being able to to find the LCM of two types of fractions with different denominators, also there are students who find the LCM of fractions that have a different denominator but don't pay attention to the numerator so the result is wrong. This happens due to the influence of simple integer operations, which carry over to the

concept of fractions, which have more complex difficulties. This can be seen in the response of subject A, who made a mistake in the concept of fractional operations.

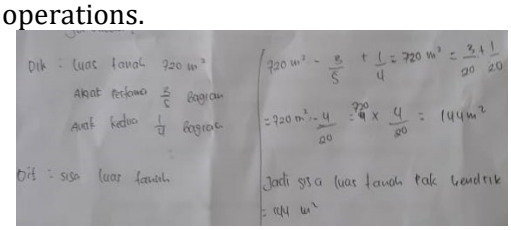


Figure 4.1 Subject A's answer to question number 1

Figure 4.1 shows the results of subject A's response, who made an error in creating the mathematical model and performing calculations or calculations incorrectly, and was unable to connect the concepts of the material to be used. Using the results of his work, subject A created a mathematical model of the story problem at $720 - \frac{3}{5} + \frac{1}{4}$, the correct one should be $1 - \frac{3}{5} - \frac{1}{4}$. Here subject A does not understand the concept of a fraction that the land area of 720 m^2 is considered as 1 whole part reduced by $\frac{3}{5}$ parts and $\frac{1}{4}$parts. Then, in operation $720 - \frac{3}{5} + \frac{1}{4}$ to $720 - \frac{3}{20} + \frac{1}{20}$, subject A only pays attention to the LCM of the denominator without paying attention to the numerator, so that the value of the numerator is preserved. In this case, subject A assumes that if the denominators are the same, the numerator remains the same. Based on the results of the analysis and the indicators of the types of misunderstandings, it can be said that Subject A has translation misunderstandings, arithmetic misunderstandings, and conceptual misunderstandings.

With the concept of sorting fractions from smallest to largest value from different fractions, there are many errors in students' answers, including some students who still have difficulties when confronted with different types of fractions. There are those who did not manage to change the form of ordinary fractions to other forms, and there are also those who do not know the value contained in the numbers behind the decimal point.

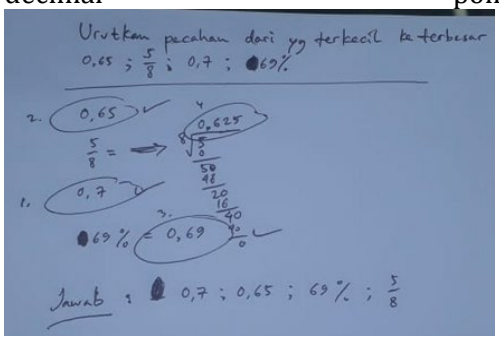


Figure 4.2 Subject B's answer to question number 2

Figure 4.2 shows the results of Person B's response, who was unable or made an error in writing the appropriate steps to solve the problem. In addition, Subject B was also unable to describe the concept of the material to be used. This can be seen in the results of his work, which made a mistake in determining the order of fractions from smallest to largest, subject B did not understand the meaning of the numbers after the decimal point, so the results were wrong. Subject B assumes that the higher the number after the decimal point, the greater the value. He understands the number after the decimal point as well as the number before the decimal point, which means hundreds with 3 digits. Even if this is not the case, the place value of the number after the decimal point differs from the number before the decimal point. Example 325.325 is three hundred twenty-five point three two five. The number 325 before the decimal point represents hundreds, tens and ones in sequence, while the number 325 in the digits after the decimal point represents tenths, hundredths and thousandths. Based on the results of the analysis and indicators of the type of misunderstanding, it can be said that

subject B experiences systematic misunderstanding and conceptual misunderstanding.

With the concept of changing the form of fractions, the mistake students experience is that some of them still make mistakes when changing the form of ordinary fractions to decimal or percent form or vice versa. This can be seen from Subject C's response, who made a mistake in the concept of changing the shape of a fracture.

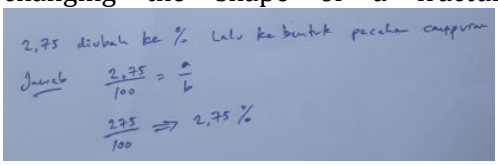


Figure 4.3 Subject C's answer to question number 3

Figure 4.3 shows the results of Subject C's response, which failed to transform the problem into the specified mathematical model. In addition, Subject C is also unable to account for or experience errors in writing the appropriate problem-solving steps. You can see that in the results of his work, that he made mistakes when converting ordinary fractions into percentages and could not convert ordinary fractions into mixed fractions. Based on the results of the analysis and the indicators of the types of misunderstandings, it can be said that subject C had translation misunderstandings and systematic misunderstandings.

In the context of these results, it shows that PGSD UKI Toraja students in grade A in the even semester of the 2021/2022 academic year still have many failures in solving fractional problems attributed to lack of conceptual understanding. Some things that need to be followed up to help students understand the concept of fractions is to re-teach the basics of the concept of fractions and to provide exercises to help students get used to dealing with different fraction problems.

CONCLUSION

Based on the results of the research and discussion, the conclusions of the study analyzing misconceptions of PGSD-UKI-Toraja students about fractional material are as follows:

1. PGSD UKI Toraja students still experience many errors in solving fractional problems caused by lack of understanding of concepts, so it can be said that they have misunderstandings, including students unable to solve problems in math transforming models, making mistakes in arithmetic or arithmetic, unable to account for or experience error in writing the appropriate steps to solve problems, and unable to connect the concepts of the material to be used.
2. Solutions that can be made to help students understand the concept of fractions so that later, when they become elementary school teachers, they can teach the concept of fractions well, including 1) the concept of fractions using visualizations (props) re-teaching, 2) teaching abstract concepts of fractions, 3) using fraction terminology to make it easier for students. In addition, the learning atmosphere, the students' willingness to learn, and the required media must also be considered in order for the students to have a good understanding of the concept of fractions.

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