

## AN ANALYSIS OF STUDENT LEARNING BARRIERS FOR ELEMENTARY SCHOOL STUDENTS IN UNDERSTANDING MATHEMATICAL CONCEPTS OF FRACTIONS

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### ABSTRACT

This study aims to: (1) describe the achievement of indicators for understanding students' mathematical concepts about fractions. (2) Describe the learning barriers that occur in students and the factors that cause them to understand the mathematical concept of fractions. This research is a qualitative descriptive study conducted in class IV MI Darul Muttaqin Sukomangu, with a total of 10 students. All students are given a test to measure the achievement of indicators of understanding the concept. The test results are then grouped into 3 categories, namely high, medium, and low. From each category, interview subjects were selected with the criteria of not achieving some or all of the indicators of understanding the concept and having good communication skills. This interview aims to determine the learning barriers that occur and the factors that cause them. The data analysis technique was carried out in three stages, namely data condensation, data presentation, and conclusion. The test results show that 4 students fall into the category of high concept understanding, 3 students in the medium category, and 3 students in the low category. In the results of the interview, it was found that there were learning barriers, namely ontogeny and epistemological barriers. The most dominant obstacle is the ontogeny barrier with indicators of lack of concentration when learning begins. In addition, the most dominant factor was found, namely internal factors in the form of emotional aspects or wrong attitudes, namely lack of learning.

Keywords: Learning barriers; Concept Understanding; Fractions.

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Submission	Revised	Accepted	Published
December 24, 2023	February 23, 2024	February 28, 2024	March 12, 2024

How to cite (in APA style):

Dewi, M. R., Jumadi, & Wahyudi. (2024). An Analysis of Student Learning Barriers for Elementary School Students in Understanding Mathematical Concepts of Fractions. *Jurnal Pendidikan Matematika (JPM)*, 10(1), 74–86. <https://doi.org/10.33474/jpm.v10i1.21576>

## INTRODUCTION

Mathematics is a basic science that has an important role in mastering various fields of science and technology (Budiono & Suhendar, 2019). In line with this opinion, Novitasari (2016) states that mathematics is an important part of improving the quality of education. In addition, Agustina & Fuadiah (2018) state that in the mathematics learning process, one of the important things that must be done is instilling mathematical concepts in students.

According to Siagian (2016) concepts in mathematics are related to one another, so students must be given more opportunities to see connections with other material. In addition, Anggraeni (2016) states that understanding concepts is an important requirement for students' concept development. Students are said to be able to understand mathematical concepts if they meet the indicators for understanding the concept. Herini et al. (2023) and Wahyudi et al.

(2022) also said that understanding mathematical concepts would be better if students also had learning experiences and the teacher only acted as a facilitator during learning activities. Based on several opinions regarding the importance of students' conceptual understanding, the researcher chose a research topic related to students' conceptual understanding.

There are still some students who still have difficulty understanding mathematical concepts. Based on the results of the researcher's preliminary interview with the homeroom teacher in class IV MI Darul Muttaqin, it was found that as many as 70% of students still experienced errors in answering daily test questions related to fractions. These errors include calculation errors, errors in writing or reading the questions, wrong steps in completing the questions, and other errors. According to the research results of Mukminah & Sriyani (2021), it was found that the majority of class IV students do not understand mathematical concepts, especially in calculations. This is supported by research by Nurhayati (2019) which found that class IV students' low understanding of mathematical concepts in flat shapes material.

The lack of conceptual understanding experienced by students occurs in several materials, one of which is the concept of fractional numbers. According to Torbeyns et al. (2015), students' understanding of fractions is positively correlated with students' overall mathematics learning outcomes. In other words, if students understand the concept of fractions, they can also understand mathematical concepts other than fractions. A lack of understanding of the concept indicates a problem in learning. To be able to solve this problem, one of the steps that must be taken is to know the learning obstacles experienced by students in understanding concepts and the factors that influence them.

Fernandes et al. (2019) believes that learning obstacles can be expressed in learning difficulties. In addition, Brousseau (2002) states that learning obstacles are classified into three types. These obstacles include ontogeny, didactic, and epistemological obstacles. Ontogenic barriers are related to learning readiness, didactic barriers are related to the teacher's teaching system, and epistemological barriers are related to student knowledge.

In the previous presentation, it was stated that as many as 70% of students still experience errors in answering daily test questions such as calculation errors, errors in writing or reading questions, errors in the steps in completing questions and other errors. To be able to solve the problem of lack of understanding of this concept, it is necessary to know the obstacles and the factors that influence them. For this reason, the focus of this research is on the analysis of learning barriers for elementary school students in understanding mathematical concepts with limited material, namely about fractions.

## METHOD

This type of research is qualitative with a descriptive approach. This research was located at MI Darul Muttaqin Sukomangu whose address is Geluran Hamlet RT 002 RW 004 Sukomangu Village, Purwantoro District, Wonogiri Regency. There are 10 class IV students at MI Darul Muttaqin. Some students were then given a test in the form of a description test to measure the achievement of indicators of understanding the concept. After carrying out the test, some students were grouped into several categories of understanding which were adapted from the categories of understanding according to Arikunto (2010) as shown in Table 1.

**Table 1.** Concept Understanding Category

Category	Percentage
High	$66\% < x \leq 100\%$
Medium	$33\% < x \leq 66\%$
Low	$0\% < x \leq 33\%$

The percentage of achievement of the concept understanding indicator is adapted from the opinion of Arikunto (2009) as follows.

$$x = \frac{\text{Number of Indicators Achieved}}{\text{Total Number of Indicators}} \times 100\%$$

From the results of these categories, all students who met the criteria were taken to be used as research subjects. These criteria are students who do not meet some or all of the indicators for understanding concepts and having good communication skills.

Research techniques are carried out by giving tests and conducting interviews. The test in this study was used to measure the achievement of indicators of understanding the concept. Meanwhile, interviews are used to find out more about the learning obstacles experienced by students and the factors that influence them. Data analysis in this research uses data analysis stages as stated by Miles et al. (2020), which consists of three stages, namely data condensation, data presentation, and conclusion.

## RESULT

The concept understanding test was carried out on June 10, 2022. The concept understanding test was carried out in class IV with a total of 10 students. Kristanti et al. (2019) states that students who understand a mathematical concept well will be able to define, classify, give examples, and relate various concepts to apply and present a concept in various mathematical representations. The ability to understand good concepts makes students not only know or remember, but students are also able to express a mathematical concept in another form. Students will also be able to apply one or several concepts in solving certain problems. For this reason, students need to have the ability to understand concepts as a basis for solving various mathematical problems. In this research, the concept understanding indicators used were adapted from Utomo's opinion (Utomo, 2016). Basic competencies and indicators of competency achievement which are used as reference material in research in class IV are presented in Table 2.

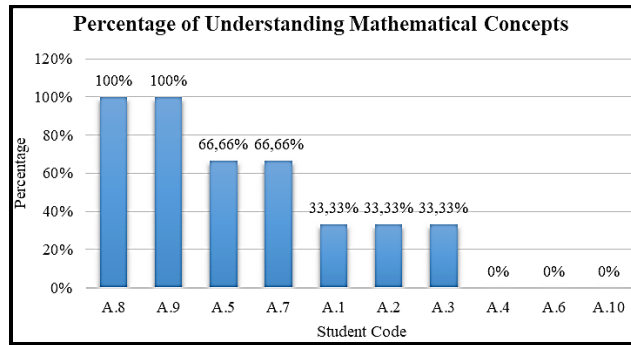
**Table 2.** Basic Competencies and Indicators of Competency Achievement

Basic Competencies	Indicators of Competency Achievement
Explain equivalent fractions with pictures and concrete models.	a. Mention the elements of fractions. b. Comparing fractions. c. Explain equivalent fractions with concrete pictures and models.

Source: (Permendikbud, 2018)

From the test results it was found that of the 10 students who were given the concept understanding test, 2 students met all the indicators of concept understanding so they did not meet the criteria for subject selection. Of the 8 students who did not meet some or all of the indicators, students who had good communication skills were then selected to be used as interview subjects. Information on students' communication skills was obtained from the class teacher's recommendations.

The following is a diagram of the results of the concept understanding test



**Figure 1.** Concept Understanding Test Results

From these recommendations, the results of the interview subjects were obtained with the subject codes as follows.

**Table 3.** Subject Code

Category	Percentage	Students Code	Subject Code
High	100%	A.8	-
	100%	A.9	-
	66,66%	A.5	ST1
	66,66%	A.7	ST2
Medium	33,33%	A.1	SS1
	33,33%	A.2	SS2
	33,33%	A.3	-
	0%	A.4	SR1
Low	0%	A.6	SR2
	0%	A.10	-

The following is a presentation of the results of the concept understanding test for each indicator of concept understanding.

1. Restate the concept (GPA 1)

From the test results it was discovered that of the 6 subjects studied there were 3 subjects who did not meet a GPA of 1. The third subject was SS1, SR1, and SR2. The following are questions to measure GPA 1.

**SOAL TES**

1. Menurut pendapatmu, apa yang dimaksud dengan pecahan itu?

**Figure 2.** Question Number 1

At GPA 1, the subject does not yet know the concept of fractions themselves. This is known from the test results of subjects who have not shown the meaning of the fractions they have studied. Each of them only wrote that a fraction is a number that is divided but did not understand the terms of the number itself. One of the test results answers by subjects at GPA 1 is shown in Figure 3 below.

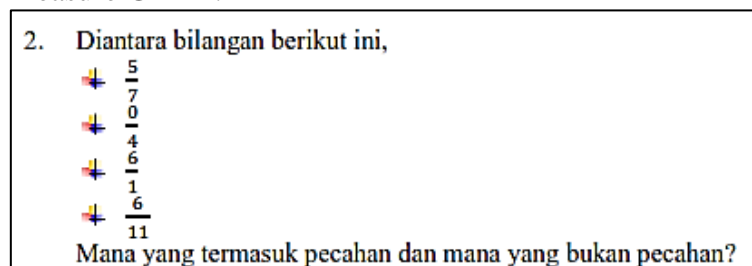
1. Pecahan adalah perpekan dan dikali

**Figure 3.** SS1 Answers to GPA 1

From the results of these answers, it can be seen that the subject does not understand the concept of fractions as a whole. Other subjects, namely SR1 and SR2, also showed similar answers and both did not know the concept of fractions themselves.

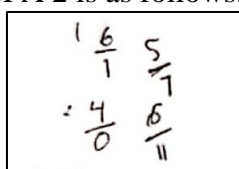
2. Classifying objects based on certain properties according to the concept (GPA 2)

From the test results, it was discovered that of the 6 subjects studied, there were 3 subjects who did not meet a GPA of 2. The three subjects were SS1, SR1, and SR2. The following are questions to measure GPA 2.



**Figure 4.** Question Number 2

At GPA 1, the subject cannot group fractions according to the concept of fractions. The subject only carelessly answers the question, giving rise to inaccurate answers. One of the test results answers by subjects at GPA 2 is as follows.



**Figure 5.** SR1 Answers to GPA 2

From the results of these answers, it can be seen that the subject has not been able to group fractions and non-fractions correctly. Other subjects, namely SS1 and SR2, also showed similar answers and were both unable to group fractions and non-fractions.

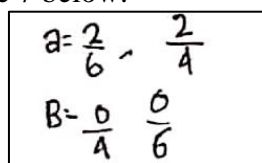
### 3. Provide examples and non-examples according to the concept (GPA 3)

From the test results, it was discovered that of the 6 subjects studied, 4 subjects did not meet a GPA of 3. The four subjects were ST1, SS2, SR1, and SR2. The following are questions to measure GPA 3.

3. a. Berikan 2 contoh pecahan yang senilai! Berikan alasanmu!  
b. Berikan 2 contoh pecahan yang tidak senilai! Berikan alasanmu!

**Figure 6.** Question Number 3

At GPA 3, the subject was not able to provide examples of equivalent fractions according to the concept of equivalent fractions. Subjects did not know the concept of equivalent fractions, which resulted in inaccurate answers. One of the test results answers by subjects with a GPA of 3 is shown in Figure 7 below.



**Figure 7.** SR2 Answers to GPA 3

From SR2's answer to GPA 3, it can be seen that SR2 does not yet understand the meaning of fractions and equivalent fractions. This causes SR2 to not be able to provide examples and not examples of equivalent fractions correctly. SR2's answer to point a is not correct because  $\frac{2}{6}$  and  $\frac{2}{4}$  are not equivalent fractions. Apart from that, SR2's answer to point b is also not correct because  $\frac{0}{4}$  and  $\frac{0}{6}$  are not fractions or equivalent fractions. For this reason, it can be concluded that SR2 has not yet reached a GPA of 3. Other subjects, namely ST1, SS2, SR1, and SR2 also showed similar answers and both did not know the concept of equivalent fractions so the resulting answers were not correct.

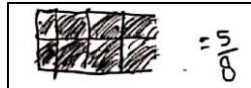
### 4. Presenting concepts in various forms of mathematical representation (GPA 4)

From the test results, it was discovered that of the 6 subjects studied, 3 subjects did not meet a GPA of 4. The three subjects were SS2, SR1, and SR2. The following are questions to measure GPA 4.

4. Bagaimanakah bentuk pecahan  $\frac{5}{8}$  apabila dinyatakan dalam bentuk gambar!

**Figure 8.** Question Number 4

At GPA 4, the subject cannot present fractions in the form of pictures. Apart from that, there were also subjects who were not careful in loading images, resulting in inaccurate answers. One of the answers to the test results by subjects with a GPA of 4 is as follows



**Figure 9.** SR1 Answers to GPA 4

From Figure 9, it can be seen that SR1's answer regarding the presentation of the fraction  $\frac{5}{8}$  is not correct. In this image, SR1 cannot yet present part of the entire fractional image. This is proven by the fact that the shading part is displayed not only partially but completely shaded. Based on this description, it can be concluded that SR1 has not yet reached a GPA of 4. Other subjects, namely SS2, SR1, and SR2 also showed similar answers and were able to present the fractions correctly.

5. Using utilizing and selecting certain procedures or operations (GPA 5)

From the test results, it was discovered that of the 6 subjects studied, 5 subjects did not meet a GPA of 5. The five subjects were ST2, SS1, SS2, SR1, and SR2. The following are questions to measure GPA 5.

5. Gunakan tanda ">", "<", atau "=" untuk menyatakan perbandingan dua pecahan berikut ini!

$$\frac{2}{3} \dots \frac{3}{6}$$

Uraikan langkah-langkah dalam memperoleh jawaban tersebut!

**Figure 10.** Question Number 5

At GPA 4, the subject cannot describe the steps in comparing fractions. Subjects immediately make comparisons by looking at the numbers in the fraction part. This causes the answers obtained to be inaccurate. One of the test results answers by subjects with a GPA of 5 is shown in Figure 11 below.

**Figure 11.** SS1 Answers to GPA 5

From Figure 11 it can be seen that SS1 answered that the fraction  $\frac{2}{3}$  is smaller than  $\frac{3}{6}$ . If the procedure or steps for answering the question are correct, the correct answer should be  $\frac{2}{3}$  greater. Other subjects, namely ST2, SS1, SS2, SR1, and SR2 also showed similar and not correct answers.

6. Applying concepts or algorithms to problem-solving (GPA 6)

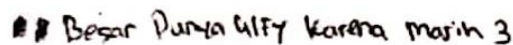
From the test results, it was discovered that of the 6 subjects studied, 6 subjects did not meet a GPA of 6. The five subjects were ST1, ST2, SS1, SS2, SR1, and SR2. The following are questions to measure GPA 6.

6. Linda dan Ulfy membeli kue berbentuk persegi. Kue yang mereka beli memiliki ukuran yang sama. Linda memotong kuenya menjadi 4 bagian yang sama besar. Sedangkan Ulfy memotong kuenya menjadi 8 bagian yang sama besar. Setelah dimakan, kue Linda bersisa 2 bagian sedangkan kue ulfy bersisa 3 bagian. Bandingkanlah sisa kue milik siapa yang paling besar?

**Figure 12.** Question Number 6



At a GPA of 6, the subject cannot describe the steps in comparing fractions. Subjects answered questions directly without writing down the procedures used. The answer produced by the subject is also not correct. One of the answers to the test results by subjects with a GPA of 6 is as follows.



**Figure 13.** SS1 Answers to GPA 5

From Figure 13, it can be seen that ST1's answer is still not correct because it does not present the remaining cake in fraction form. Based on the questions given, the remaining cake must be expressed in fraction form according to the concept studied. If the procedure used is correct, the result will be that Linda's remaining cake is larger. Other subjects, namely ST1, ST2, SS1, SS2, SR1, and SR2 also showed similar and not correct answers.

From the test results, it was found that most of the students had not reached the concept understanding indicators. The results of students' answers who do not meet some or all of the indicators of understanding the concept and who have good communication skills will be used as interview subjects. The research subjects were then interviewed to find the obstacles they experienced and the factors that caused them. From the results of interviews with subjects, the learning obstacles that occur and the factors causing them are as follows.

1. Unpreparedness in learning due to psychological aspects such as low motivation and interest in the material being studied (O1)

Barriers to learning ontogeny with the O1 indicator were experienced by 3 research subjects, namely SS1, SR1, and SR2. The following are the results of interviews conducted with one of the subjects, namely SR1

*Researcher* : Do you like this fraction material?

*SR1* : No

*Researcher* : Why don't you like it?

*SR1* : Yes, basically I don't like it, it's difficult

The results of the interview show that SR1 does not like fractional material. From this it can be seen that SR1 experiences ontogeny barriers with the O1 indicator. The factors causing these obstacles are internal factors in the form of psychological aspects of lack of interest in learning.

2. Lack of concentration when learning begins (O2)

Barriers to learning ontogeny with the O2 indicator were experienced by all research subjects. The following are the results of interviews conducted with one of the subjects, namely ST2.

*Researcher* : When this material was given in class, did you concentrate or not?

*ST2* : Sometimes not, sis

*Researcher* : Why do you sometimes not concentrate?

*ST2* : Because it's noisy outside, Sis

The results of the interview show that ST2 shows a lack of concentration when learning in class. From this, it can be seen that ST2 experiences ontogeny barriers with the O2 indicator. These obstacles occur due to external factors, namely school factors in the form of crowded classroom conditions.

3. Incomplete understanding of prerequisite material (O3)

Barriers to learning ontogeny with the O3 indicator were experienced by 2 research subjects, namely SR1 and SR2. The following are the results of interviews conducted with one of the subjects, namely SR1.

*Researcher*: Is it possible to calculate integer operations such as addition, subtraction, multiplication, and division?

*SR1*: You can add and subtract, but not so much for multiplication and division

*Researcher*: Why can't it be done yet?

*SR1 : Not yet memorized*

*Researcher: Not memorizing it means not learning?*

*SR1: rare*

The results of the interview showed that SR1 showed an incomplete understanding of the prerequisite material, namely whole number arithmetic operations. From this it can be seen that SR1 experiences ontogeny barriers with the O3 indicator. The factors causing these obstacles are internal factors in the form of emotions or wrong habits such as lack of learning.

4. Unable to determine mathematical concepts and does not write them down when answering questions (E1)

Barriers to epistemological learning with indicator E3 were experienced by 4 research subjects, namely SS1, SS2, SR1, and SR2. The following are the results of interviews conducted with one of the subjects, namely SR2.

*Researcher: What do you mean by fractions in your answer?*

*SR2: All I know is a number like that, sis*

*Researcher: What number?*

*SR2: The one with the spring*

*Researcher: Are the numbers free or just certain numbers?*

*SR2 : Free*

*Researcher: Apart from that, are there any other rules that require fractions?*

*SR2: Don't know*

*Researcher: Then what do you mean by equivalent fractions, do you know or not?*

*SR2 : No*

*Researcher: Isn't the fraction written in number 6?*

*SR2: Don't know*

*Researcher: Why don't you know?*

*SR2: Because you don't study enough, Sis*

The results of the interview show that SR2 has not been able to determine the concept of fractions. SR2 only knows that a fraction is a number that is divided. However, SR2 does not yet know the other conditions for the concept of fractions as division. From this, it can be seen that SR2 has not been able to determine the concept of fractions. Apart from that, SR2 also doesn't know the concept of equivalent fractions so he isn't able to give an example correctly. This means that SR2 experiences epistemological obstacles with indicator E1. These obstacles are caused by internal factors in the form of emotional factors or wrong habits, namely not studying.

5. Unable to explain the steps in answering questions (E2)

Barriers to epistemological learning with indicator E2 were experienced by 4 research subjects, namely SS1, SS2, SR1, and SR2. The following are the results of interviews conducted with one of the subjects, namely SR1.

*Researcher: Number 3, what method do you use?*

*SR1 : Forget it sis*

*Researcher: Number 4, how do you change the fraction?*

*SR1: Divided into 8 parts, sis*

*Researcher: So what are the next steps?*

*SR1: It was shaded like that but I didn't know how so I shaded it all*

*Researcher: For number 5, what method do you use?*

*SR1: 2 is compared to 3 then 3 is compared to 6*

*Researcher: For number 6, what method do you use?*

*SR1: Make it into fractions first and then compare it, sis*

*Researcher: Who does the  $\frac{2}{3}$  fraction belong to?*

*SR1 : Linda's*

*Researcher: So, based on your answer, the bigger one belongs to Ulfy, right?*

*SR1 : Yes sis*

*Researcher: So what do you use to compare fractions?*

*SR1: I forgot how to do it, so it's just inconsequential*



*Researcher: How could you forget why?*

*SR1: I don't study it anymore, sis*

In answering the question, SR1 was not able to explain the steps in the process. The results of the interview showed that SR1 had not been able to write down the steps in giving examples of equivalent fractions. SR1 also cannot explain the steps in drawing fractions. In addition, SR1 also does not use fraction comparison steps such as equalizing the denominators. From this, it can be seen that SR1 experiences epistemological obstacles with indicator E2. These obstacles are caused by internal factors, namely emotional factors or wrong habits such as lack of learning.

#### 6. Not being careful in writing, causing errors in calculations (E3)

Barriers to epistemological learning with indicator E2 were experienced by 5 research subjects, namely ST1, ST2, SS2, SR1, and SR2. The following are the results of interviews conducted with one of the subjects, namely SR1.

*Researcher: This picture of fractions shows fractions with what value?*

*SR2 : 5/8 sis*

*Researcher: Try calculating again*

*SR2: Oh yes, I miscalculated, sis, this white box has 1 excess*

*Researcher: After doing the work, it will be checked again or not*

*SR2 : No*

*Researcher: Why wasn't it researched?*

*SR2 : Hurry because it's time to go home*

The results of the interview show that SR2 did not re-correct his answers. This causes errors in calculations. From this, it can be seen that SR2 experiences epistemological obstacles with indicator E3. The factors that cause these obstacles are external factors at school, namely time constraints.

## DISCUSSION

Based on the results of conceptual understanding tests, interviews, and analysis of research results that have been carried out, it is known that the subjects studied experienced two learning obstacles, namely ontogeny obstacles and epistemological obstacles. The indicators of ontogeny and epistemological barriers experienced by students are discussed in the following presentation.

### A. Ontogenic Barriers

#### 1. Unpreparedness for learning due to psychological aspects such as low motivation and interest in the material being studied

From the results of the analysis carried out by researchers, it was found that barriers to ontogeny learning with indicators of low motivation and interest in the material being studied occurred in 3 subjects. Of these three subjects, one subject is in the medium category. Subjects in the medium category achieved a concept understanding percentage of 33.33%. Meanwhile, the other two subjects came from the low category. Subjects in this low category have not achieved all indicators of conceptual understanding. Research from Ulfa et al. (2021) also obtained the same results. In his research, it was also found that students had weak motivation when studying fractions. Nurhidayah (2015) states that the higher the student's motivation, the higher their learning achievement and vice versa. The findings in this study are in line with this opinion because it was also found that there was a lack of motivation and low interest in the material being studied. The most dominant factor causing these obstacles is internal psychological factors in the form of a lack of interest in learning. Putri & Rifai (2019) state that interest influences learning motivation. According to him, if interest in learning is high it will increase motivation to learn.

#### 2. Lack of concentration when learning begins

From the results of the analysis carried out by researchers, it was found that 6 subjects showed a lack of concentration during learning. These six subjects constitute the total of all research subjects. Both high, medium, and low conceptual understanding categories experienced this obstacle. The high subject achieved a concept understanding percentage of 66.66%, and the medium category achieved an indicator percentage of 33.33%. Meanwhile, the low category has not yet reached the concept understanding indicator. This finding is in line with research by Ulfa et al. (2021) which also found that there were students who lacked focus in learning fractions. Setyani & Ismah (2018) state that concentration is very necessary in any learning. This is because the aspect that supports students in learning is concentration. In this research, ontogeny barriers with indicators of lack of concentration when learning are the most dominant learning barriers because they are experienced by all research subjects. The most dominant factor causing these obstacles is external factors at school in the form of crowded school conditions. Novrilla et al. (2020) states that a good environment for the learning process is an environment that is far from noise so that you can concentrate optimally.

3. Incomplete understanding of the prerequisite material

From the results of the analysis carried out by researchers, it was found that 2 subjects did not fully understand the prerequisite material. These two subjects come from the low category of subjects or those that have not met all the indicators of conceptual understanding. According to Unaenah (2017), prerequisite material plays an important role. This is because if you do not have these prerequisite abilities it will be difficult to continue with the next material. After conducting interviews, the two subjects who had not met all the indicators of understanding this concept did have obstacles to learning ontogeny with indicators of incompleteness in the prerequisite material. The most dominant factor causing these obstacles is internal factors in the form of emotional aspects or wrong habits, namely lack of learning. Astuti (2015) states that initial abilities or prerequisite abilities are the result of learning. From this, it can be concluded that students' lack of learning can result in a lack of understanding of the prerequisite material.

B. Epistemological Barriers

1. Not being able to determine mathematical concepts and not writing them down when answering questions

From the results of the analysis carried out by researchers, it was found that 4 subjects were unable to determine and write down the concepts studied in answering questions. Of these four subjects, 2 subjects came from the medium category and 2 subjects came from the low category. In Elfiah's research, the same learning barriers were also found, namely epistemological barriers with the indicators of being unable to determine mathematical concepts and not being able to write them down when answering questions (Elfiah et al., 2020). Radiusman (2020) states that in solving problems in mathematics, understanding concepts is very important. Apart from that, Annisah et al. (2021) stated that students will be hampered in mastering other mathematics material if their understanding of the concepts is not good. The most dominant factors causing these obstacles are internal factors with emotional aspects or wrong attitude habits, namely being lazy about studying. Rais & Ferinaldi (2019) state that learning influences the activity of understanding mathematical concepts. According to him, students who are diligent in studying mathematics will obtain better results in understanding mathematical concepts compared to students who are lazy in studying mathematics.

2. Unable to explain the steps in answering the question

From the results of the analysis carried out by researchers, it was found that 4 subjects were unable to describe the steps in answering the questions. Of these four subjects, 2 subjects came from the medium category and 2 subjects came from the low category. In Elfiah's research, the same epistemological obstacles were also found. This obstacle is not being able to describe the steps in answering the questions as expected by the researcher. The most dominant factors causing these obstacles are internal factors with emotional aspects or wrong attitude habits such as not studying (Elfiah et al., 2020). In line with this, Kumalasari et al. (2021) states that learning influences accuracy in solving problems.

3. Not being careful in writing, causing errors in calculations

From the results of the analysis carried out by researchers, it was found that 5 subjects were less careful in writing. This results in errors in calculations. Of the five subjects, 2 subjects came from the high category, 1 subject came from the medium category and 2 subjects came from the low category. In Elfiah's research, the same epistemological obstacles were also found (Elfiah et al., 2020). Koswara (2018) states that in solving problems in mathematics, accuracy is very necessary. According to him, accuracy influences the results obtained by students. The more careful the students are, the better the results the students will get, and vice versa. The most dominant factor causing these obstacles is external factors at school which are rushed by time/haste. In line with this, Rosyida et al. (2016) stated that students' lack of accuracy in solving questions was caused by students being in a hurry when working on questions.

## CONCLUSION AND SUGGESTIONS

Based on the results of the research and data analysis that has been carried out, it can be concluded that students who understand the mathematical concept of fractions are categorized into 3, namely students in the high, medium, and low categories. Students in the high category achieved a concept understanding percentage of 66.66%. Students in the medium category achieved a concept understanding percentage of 33.33%. Meanwhile, students in the low category have not achieved all indicators of concept understanding. The most dominant barrier to learning is ontogeny barriers with indicators of lack of concentration when learning begins. The most dominant causal factor is internal factors in the form of emotional aspects or wrong attitude habits such as lack of learning.

Suggestions from the research and data analysis that have been carried out are that teachers should view this obstacle as a consideration in providing learning. Apart from that, from this research teachers can pay more attention to students' readiness so they can concentrate more when learning. For further research, this research should be used as supporting information regarding student learning barriers for elementary school students in understanding students' mathematical concepts about fractions.

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