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EXPLORING THE WORLD OF PLANE SHAPES: A STUDY ON FOURTH-GRADE STUDENTS' COMPREHENSION OF MATHEMATICAL CONCEPTS

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ABSTRACT

This research investigates the mathematical understanding of fourth-grade students on plane materials using interactive multimedia. Qualitative methods and a descriptive approach are applied to students at MI Ar Rahmah, Bengle Village, Majalaya, during the academic year 2020/2021. Sampling and mathematical comprehension tests are conducted on rectangular and triangular plane materials. The results reveal three levels of understanding: high (47%), medium (21%), and low (32%). The analysis shows that high and medium-level students fulfill indicators with errors, while low-level students only meet the concept application indicator. Student interviews uncover difficulties in grasping concepts, including recognizing objects and modeling mathematical statements. Hence, improved teaching methods are needed to enhance students' mathematical understanding, particularly in plane materials. Further research is recommended to explore effective strategies for reducing mathematical anxiety and enhancing students' conceptual understanding.

MENJELAJAHI DUNIA BENTUK DATAR: SEBUAH STUDI TENTANG PEMAHAMAN SISWA KELAS EMPAT TERHADAP KONSEP MATEMATIKA

Kata Kunci:

Siswa kelas empat
Multimedia interaktif
Pemahaman matematika
Bangun datar

ABSTRAK

Penelitian ini menyelidiki pemahaman matematika siswa kelas empat terhadap bahan datar dengan memanfaatkan multimedia interaktif. Metode kualitatif dan pendekatan deskriptif digunakan pada siswa MI Ar Rahmah, Desa Bengle, Majalaya, tahun akademik 2020/2021. Pengambilan sampel dan uji pemahaman matematika dilakukan pada bahan datar persegi dan segitiga. Hasilnya menunjukkan tiga tingkatan pemahaman: tinggi (47%), sedang (21%), dan rendah (32%). Analisis mengungkapkan siswa tinggi dan sedang memenuhi indikator dengan kesalahan, sedangkan rendah hanya memenuhi indikator penerapan konsep. Wawancara siswa mengungkap kesulitan memahami konsep, termasuk mengenali objek dan memodelkan pernyataan matematika. Dengan demikian, perlu metode pengajaran yang lebih baik untuk meningkatkan pemahaman matematika siswa, khususnya pada bahan datar. Penelitian selanjutnya direkomendasikan untuk mengeksplorasi strategi efektif dalam mengurangi kecemasan matematika dan meningkatkan pemahaman konseptual siswa.

1. INTRODUCTION

Learning is teaching someone about an information or concept through experience [1]. Mathematics learning emphasizes the process of finding knowledge. Students are directed to discover for themselves the various facts and concepts, as well as new values necessary for their lives, and the focus of learning is directed towards developing students' skills in processing knowledge, discovering, and developing the necessary facts, concepts, and values. Learning is an effort by teachers to organize the environment and provide learning facilities for students to learn it.

Mathematics is the queen of science in everyday life as well as in helping in other fields of science [2]. Mathematics is not separated from life, either directly or indirectly. Mathematics has a vital role, both in science and in everyday life. In addition, mathematics is also one of the subjects that play a significant role in education. By learning mathematics, we will learn the critical, creative, and active reasoning that people desperately need to solve various problems [3]

Mathematics is a fundamental science in life, so it makes mathematics mandatory learning at every level of education, namely elementary school, junior high school, senior high school, and even universities [4]. Mathematics needs to be studied and understood by all students. Mathematics is taught from elementary school to college so students can achieve a goal [5]. As is known that one of the objectives of mathematics subjects is explained in the Regulation of the Minister of National Education Number 22 of 2006 on Standard Content of Mathematics Subjects for all levels of primary and secondary education so that learners can understand mathematical concepts, explain the interrelationships between concepts and apply concepts or algorithms, flexible, accurate, efficient and precise in problem-solving. One of the success factors of students in mastering mathematical materials and achieving learning goals is the teacher's ability to carry out the learning process. Mathematics learning is still one of the lessons many students avoid because many still consider mathematics a complex subject.

Mathematics is a structured subject. In studying mathematics, we first understand easy matter and then complex matter. Learning mathematics requires understanding the concepts taught because mathematics is related to concepts in similar materials [6]. These concepts will give birth to a theorem or formula that is expected to be applied, so the ability to use these concepts and theorems is needed. One of the basic skills that students must master in studying mathematics is understanding concepts.

The ability to understand mathematical concepts is an ability that needs to be considered in the process of learning mathematics. Understanding concepts in mathematics learning is an essential foundation for solving mathematical and everyday problems. understanding mathematical concepts is very important for students because mathematics concepts are related [7]. Mathematics lessons emphasize understanding concepts, meaning that in studying mathematics, students must understand mathematical concepts first to solve problems and be able to apply the concepts in the real world. Understanding concepts is the ability of students to master some subject matter, where students not only know or remember several concepts but can reveal again in other forms that are easy to understand [8].

In fact, students' mathematical understanding needs to improve in the field. This concept follows the results of the 2015 TIMSS report from the International Association for the Evaluation of Educational Achievement [9], which shows that Indonesia is in the 44th position out of 56 participating countries with an average score of 397 out of 500. Thus, mathematics learning in Indonesia has not achieved satisfactory or good results. That the ability to understand mathematical concepts in flat quadrilateral building material

is relatively low; this is seen from students still experiencing errors when solving problems [10]. Indications of low ability to understand the concept are characterized by some symptoms, namely, some students have not been able to choose the appropriate procedure to solve the problem, students have not been able to apply the concepts that have been taught when given the story, students have difficulty in solving problems whose models are slightly different from examples and students do not understand in determining the known data on the story [11]. The difficulty of understanding mathematics becomes a problem, especially in plane material. Grade IV elementary students need to understand plane material, for example, rectangular and triangular.

Students are said to have concept comprehension skills if all indicators of concept understanding are met. Researchers use indicators of understanding the concepts of [12], i.e., (a) Recertifying a concept, (b) Classifying objects according to certain traits (according to the concept), (c) Providing examples and non-examples of concepts, (d) Presenting concepts in the form of mathematical representations, (e) Developing the necessary terms and conditions of a concept, (f) Using, utilizing, and selecting specific procedures or operations, and (g) Applying concepts or algorithms in problem-solving. In everyday life, we do not escape with objects that are flat-shaped. For example, when we install ceramics/tiles in a square-shaped room, to avoid making mistakes in determining the number of ceramics/tiles needed, we will estimate the room area to know the number of ceramics/tiles needed.

Based on the exposition provided above on the importance of understanding mathematical concepts. Various studies have been conducted previously, including the integration of plane concepts and local wisdom as an alternative mathematical learning media in elementary schools [13], common mistakes made by students in understanding mathematical concepts related to planes [14], flipped classroom model regarding understanding of mathematical concepts [15], exploration of ethnomathematics at Cetho Temple with a focus on plane topics [16], exploration of effective teaching methods to enhance understanding of plane mathematical concepts [17]. However, there has been no research on the creative mathematical abilities of elementary school students with the assistance of interactive multimedia.

This research analyzes students' mathematical understanding abilities in plane material. Previous research has used various media tools and classroom models to see the ability to understand mathematical concepts. Still, it has yet to focus on analyzing the ability to understand mathematical concepts. In this research, we analyze multimedia learning tools used as instruments to assist students in understanding mathematical concepts.

2. METHOD

The research employed qualitative research using descriptive methods. This research aimed to describe students' ability in plane material in grade IV. To understand mathematical concepts, the subjects of this study were students of grade IV MI Ar Rahmah Bengle Village Majalaya Subdistrict 2020/2021. The technique of selecting research subjects was purposive sampling. Purposive sampling is a technique of retrieving data from source subjects with specific considerations [18]. The research subject is the subject or source of information intended for research by researchers [18].

Researchers provided instruments as a description test in determining high, medium, and low-skilled students. The test was a mathematical comprehension ability test on rectangular and triangular plane materials. Students' answers were scored on each question item to analyze their ability to understand mathematical concepts. The mathematical

concept comprehension score data obtained was analyzed using the following percentage formula: (student score)/(ideal score) x 100%.

Based on the test results analysis, the researchers interviewed research subjects about their abilities to solve problems through semistructured interviews and documentation. Semistructured interviews were used to find more open problems, where sources were asked for their opinions and ideas, making it easier for researchers to dig up information. Furthermore, the researchers performed documentation for collecting written or unwritten data, such as picture documents.

The data analysis used in this study was data analysis by Miles and Huberman, consisting of three stages: data reduction, data presentation, and conclusion/verification. The first stage is data reduction, which is to group data, ranging from collecting student answers to determining the research subjects from high, medium, and low-ability test results and then conducting interviews on research subjects. The second stage is the presentation of data, namely by presenting the data of the question, the answers, and the results of interviews on each indicator of mathematical concept understanding ability of the research subject. The last conclusion is to describe the results of student understanding as measured from indicators of mathematical concept comprehension ability in rectangular and triangular materials based on high, medium, and low categories.

3. RESULTS AND DISCUSSION

The test of mathematical concept understanding obtained 47% (nine students) of highly skilled students (scored ≥ 80), four students of moderately-skilled students or 21% (scored ≥ 65 and < 80), and six students with low-skilled ability or 32% (< score 65). The results of this study are the results of the student's test on the mathematical concept comprehension ability test. The analysis of the work of students from each category (high, medium, and low) is as follows:

3.1 High Category of Mathematical Concept Comprehension Skills

The work of subject 1 (T) on problem number 1 can be seen in Figure 1 below.

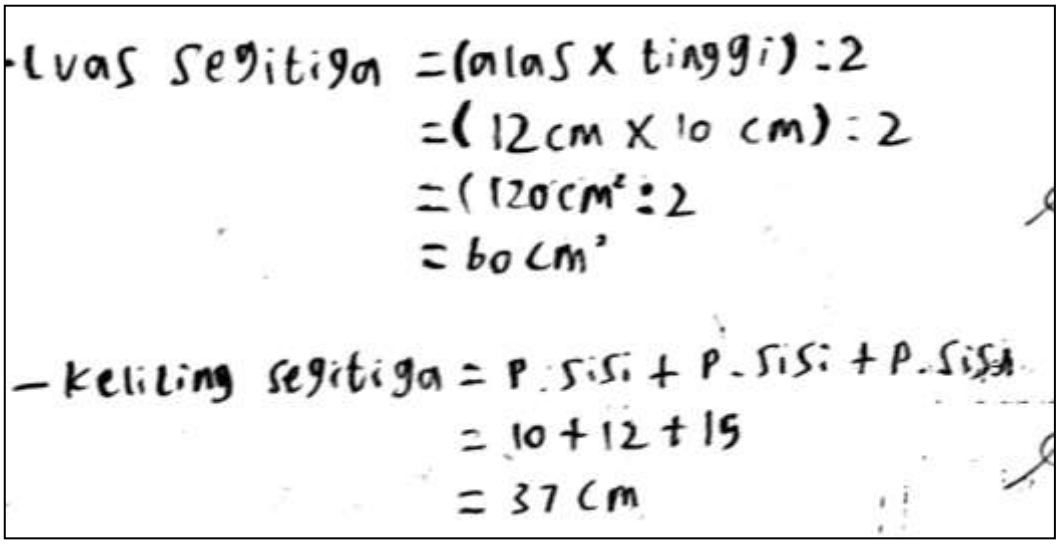

Figure 1. Work Results of Subject 1 (T) on Problem Number 1

Subject 1 (T) could not reflect the indicator of the ability to understand mathematical concepts despite the correct answer. Subject 1(T) answered question number 1 correctly, which indicated the indicator restating the concept. Subject 1 answered the question briefly

according to the concepts studied in the triangle's area and circumference. However, he needed to improve in writing the unit area of the triangle.

The work of subject 1 (T) on question number 2 can be seen in Figure 2 below.

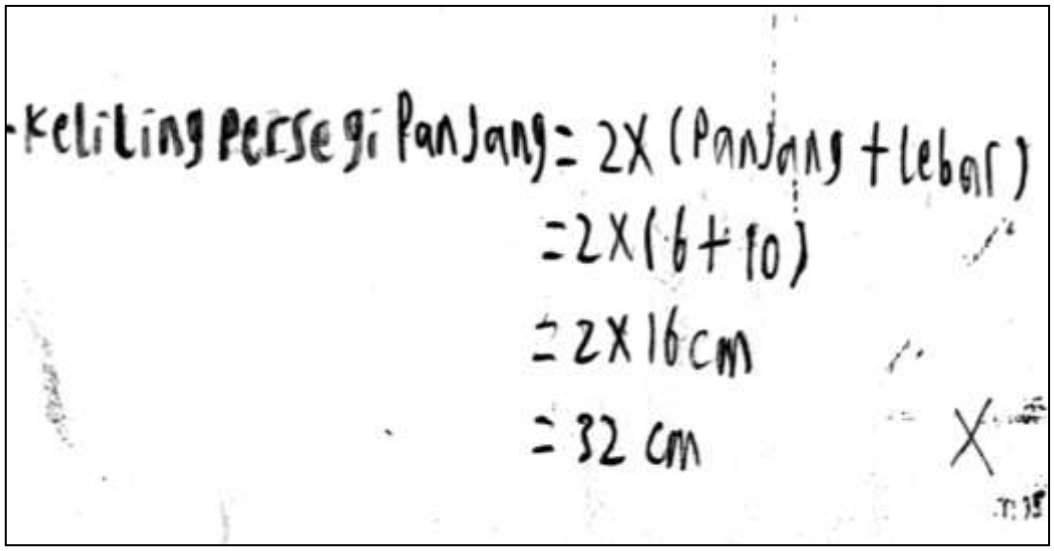

Figure 2. Work result of Subject 1 (T) on Problem Number 2

In problem number 2, which shows the indicator develops the necessary conditions or sufficient conditions of a subject concept, 1 (T) could not answer the problem appropriately and could not apply the formula to find the length of the rectangle. Subject 1 (T) needed help understanding the mathematical concept in indicator two and the intention of the problem.

The work of subject 1 (T) on question number 3 can be seen in Figure 3 below.

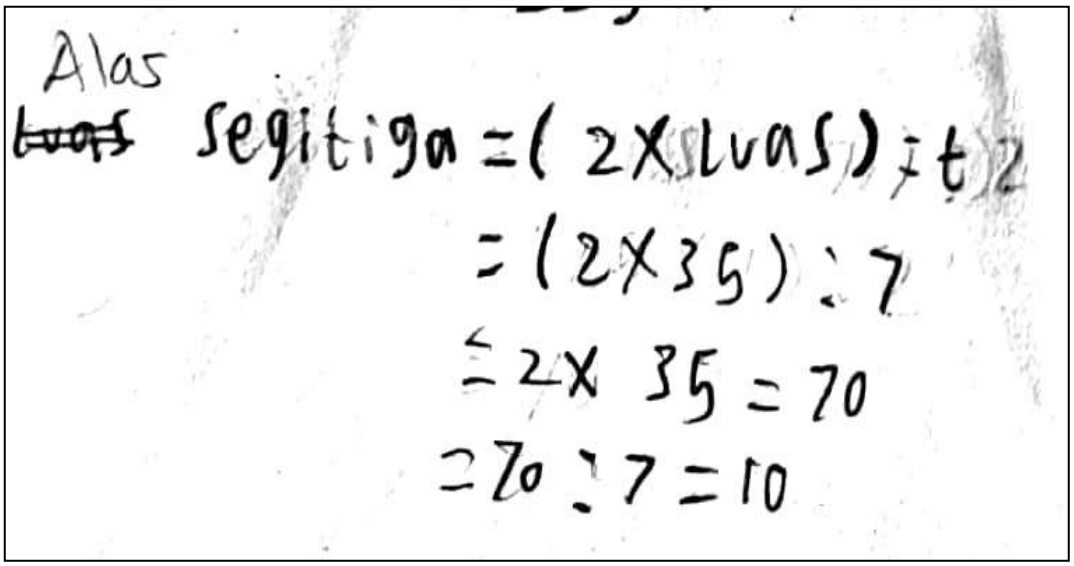

Figure 3. Work Result of Subject 1 (T) on Problem Number 3

Subject 1 (T) answered the question appropriately, which shows the indicator of using, utilizing, and selecting a specific procedure or operation. Subject 1 (T) chose a procedure for finding the length of the triangular base, which is already known to be wide and high. Subject 1 (T) answered the question correctly but needed to write the unit in solving the problem.

The result of subject 1 (T) work on problem number 4 can be seen in Figure 4 as follows.

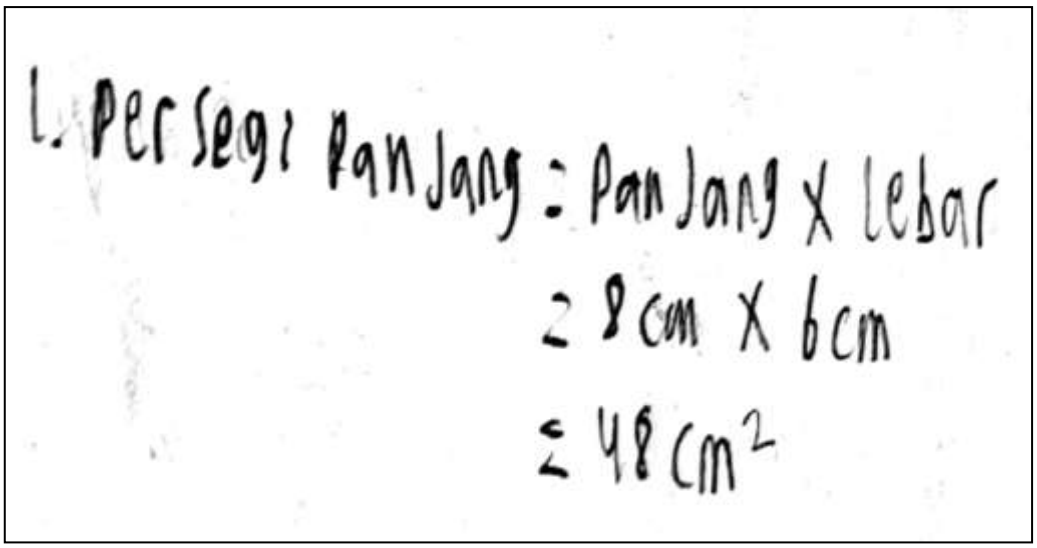

Figure 4. Work Result of Subject 1 (T) on Problem Number 4

Subject 1 (T) could answer the problem correctly in problem number 4, which shows the indicator of applying concepts or algorithms in problem-solving. In question number 4, subject 1 (T) applied the concept of the rectangular area formula to find the area of Ani's book with the correct answer and write the unit area appropriately.

The results of the analysis of the ability to understand the mathematical concept of subject 1 (T) can be seen in Table 1 below.

Table 1. Analysis of the Ability to Understand Mathematical Concepts of Subject 1 (T)

No	Indicator	Information
1	Restate a concept	
2	Develop the necessary terms or conditions of a concept	Unfulfilled
3	Use, utilize, and select specific procedures or operations	
4	Applying concepts or algorithms in problem-solving	

Table 1 shows the results of the analysis of the mathematical understanding ability of subject 1 (T) through the test. To support the test results analysis, the researcher interviewed the subject related to his understanding of solving problem number 1 on the indicator (restating the concept). Here is a snippet of the interview with subject 1 (T):

P : *Do you understand the question?*
T : *I understand.*
P : *Do you know what formulas are used in solving problems?*
T : *The formula is the width and height of the triangle.*
P : *What is your conclusion to the formula of this triangle?*
T : *The triangle area formula is the base x height divided by 2. The triangle circumference formula is the length of the side added by the length of the side added by the length of the side.*
P : *Are you having trouble solving problems?*
T : *No.*

Furthermore, the researcher interviewed the subject about his understanding of solving problem number 2 on developing a concept's necessary or sufficient conditions. Here is an interview with subject 1 (T) related to the answer to question number 2:

P : *Can you tell me what was asked about it?*
T : *The circumference of the rectangle, ma'am.*
P : *Do you know what formulas are used in solving problems?*
T : *The formula is 2 x (length + width), ma'am.*
P : *Do you know how to find a rectangular's length when what is known is its circumference and width?*
T : *I cannot, ma'am.*
P : *Are you having trouble solving problems?*
T : *No.*

After the interview related to question number 2, the researcher interviewed the subject about question number 3 related to the indicator of using, utilizing, and choosing specific procedures or operations. Here is an interview excerpt related to question number 3:

P : *Can you tell me what was asked?*
T : *The question is the length of the triangle's base.*
P : *Are you having trouble solving the problem?*
T : *Yes, on the division count operation.*

Next, the researcher interviewed the subject related to problem number 4. Here is a snippet of the interview:

P : *Do you know what information is given?*
T : *Information about the book.*
P : *Can you tell me what was asked about it?*
T : *What is asked is the rectangular area of the book.*
P : *Do you know what formulas are used in solving problems?*
T : *Formula of 2 x rectangular area (length + width).*
P : *Are you having trouble solving problems?*
T : *No, ma'am.*

3.2 Moderate Categories of Mathematical Concept Understanding Ability

The following is the work of subject 2 (S) on question number 1. Based on Figure 5, subject 2 (S) could reflect indicators of the ability to understand mathematical concepts and provide precise answers. Subject 2 (S) answered the question correctly, which indicated the indicator of restating the concept. In question number 1, subject 2 (S) answered the question briefly according to the concept studied in the triangle's area and circumference. Subject 2 (S) answered correctly and wrote the unit area and circumference of the triangle precisely.

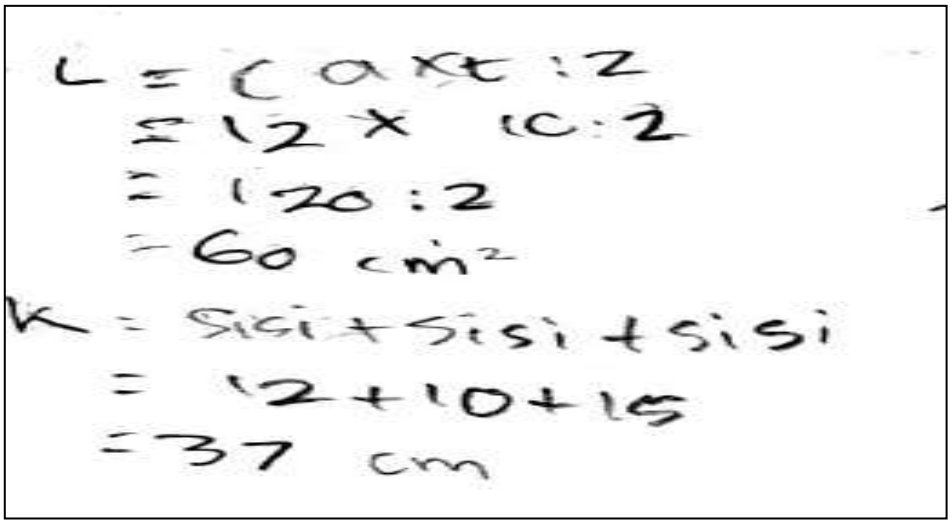

Figure 5. Work Result of Subject 2 (S) on Problem Number 1

The work of subject 2 (S) in question number 2 can be seen in Figure 6

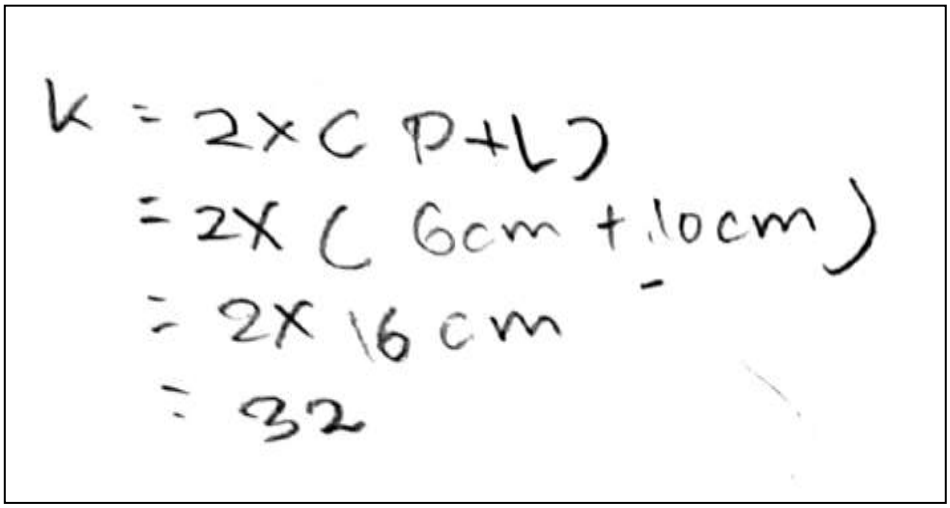

Figure 6. Work Result of Sibject 2 (S) on Problem Number 2

In problem number 2, which shows the indicator develops the necessary conditions or sufficient conditions of a concept, subject 2 (S) could not answer the problem appropriately and apply the formula for finding the length of the rectangle. Subject 2 (S) did not understand the mathematical concept in indicator 2 and the intention of the problem.

The work of subject 2 (S) on problem number 3 can be seen in Figure 7. Subject 2 (S) answered the question correctly, which shows the indicator of using, utilizing, and selecting a specific procedure or operation, although there were some errors. Subject 2 (S) chose a procedure for finding the length of the triangular base that is already known to be wide and high, but there were conceptual errors in the writing. Question number 2 asked the length of the triangular base, but subject 2 (S) wrote the area of the triangle asked. Although subject 2 (S) answered the question with the right formula and answer, subject 2 (S) did not understand indicator 3 because there were writing errors in the question problem.

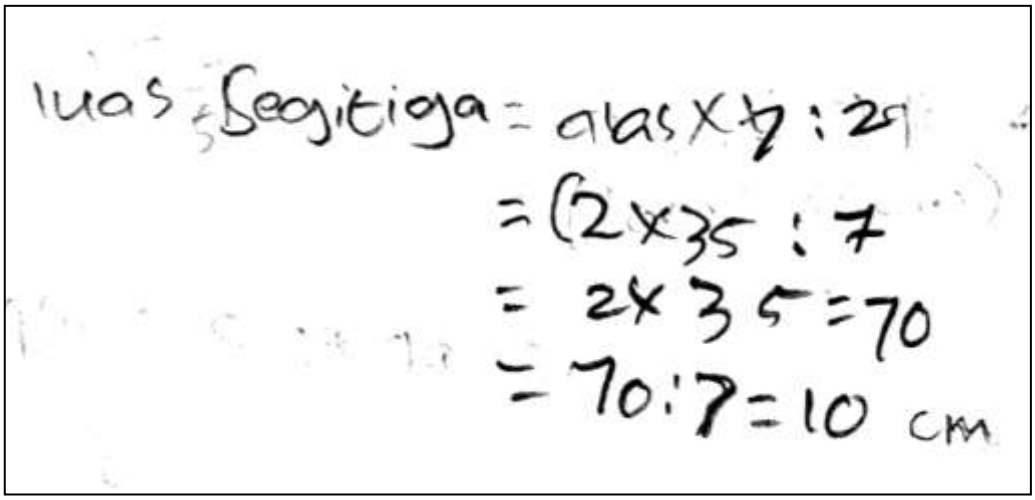

Figure 7. Work Result of Subject 2 (S) on Problem Number 3

The work of subject 2 (S) on problem number 4 can be seen in Figure 8.

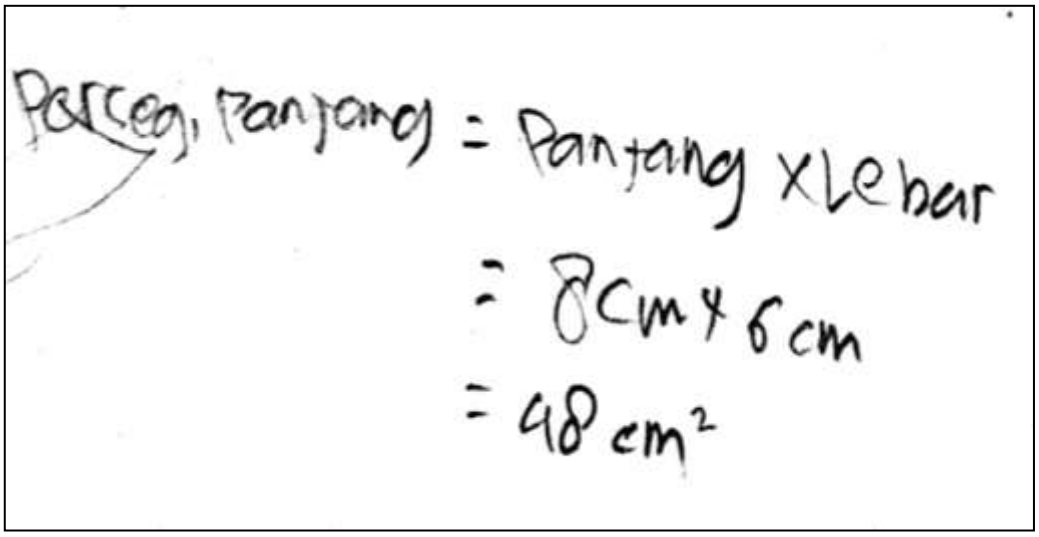

Figure 8. Work Result of Subject 2 (S) on Problem Number 4

Subject 2 (S) could answer the question correctly, which shows the indicator of applying concepts or algorithms in problem-solving. In question number 4, subject 2 (S) applied the concept of the rectangular area formula to find the area of Ani's book with the correct answer and write the unit of area correctly. However, subject 2 (S) wrote incompletely. The problem asked in the question was the area of the rectangle, but subject 2 (S) only wrote the rectangle when answering the question.

The results of the analysis of the ability to understand the mathematical concept of subject 2 (S) can be seen in Table 2.

Table 2. The Analysis of the Ability to Understand Mathematical Concepts of Subject 2 (S)

No	Indicator	Information
1	Restate a concept	
2	Develop the necessary terms or conditions of a concept	Unfulfilled
3	Use, utilize, and select specific procedures or operations	
4	Applying concepts or algorithms in problem-solving	

Table 2 shows the results of the mathematical understanding analysis of subject 2 (S) through the test. To support the test results analysis, researchers interviewed the subject about the answer to question number 1 on the indicator of restating the concept. Here is a snippet of the interview with subject 2 (S).

P : *Do you understand the question?*
S : *Understood.*
P : *Do you know what formulas are used in solving problems?*
S : *The width formula and circumference of triangles, ma'am.*
P : *What is the formula for the area and circumference of the triangle?*
S : *Base area formula x height divided by 2, side circumference formula added by side and then added by side.*
P : *Is there any difficulty in solving the problem?*
S : *None.*

Furthermore, the researcher interviewed on the subject related to understanding problem number 2 on the indicator of developing the necessary conditions or sufficient conditions of a concept. Here is an interview excerpt on subject 2 (S) related to the answer to question number 2:

P : *Can you tell me what was asked about it?*
S : *Rectangular length, ma'am.*
P : *Do you know how to find a rectangle if what it knows is its circumference and width?*
S : *I can't, ma'am.*
P : *Are you having trouble solving problems?*
S : *Yes, ma'am.*

The researchers interviewed the subject about his answer to question number 3 related to the indicator of using, utilizing, and choosing a specific procedure or operation. Here is an interview excerpt related to question number 3:

P : *Do you know what the answer to question number 3 is?*
S : *About the triangular base.*
P : *Can you tell me what was asked about it?*
S : *What is asked is the length of the triangular's base.*
P : *Are you having trouble solving the problem?*
S : *There's a little ma'am on the division operation.*

Furthermore, the researcher conducted an interview related to question number 4. Here is a snippet of the interview on the subject in question number 4:

P : *Do you know what information is there about number 4?*
S : *Information about the book.*
P : *Can you tell me what was asked?*
S : *The question is the breadth of the book.*
P : *Do you know what formulas are used in solving problems?*
S : *The formula is the length x width.*
P : *Are you having trouble solving problems?*

S : *None, ma'am.*

3.3 Low Category of Mathematical Concept Comprehension Ability

The following are the work results of subject 3 (R) on problem number 1:

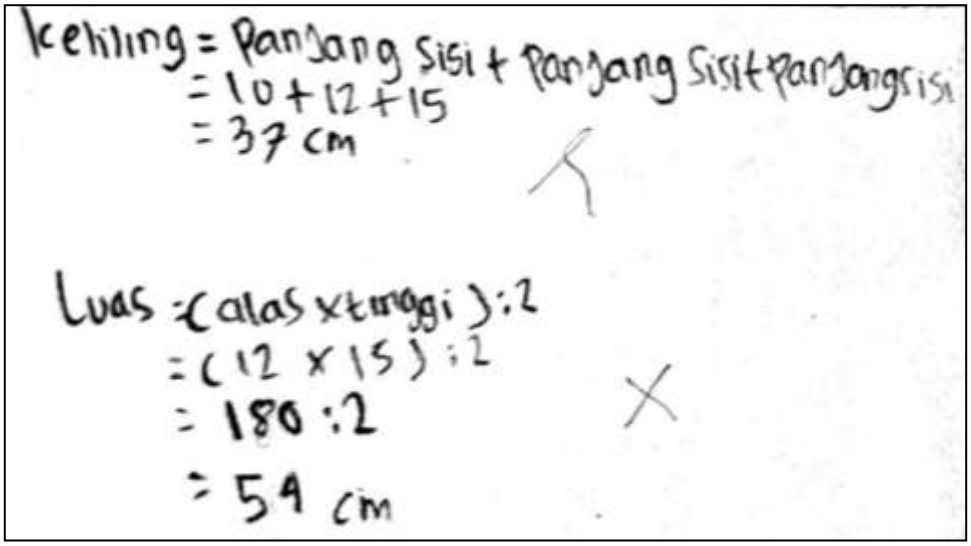

Figure 9. Work Result of Subject 3 (R) on Problem Number 1

Based on Figure 9, subject 3 (R) could not reflect the indicator of the ability to understand mathematical concepts. Subject 3 (R) answered the question correctly, which indicated the indicator of restating the concept. In question number 1, subject 3 (R) answered the question briefly according to the concept studied in the triangle's area and circumference. Subject 3 (R) answered correctly and wrote the unit of the triangle circumference appropriately. However, subject 3 (R) encountered errors in calculating the area of the triangle, and the answer was incorrect.

The result of subject 3 (R) work on problem number 2 can be seen in Figure 10 below:

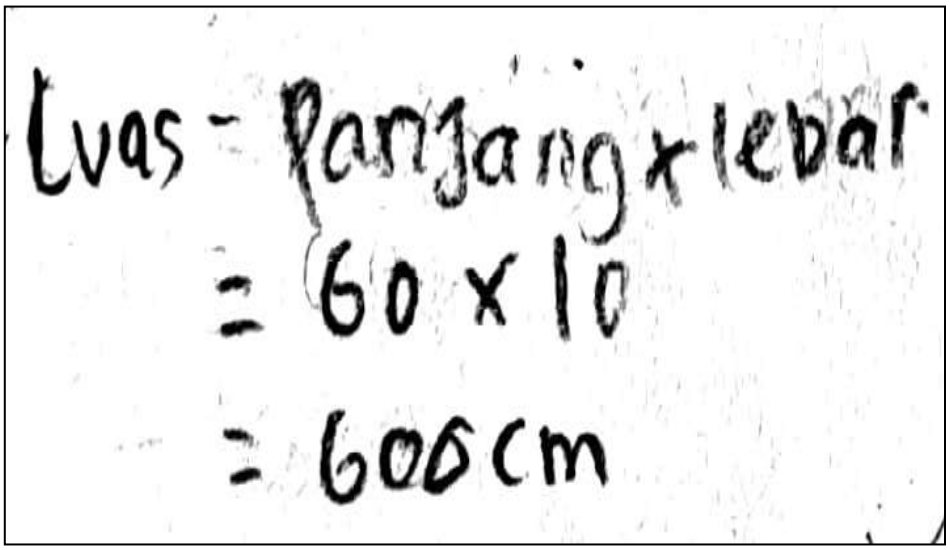

Figure 10. Work Result of Subject 3 (R) on Problem Number 2

In question number 2, which indicated the indicator of developing a concept's requirements or sufficient conditions, subject 3 (R) could not answer the question correctly. He could not apply the formula to find the length of the rectangle already known to be circumference and width. Subject 3 (R) did not understand the mathematical concept of indicator 2 and the question's meaning.

The result of subject 3 (R) work on problem number 3 can be seen in Figure 11 below:

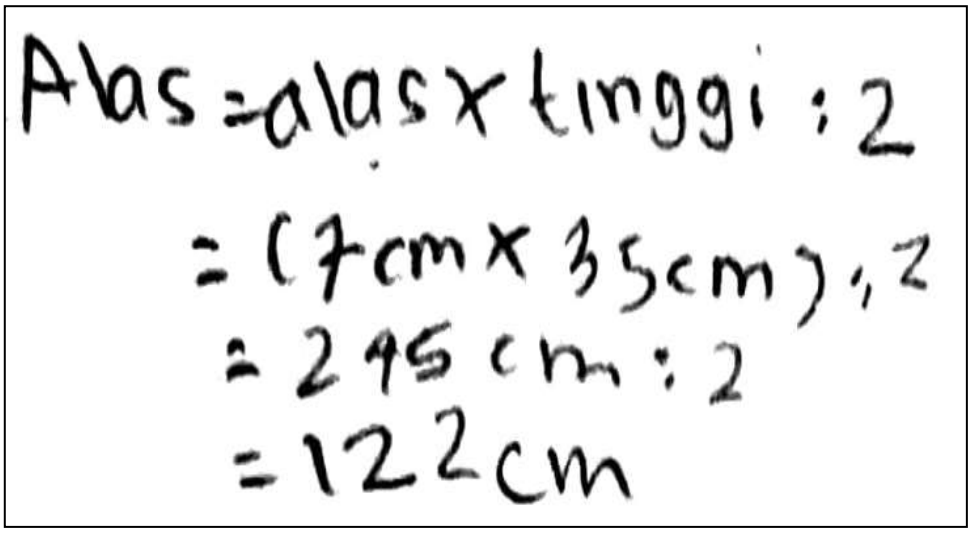

Figure 11. Work Result of Subject3 (R) on Problem Number 3

Subject 3 (R) could not answer the question correctly, which showed the indicator of using, utilizing, and selecting a specific procedure or operation. Subject 3 (R) could not choose a procedure for finding the length of the triangular base. Subject 3 (R) also experienced a conceptual error in the writing of the formula. Answer and formula errors occurred because subject 3 (R) did not understand the problem in indicator 3.

The result of subject 3 (R) work on problem number 4 can be seen in Figure 12 below:

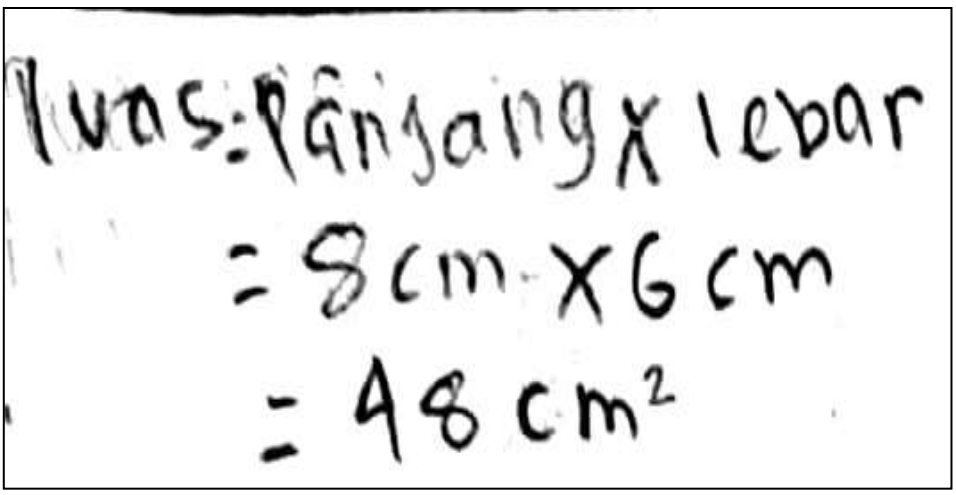

Figure 12. Work Result of Subject 3 (R) on Problem Number 4

Subject 3 (R) answered the question correctly, which showed the indicator of applying concepts or algorithms in problem-solving. In question number 4, subject 3 (R) applied the concept of the rectangular area formula to find the area of Ani's book with the correct answer and write the unit area appropriately. Thus, subject 3 (R) fulfilled indicator 3.

The results of the analysis of the ability to understand the mathematical concept of subject 3 (R) can be seen in Table 3 below:

Table 3. The Analysis of the Ability to Understand Mathematical Concepts of Subject 3 (R)

No	Indicator	Information
1	Restate a concept	Unfulfilled
2	Develop the necessary terms or conditions of a concept	Unfulfilled
3	Use, utilize, and select specific procedures or operations	Unfulfilled
4	Applying concepts or algorithms in problem-solving	

Table 3 shows the results of the mathematical understanding analysis of subject 3 (R) through the test. To support the test results analysis, the researcher interviewed the subject about his answer to problem number 1 of the indicator of restating the concept. Here is a snippet of the interview with subject 3 (R):

P : *Do you know what the answer to question number 1 is?*
R1 : *I understood. It was about the circumference and area of the triangle.*
P : *Do you know the formula?*
R : *The formula of the circumference of the triangle of side length + side length + side length. The triangle area formula of the base x height is divided by 2.*
P : *Is there a problem with number 1?*
R : *None.*

Furthermore, the researchers interviewed the subject about his understanding of problem number 2 on developing the necessary or sufficient conditions of a concept. Here is an interview excerpt on subject 3 (R) related to the answer to question number 2:

P : *Can you tell me about number 2?*
R : *The length of the rectangle.*
P : *Do you know how to find a rectangle in problem number 2?*
R : *The trick is 30 x 10.*
P : *The formula is still not right. What is the difficulty in solving the problem?*
R : *I did not understand the formula, and I hurriedly answered.*

Then, the researchers interviewed the subject about question number 3 related to the indicator of using, utilizing, and choosing a specific procedure or operation. Here is an interview excerpt related to question number 3:

P : *Do you know what number 3 is about?*
R : *About the length of the triangular base.*
P : *Can you tell me what was asked?*
R : *The length of the triangular base.*
P : *How do you calculate the triangular base on problem number 3?*
R : *The base is multiplied by the height and then divided by 2.*
P : *The formula was correct, but the answer was not. Do you have any difficulty in solving the problem?*

R : *Yes, ma'am. It was on the division operation.*

Next, the researchers conducted an interview related to problem number 4. Here is an interview excerpt:

P : *Can you tell me what information is about number 4?*
R : *Looking for the width of books.*
P : *Do you know what formula is used in problem number 4?*
R : *Length x width.*
P : *Are you having trouble solving problems?*
R : No, ma'am.

Judging from the category of ability to understand concepts, the fourth-grade students' concept understanding test results show three levels of understanding: high, medium, and low [8], [19]. As mentioned in the above research results, Figure 13 describes the percentage of fourth-grade students' ability to understand mathematical concepts.

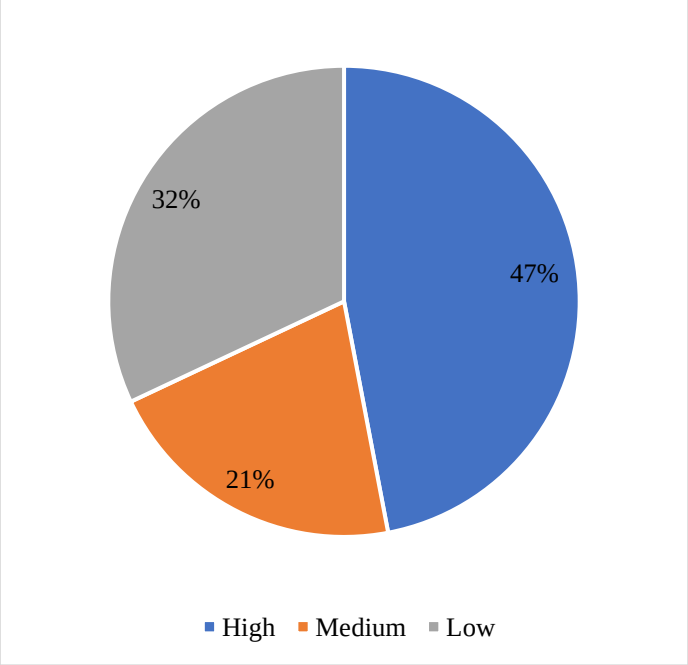

Figure 13. The Percentage of Concept Understanding Ability Level

Figure 13 shows the ability level to understand the mathematical concept of class IV. There are three categories: high category with 47% percentage, medium category with 21% percentage, and low category with 32% percentage. The classification of the level of understanding ability of the concept refers to Arikunto [8], [19], who states that the average value and standard deviation of research data can determine the categories of concept understanding capabilities, including high, medium, and low. The explanation of the three categories is: (1) The high category is the student who gets more than the average grades summed by the standard deviation, (2) The moderate category is the student who obtains a grade between high category grades and low category grades, and (3) Low categories are students who get grades less than the difference from the average grade with standard deviation.

The guidelines for the test questions are adjusted to indicators of understanding concepts according to [12]. The suspension guidelines used in the study refer to the modified chords according to Abraham. The category of achievement of the ability to understand mathematical concepts used in this study refers to Arikunto [8], [19]. The analysis found 47% of nine high-skilled students (scored ≥ 80), 21% or four moderately-skilled students (scored≥ 65 and < 80), and 32% or six low-skilled students (scored < 65).

Students with high and moderate categories met the indicators of stating concepts; using, utilizing, and selecting certain procedures or operations; and applying concepts or algorithms in problem-solving. However, there were errors. Students with low categories met the indicator of applying concepts or algorithms in problem-solving. Students with high, medium, and low categories cannot meet the indicators of developing the requirements and sufficient requirements of a concept because they were fixated on memorizing formulas and mimicking the solution of problems exemplified by teachers. This finding follows the research results which states that based on interviews with teachers, students cannot develop the necessary conditions because they are fixated on memorizing formulas [20]. Students only imitate the completion of the same problem with the teacher. When given a different problem, students are still confused about how to solve it. Many students made mistakes in the calculation, so the answer was incorrect.

The grade IV student's concept understanding test results showed that all research subjects from the high, medium, and low categories could not work on the mathematical concept understanding test problem perfectly. Based on the interview results, researchers found problems in mathematics learning. The students have not mastered the indicators of understanding concepts. Some students can redefine a concept but were confused about recognizing objects by their nature. They had difficulty deciphering problems, especially problems in the form of stories, and could not model statements into mathematical form. This finding is in line with the opinion of [21], which states that some students have difficulty solving mathematics problems in the form of stories, understanding language, what is asked in questions, and calculations.

Interview results showed each subject experienced a different level of difficulty. This finding refers to the study's results [22], which state that students with high, medium, and low cognitive levels all have difficulty working on the problem of understanding mathematical concepts. The inaccuracy of students in working on test problems leads to students' errors in completing comprehension test questions.

Errors in the results of students' work when completing the test include errors in writing units of area or circumference, errors in the writing of what is asked, and errors during the calculation operation process so that the results of student answers are incorrect. These errors occurred because they were in a hurry and were less thorough, so they could not apply the right formula and experienced errors in calculating operations and solving mathematical concepts. This finding follows the results which states that the factors that cause mistakes made by students are less understanding of the intention of the problem, less careful in reading the problem, less thorough, too hasty in solving the problem, and not mastering the steps of the problem [23]. In addition, high student mathematics anxiety is also a factor that causes student errors in working on concept comprehension test problems. Students with high mathematics anxiety experience errors in three aspects: (1) mistakes in writing mathematical symbols, (2) the meaning of mathematical models, and (3) inconsistency in the use of symbols [24].

Aside from the above mistakes, the student's psychology also affects their understanding of the concept. Psychological factors play an essential role in students studying mathematics. Anxiety is the most significant psychological factor because, as a

result of anxiety, students are nervous about learning, have no interest in learning, and feel less confident [25]. When that happens, students cannot understand mathematical concepts. Students become clueless and have difficulty learning the following material. Mathematics anxiety can cause students difficulties as well as a phobia of mathematics. Anxiety is the most significant psychological factor because, as a result of anxiety, students are nervous about learning, have no interest in learning, and feel less confident [26].

4 CONCLUSION

Based on the research and discussion, the analysis of the ability to understand the mathematical concept of students on plane materials in the fourth grade at MI Ar Rahmah Bengle Village, Majalaya Subdistrict, varies according to the level of understanding. There are high, medium, and low-skilled students. Students with high and medium categories met the indicators of stating concepts; using, utilizing, and selecting specific procedures or operations; and applying concepts or algorithms in problem-solving. However, there were errors. Students with low categories met the indicator of applying concepts or algorithms in problem-solving. Hence, improved teaching methods are needed to enhance students' mathematical understanding, particularly in plane materials. Further research is recommended to explore effective strategies for reducing mathematical anxiety and enhancing students' conceptual understanding.

REFERENCES

[1] F. Zahro, I. N. S. Degeng, and A. Mudiono, "Pengaruh model pembelajaran student team achievement devision (STAD) dan mind mapping terhadap hasil belajar siswa kelas IV sekolah dasar," *J. Pendidik. Dasar dan Pembelajaran*, vol. VIII, no. 2, pp. 196 – 205, 2018.

[2] A. G. Fahrudin, E. Zuliana, and H. S. Bintoro, "Peningkatan Pemahaman Konsep Matematika melalui Realistic Mathematic Education Berbantu Alat Peraga Bongpas," *J. Ilm. Pendidik. Mat.*, vol. I, no. 1, pp. 14–20, 2018.

[3] A. Susanto, *Teori Pembelajaran dan Pembelajaran di Sekolah Dasar*. Jakarta: Kencana, 2013.

[4] A. A. Adiansha, M. S. Sumantri, and M. Makmuri, "Pengaruh Model Brain Based Learning Terhadap Kemampuan Komunikasi Matematis Siswa Ditinjau Dari Kreativitas," *J. Pendidik. Dasar dan Pembelajaran*, vol. VIII, no. 2, pp. 127 – 139, 2018.

[5] R. S. Bintang, Sutarjo, and Ramlah, "Kemampuan Pemahaman Matematis Bangun Datar Segiempat Siswa Smp Berdasarkan Level Kognitif Dimasa Pandemi Covid-19," *J. Edukasi dan Sains Mat.*, vol. VII, no. 1, pp. 59–75, 2021.

[6] S. Rasid, Y. Hairun, and A. Afandi, "Penerapan Model Pembelajaran Team Assisted Individuallization (Tai) Ditinjau Dari Kemampuan Pemahaman Matematis Siswa Pada Materi Trigonometri," *J. Mat. dan Pendidik. Mat.*, vol. V, no. 1, pp. 1–23, 2016.

[7] Nurrahmawati, H. Syakdiah, and L. E. Afri, "Pengaruh Model Pembelajaran Kooperatif Tipe Think Pair Share (TPS) Terhadap Kemampuan Pemahaman Konsep Matematis Siswa Kelas VII SMP Muhammadiyah Pasir Pengaraian," *J. Mhs. Prodi Mat. UPP*, vol. III, no. 11, pp. 1–4, 2016.

[8] K. N. S. Effendi, "Pemahaman Konsep Siswa Kelas VIII Pada Materi Kubus Dan Balok," *J. Res. Math. Learn. Educ.*, vol. II, no. 2, pp. 87–94, 2017.

[9] A. A. Adiansha, M. S. Sumantri, and A. Makmuri, "The Effect of Brain Based Learning Model and Creative Thinking about the Ability of Mathematics Concept

of Elementary Students," *Am. J. Educ. Res.*, vol. V, no. 12, pp. 1195–1199, 2017.
[10] L. Ariyanto, D. Aditya, and I. Dwijayanti, "Pengembangan Android Apps Berbasis Discovery Learning Untuk Meningkatkan Pemahaman Konsep Matematis Siswa Kelas VII," *J. Ris. Pendidik. Mat.*, vol. II, no. 1, pp. 40–51, 2019.
[11] S. Suraji, M. Maimunah, and S. Saragih, "Analisis Kemampuan Pemahaman Konsep Matematis dan Kemampuan Pemecahan Masalah Matematis Siswa SMP pada Materi Sistem Persamaan Linear Dua Variabel (SPLDV)," *J. Math. Educ.*, vol. IV, no. 1, pp. 9–16, 2018.
[12] A. Haris and A. Jihad, *Evaluasi pembelajaran*. Yogyakarta: Multi Pressindo, 2019.
[13] A. Arisetyawan, T. Taher, and I. Fauzi, "Integrating the Concept of Plane Figure and Baduy Local Wisdom as a Media Alternative of Mathematics Learning In Elementary Schools," *J. Mat. Kreat.*, vol. XII, no. 1, pp. 1–13, 2021.
[14] E. Unaenah, A. Syafinka, D. Anisa, and Z. Weningtyas, "Identifikasi Kesalahan Siswa dalam Menjawab Pertanyaan dalam Memahami Konsep Matematika Sekolah Dasar Mengenai Bangun Datar," *J. Pendidik. dan Sos. Budaya*, vol. III, no. 6, pp. 1167–1177, 2023.
[15] S. Imawati, D. Meliyana, N. Yusuf, and G. Santoso, "Pengaruh Model Pembelajaran Flipped Classroom Terhadap Kemampuan Pemahaman Konsep Matematis Siswa Kelas IV Sekolah Dasar," *J. Penelit. dan Artik. Pendidik.*, vol. XIV, no. 2, pp. 111–120, 2022.
[16] R. A. Purnamasari, A. Agustiningsih, and R. Alfarisi, "Ethnomathematical Exploration of Cetho Temple on the Topic of Plane Figures for Elementary School," *Ethnomathematics J.*, vol. III, no. 2, pp. 86-99, 2022.
[17] N. K. C. P. Sari, "Powtoon Animation Video Based on Contextual Approach in Elementary School Mathematics Learning," *Mimb. PGSD Undiksha*, vol. X, no. 2, pp. 308–317, 2022.
[18] Sugiyono, *Metode Penelitian Kuantitatif, Kualitatif dan RnD*. Bandung: Alffabeta, 2022.
[19] S. Arikunto, *Research Procedure a Practical Approach*. Jakarta: Rineka Cipta, 2010.
[20] N. A. Mukrimatin, M. Murtono, and S. Wanabuliandari, "Pemahaman Konsep Matematika Siswa Kelas V SD Negeri Rau Kedung Jepara pada Materi Perkalian Pecahan," *J. Ilm. Pendidik. Mat.*, vol. I, no. 1, pp. 67–71, 2018.
[21] I. M. A. Dharma, I. M. Suarjana, and I. K. Suartama, "Analisis Kemampuan Menyelesaikan Soal Cerita Pada Siswa Kelas IV Tahun Pelajaran 2015/2016 Di Sd Negeri 1 Banjar Bali," *Mimb. PGSD Undiksha*, vol. 4, no. 1, pp. 1-10, 2016.
[22] N. R. Putri, E. A. Nursyahban, G. Kadarisma, and E. E. Rohaeti, "Analisis Kemampuan Pemahaman Matematik Siswa Smp Pada Materi Segitiga Dan Segiempat," *J. Pembelajaran Mat. Inov.*, vol. I, no. 2, pp. 157–170, 2018.
[23] I. Nurjanatin, G. Sugondo, and M. M. H. Manurung, "Analisis Kesalahan Peserta Didik Dalam Menyelesaikan Soal Cerita Pada Materi Luas Permukaan Balok Di Kelas VIII-F Semester II Smp Negeri 2 Jayapura," *J. Ilm. Mat. dan Pembelajarannya*, vol. II, no. 1, pp. 22–31, 2017.
[24] M. Irfan, "Analisis Kesalahan Siswa dalam Pemecahan Masalah Berdasarkan Kecemasan Belajar Matematika," *J. Mat. Kreat.*, vol. VIII, no. 2, pp. 143–149, 2017.
[25] H. Liberna, "Hubungan Gaya Belajar Visual Dan Kecemasan Diri Terhadap Pemahaman Konsep Matematika Siswa Kelas X Smk Negeri 41 Jakarta," *J. Nas. Pendidik. Mat.*, vol. II, no. 1, pp. 98–108, 2018.

[26] S. Maisaroh, "Pengaruh Kecerdasan Matematis Logis Dan Kecemasan Terhadap Prestasi Belajar Matematika," *Pros. Semin. Nas. Pendidik. Mat*, vol. II, no. 1, pp. 12-22, 2016.