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ANALYSIS OF MATHEMATICAL CONNECTION ABILITY AND SELF-CONFIDENCE ON JUNIOR HIGH SCHOOL STUDENTS

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ABSTRACT

This research is motivated by the importance of students' mathematical connection abilities and self-confidence in learning mathematics. Mathematical connection ability is an important factor in understanding mathematical concepts. The aim of this research is to analyze the level of students' mathematical connection abilities and junior high school students' self-confidence. The method used in this research is a descriptive-qualitative method. The research subjects were 37 students in class VIII-C of SMPN 3 Margahayu. The instruments used were four items of mathematical connection test material on the System of Two-Variable Linear Equations and non-tests of students' confidence in learning mathematics. The results of the analysis show that the average score of all mathematical connection ability test questions in indicator 1 using relationships between mathematical topics is 5%, indicator 2 is understanding equivalent representations of the same concept (36%), indicator 3 uses mathematics in everyday life (52%), and indicator 4 uses mathematics in other subjects (27%). So the average is 30%. So the students' mathematical connection ability is included in the low category. Most students are unable to solve problems with indicators using relationships between mathematical topics. This is shown by the results of the mathematical connection ability test; students did not connect optimally. But in learning mathematics, students already have good self-confidence.

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INTRODUCTION

Education is an important factor in the progress of a nation. Education is a place to form quality human resources so that they can have an influence on the progress of a nation's development. Education is something that cannot be separated from life. One of the sciences that plays an important role in various aspects of life is mathematics. In every field of life, mathematics is a

science that is always used to solve various problems that occur. Thus, mathematics is one of the most important subjects in school. The importance of applying mathematics in schools is that mathematics is essentially a structured and systematic science and develops critical, objective, and open-minded attitudes.

In the National Council of Teachers of Mathematics (Ningrum et al., 2019), there are five basic mathematical abilities that are standards for the mathematics education process, namely: (1) problem-solving ability; (2) reasoning ability; (3) communication ability; (4) the ability of connection; (5) the ability of representation. In studying mathematics, on of the important abilities that students have is the ability to make mathematical connections.

Mathematical connection ability is the ability to connect one science to other scientific disciplines, other fields, and every day life. According to Ruspiani (Adni et al., 2018), mathematical connection is the student's ability to make connections between mathematical concepts and themselves and connect mathematics with othe fields. There are several considerations that must be made to help sudents develop their mathematical connection abilities, namely: 1) deepen their understanding; 2) observe the relationship between mathematical topics as well as between mathematics and other academic fields; and 3) solve problems in everyday life (Amelia et al., 2021). The indicators of mathematical connections, according to Ramdani (Isnaeni et al., 2018), are: a) using relationships between mathematical topics; b) using mathematics in other subjects; c) understanding the equivalent representation of the same concept.

According to Latipah & Afriansyah (2018), with the ability to make mathematical connections, students are able to connect concepts that they have acquired separately so that they can be used or applied in real-world contexts, thereby increasing understanding and arousing interest. In line with Kenedi et al., (2018), one of the main goals in the learning process is for students to improve their ability to make mathematical connection, as this mathematics better as a whole and give them the oppurtunity to improve their mathematical abilities.

There are three aspects that students need, namely cognitive, affective, and psychomotor abilities (Prasetyo et al., 2019). Mathematical connection abilities are students' cognitive abilities; affective abilities are psychological abilities related to attitudes or behavior; and psychomotor abilities are actions or activities carried out by students.

Apart from cognitive abilities, affective skills are also needed to achieve learning goals. Another ability needed by students is self-confidence. Student self-confidence is one aspect that influences the mathematics learning process. Self-confidence is a positive attitude and belief in one's ability to develop a positive assessment of oneself and one's environment so that one can think about the current situation optimistically, objectively, responsibly, and rationally (Yulianto et al., 2020). In his book, Hendriana et al., (2018) suggests several indicators of self-confidence, including: 1) believing in one's own abilities, not worrying, and feeling free and responsible for one's actions; 2) acting independtly when making decisions; 3) having a positive self-concept, being warm and polite, and being able to respect and accept other people; 4) having the drive to achieve and dare to express opinions; and 5) recognizing ypurself for your strengths and weaknesses.

Some people think that mathematics is easy, and others find it difficult. What affects them is their confidence in their own abilities. Students who believe in their abilities ask and answer more questions than students who do not believe in their abilities; they are more calm an afraid to answer questions. Students with high self-confidence are more able to achieve their own success. When self-confidence arises, the hope is that students are able to master the learning material well (Novtiar & Aripin, 2017).

In learning mathematics, especially in the material on systems of linear equations in two variables, many students experience difficulty solving word problems. In line with Lineaus et al., (2016), when learning in class takes place, it is often found that some students experience learning difficulties, including the material on a system of linear equations of two variables, especially whwn given questions in the form of stories. Therefore it is necessary fo students to have mathematical connection skills in order to be able to solve word problems about the material.

Therefore, it is deemed necessary to study and research the ability of mathematical connections in the material on system of linear equations in two variables and the self-confidence of class VIII junior high school students.

METHOD

The method used in this research is a qualitative method with a descriptive approach. This research aims to analyze the level of students' mathematical connections abilities in solvig problems in two-variable linear equation systems and to analyze students' self-confidence. The instruments used in the research were four written linear equation systems and non-tests regarding student self-confidence. This research was carried out at one of the schools in Bandung Regency, namely SMPN 3 Margahayu, with research subjects of class VIII-C students, as many as 37 students.

The research stages start with (1) the preparation stage, which includes making question instruments and questionnaires, determining the research location, and determining the research time; (2) the implementation stage, namely giving four questions and a self-confidence questionnaire to students; and (3) the evaluation stage, which involves processing data and analyzing the results of student work to analyze the level of students connection ability and self-confidence.

To assess mathematical connection abilities, a modified mathematical connection ability research rubric from Hendriana & Soemarmo (2019) is used:

Table 1. Connection Assessment Criteria

Score	Criteria
0	The answer is no.
1	The answers are hardly similar or according to the question, issue, or problem.
2	There are several answers that are similar or suitable to the question, issue, or problem, but the relationship is not clear.
3	There are several answers that are similar or suitable to the question, issue, or problem, and the relationship is clear but not complete.
4	The answer is similar to or in accordance with the question, issue, or problem but is incomplete.
5	The answer is similar or appropriate to the question, issue, or whole problem.

Table 2. Categories of Students' Mathematical Connection Ability

Category	Connection Capability Achievement (Percentage)
High	$70 \leq KKN < 100$
Medium	$50 \leq KKN < 70$
Low	$0 \leq KKN < 50$

(Setialesmana et al., 2017)

To calculate students' level of self-confidence, a questionnaire with a Likert scale is used, which is presented in Table 3 below:

Table 3. Student Self-Confidence Level Score

Statement	Score			
	Totally Disagree	**Don't Agree**	**Agree**	**Strongly Agree**
Positive	1	2	3	4
Negative	4	3	2	1

(Rismawati et al., 2019)

The categorization of student self-confidence is adapted from Primadhini (2021):

Table 4. Categories of Student Confidence

Category	Criteria
High	$70 < x$
Medium	$55 < x \leq 70$
Low	$x < 55$

RESULTS AND DISCUSSION

Results

Results of Mathematical Connection Ability Analysis

An analysis was carried out on the test results of four items of mathematical connection questions on the matter of a two-variable system of linear equations from 37 students in class VIII-C. The results obtained are in the form of analysis of student answers, which refers to the mathematical connection evaluation guide in Table 1. The scoring results can be seen in Table.5 below:

Table 5. Results of Students' Mathematical Connection Ability Test

No question	N	Percentage	Category
1	37	5	Low
2	37	36	Low
3	37	52	Medium
4	37	27	Low

Percentage of students' mathematical connection ability: in question number 1, it was obtained at 5%, meaning that only a few students were able to solve the problem on the indicator using the relationship between mathematical topics. Question number 2 obtained 36%, meaning that more than a quarter of students were able to solve the question on the indicator of understanding the equivalent representation of the same concept. Question number 3 received 52%, meaning more than half of the students were able to solve questions on the indicator of using mathematics in everyday life. Question number 4 received 27%, meaning that more than a quarter of students were able to solve questions on indicators using mathematics in other subjects. The average percentage of students' mathematical connection abilities in all questions reached 30%, meaning that almost all students were classified as having low mathematical connection abilities.

Some of them have quite good and poor mathematical connection skills, as shown by the comparison of answers. Student A's answers show fairly good mathematical connection abilities, while student B's answers show poor mathematical connection abilities.

In question number 1 with indicator 1, namely using relationships between mathematical topics, students are asked to calculate the area of a rectangular parking lot that has a perimeter of 104 cm and a width that is 12 cm shorter than its length.

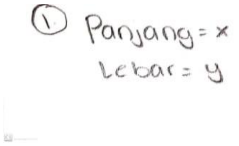

Figure 1. Answers to Indicator 1: Student A

From the students' answers in Figure 1 above, it can be seen that student A has good mathematical connection skills because student A can create a mathematical model of the problem. Student A could only make examples of the story questions, so student A was not able to solve the question well.

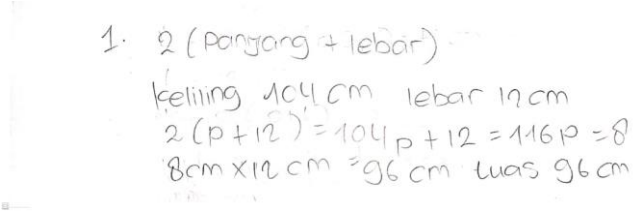

Figure 2. Answers to Indicator 1: Student B

Based on Figure 2, student B was completely unable to create a mathematical model of the problem, so student B was unable to solve the problem.

In question number 2 with indicator 2, namely understanding the equivalent representation of the same concept, students are asked to determine the price of one food and one drink in one of the canteens at school in various ways.

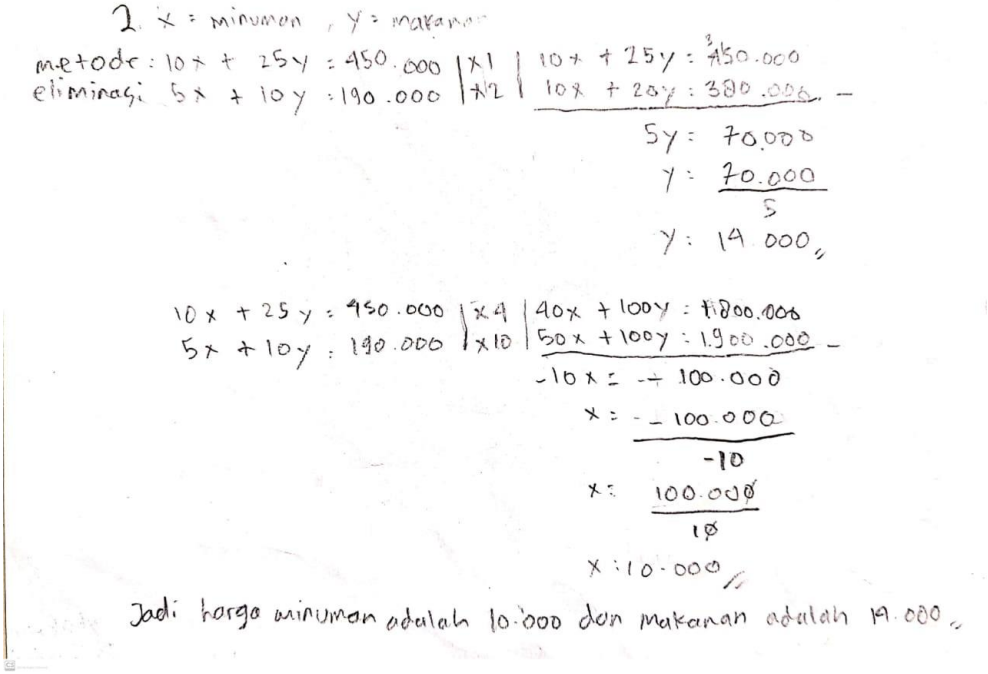

Figure 3. Answers to Indicator 2: Student A

Based on Figure 3, student A was able to solve the questions well. However, student A only completed it in one way, namely the elimination method. Even though students are asked to solve the problem in several ways or with more than one solution method,

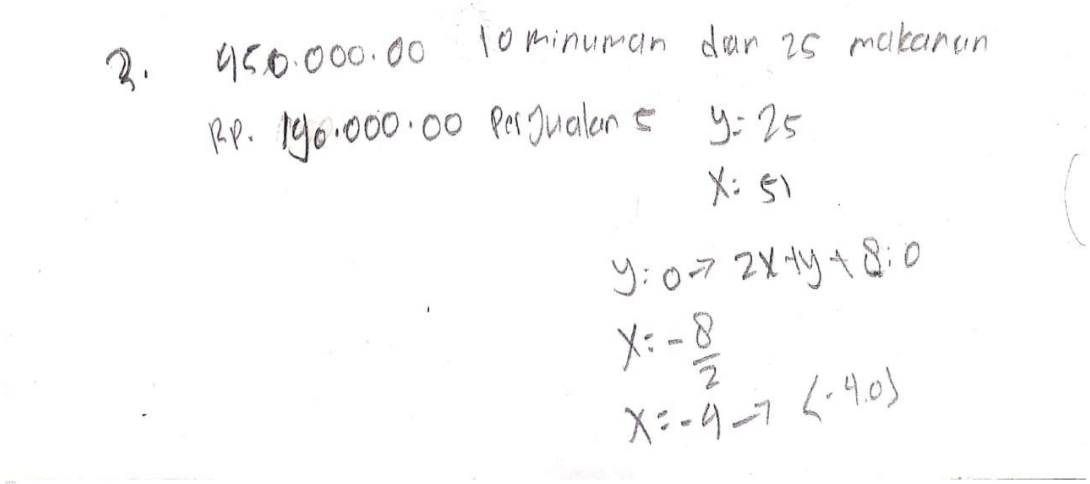

Figure 4. Answers to Indicator 2: Student B

From the students' answers in Figure 4 above, it can be seen that student B does not understand the questions, so students do not have mathematical connection skills.

In question number 3 with indicator 3, namely using mathematics in everyday life, students are asked to determine the amount of income earned by sellers of personal protective equipment.

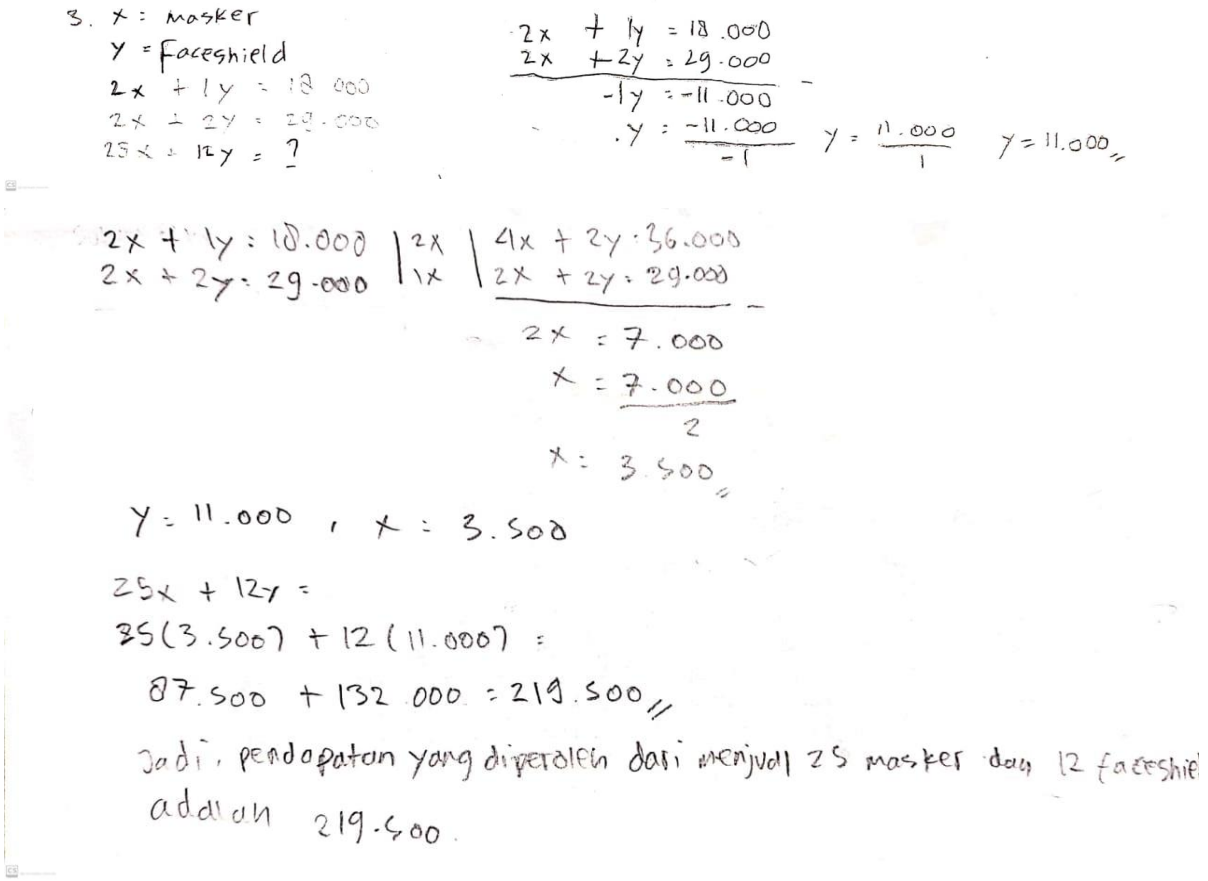

Figure 5. Answers to Indicator 3: Student A

Based on Figure 5, Student A was able to solve the questions well and correctly. Student A is able to determine the income of personal protective equipment sellers using the elimination method.

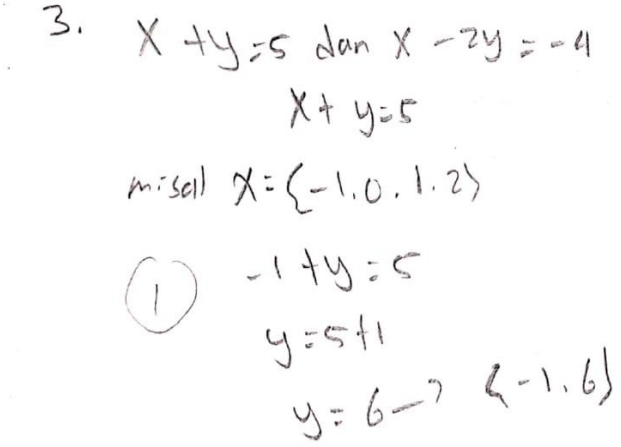

Figure 6. Answers to Indicator 3: Student B

Based on Figure 6, student B does not understand the questions and is not able to solve the questions well, so he does not have mathematical connections skills.

In question number 4 with indicator 4, namely using mathematics in other subjects, students are asked to determine the speed of each car and motorbike (in m/s).

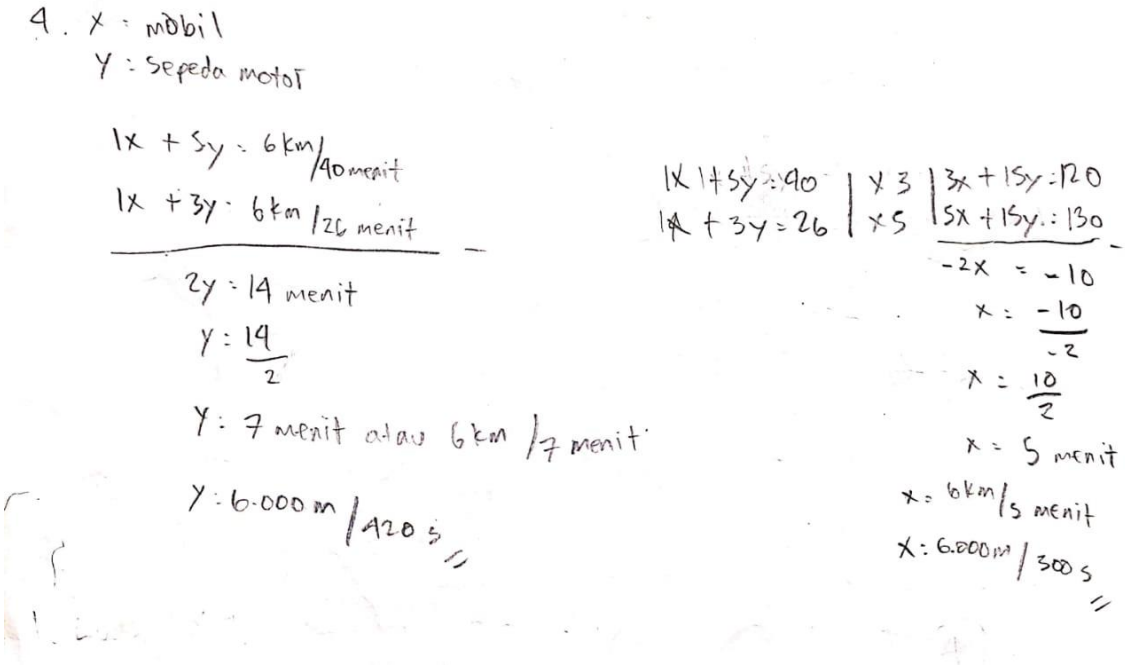

Figure 7. Answers to Indicator 4: Student A

Based on Figure 7, student A was able to solve the questions well. However, students were less careful in concluding the questions they had worked on.

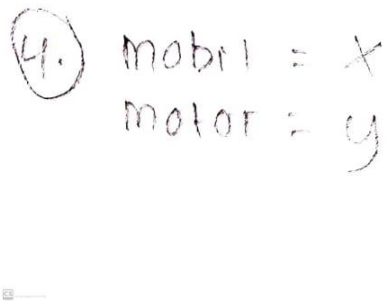

Figure 8. Answer to Indicator 4: Student B

Based on figures 8, student B can only make examples, so student B is not able to solve the questions well.

Student Mathematical Confidence Result

The analysis is adjusted to the student's self-confidence indicator. The indicators measured to determine the level of students' confidence in learning mathematics are: 1) believing in their own abilities; 2) acting independently in making decisions; 3) having a positive self-concept; and 4) daring to express opinions. Table 6 presents the percentage of self-confidence of 37 students in learning mathematics:

Table 6. Category of Student Self-Confidence

Category	Criteria	The Number of Students	Percentage
High	$70 < x$	21	57
Medium	$55 < x \leq 70$	13	35
Low	$x < 55$	3	8

Based on Table 6, more than half of the students have high self-confidence in learning mathematics.

Discussions

The ability of students' mathematical connections to indicate indicators using relationships between mathematical topics is included in the low category. This is because students lack the ability to relate mathematics topics to other topics. The indicator of understanding equivalent representations of the same concept is included in the low category. This is because students have not been able to recognize equivalent concepts of the same concept. The indicator of using mathematics in everyday life is in the medium category. This means that more than half of the students have been able to use mathematical concepts to solve problems in everyday life. The indicator of using mathematics in other subjects is in the low category. This is because students are not able to use mathematical concepts in other subjects. Kusmayandi (S et al., 2016) stated that most students do not know and do not understand which material is related to the material to be studied. Based on the results, it showed that the mathematical connection ability of 37 class VIII-C students at SMPN 3 Margahayu was in the poor category. This is in line with the results of Ruspiani's research (Handayani, 2015), which revealed that the average connection ability score for secondary students was still low. So, to train mathematical connection skills, students must be familiar with them so that they are motivated to work on and solve mathematical connection problems. According to Ulya et al., (2016), students must be able to apply mathematics in all fields, not only in mathematics but also in other subjects and in life.

For affective abilities, namely students' self-confidence in learning mathematics as a whole, more than 70% of students already have a fairly good level of self-confidence. They are already able to learn mathematics. This is in line with the results of research by Andriani and Aripin (2019), who found that the majority of students already have quite good self-confidence when learning mathematics. According to Vandini (2015), if students want to be successful in learning mathematics, they must have good self-confidence. This is proven by the research results of Setyowati and Widana (2016), which reveal that there is an influence of self-confidence on mathematics learning outcomes.

CONCLUSION

Based on the results of the analysis and discussion, it can be concluded that students' mathematical connection abilities in solving systems of two-variable linear equations are still low. Most students are unable to solve problems with indicators using relationships between mathematical topics. This is shown by the results of the mathematical connection ability test; students did not connect optimally. Students cannot apply previously learned concepts to the concepts contained in the material on systems of linear equations in two variables, making it difficult to solve problems. Students are also confused about the concepts that should be used in solving problems. Then, for students' self-confidence in learning mathematics, most students have high self-confidence.

To obtain maximum results on mathematical connection abilities, teachers should use interactive teaching materials using approaches that can improve students' mathematical connection abilities. In addition, further research in needed regarding the development of interactive teaching materials to enhance mathematical connection abilities.

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