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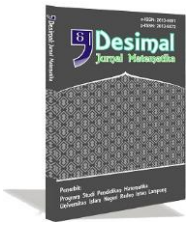

Mathematical connection ability in solving hots questions on systems of linear equations in two variables material

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ABSTRACT

In the world of mathematics education, mathematical connection skills played an important role, especially in dealing with Higher Order Thinking Skills (HOTS) type questions, where students were required to understand and solve problems well. However, in reality, many students faced difficulty in solving these problems. This research aimed to analyze junior high school students' mathematical connection abilities in solving HOTS questions on systems of linear equations in two variables material. The study used a descriptive method to understand the phenomenon being investigated. Data collection techniques included tests, which assessed specific aspects of student abilities, and interviews, which enabled the researchers to observe and analyze students' behavior in their natural context. The results indicated that students with high mathematical ability demonstrated connections that met all three indicators of mathematical connection, students with moderate mathematical ability fulfilled two indicators well, and students with low mathematical ability fulfilled only one indicator of mathematical connection adequately.

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INTRODUCTION

Mathematics education is one of the most important topics in the world of education (Bernard & Senjayawati, 2019). This is because mathematics has a very important role in human life (Kwangmuang, Jarutkamolpong, Sangboonraung, & Daungtod, 2021). Therefore, the ability to understand and apply mathematical concepts is very important for students, especially at the junior high school level (Amaliah, Baharullah, & Ma'rup, 2021). One important aspect of mathematical ability is mathematical connection ability (Ismail, Retnawati, Sugiman, & Imawan, 2024). Mathematical connection ability refers to the skill of recognizing and understanding relationships between various mathematical concepts (Marsitin, Sa'dijah, Susiswo, & Chandra, 2022). This ability is crucial for students, especially at the junior high level, as it helps them integrate and apply mathematical ideas across different topics (Zana, Sa'dijah, & Susiswo, 2022). In the context of this research,

mathematical connection ability is operationalized as the capacity to identify, link, and apply concepts from systems of linear equations in two variables material to solve HOTS questions.

Mathematical knowledge is considered to have structure and relationships between various materials (Murtafi'ah, Delia, & Suprapto, 2022). Each material is an important requirement for other material, and understanding certain concepts is a prerequisite for understanding other concepts (Hasbi, Lukito, & Sulaiman, 2019). NCTM introduced the concept of mathematical connections in 1989 to explain the relationships between concepts in mathematics. Mathematics can be divided into several areas but is not a collection of independent subjects with different skills. As a holistic and integrated science, understanding mathematics as a whole is very important in the learning process. According to NCTM (2000), indicators of mathematical connections include, among other things, recognizing and using relationships between mathematical ideas, understanding how mathematics is related to other fields of study, and recognizing and applying mathematics in the context of everyday life.

Mathematical connection ability is the ability to find connections between representations of concepts and procedures, understand mathematical topics, and students' ability to apply mathematical concepts in other fields or everyday life (Amelia, Ansari, Fitriani, Winarti, & Andriyana, 2021). This is in line with research conducted by Ansari, Somakim, Darmawijoyo, & Eliyati (2020), explaining that mathematical connection abilities are students' ability to find and present mathematical relationships, which include connections between mathematical topics, connections with other scientific disciplines, and connections in everyday life or application in the real world.

Research by Amelia et al. (2021) aimed to assess the mathematical connection abilities of junior high school students in solving HOTS systems of linear equations in two variables class VIII questions. The study involved 40 students who completed a written test with three HOTS systems of linear equations in two variables questions. The results indicated that most students demonstrated low mathematical connection abilities in solving these questions.

This highlights the need for effective teaching strategies to improve students' mathematical connection abilities. Wibowo (2017) suggests that a realistic mathematical approach can help students relate mathematics to real life, enhancing their connection skills. Additionally, Bernard & Senjayawati (2019) note that using technology, such as the GeoGebra application, can support students in developing mathematical connections when solving problems. These findings emphasize the importance of employing strategies like the realistic mathematical approach and technology integration to improve students' mathematical connection abilities, especially for HOTS systems of linear equations in two-variable questions. This article aims to analyze junior high school students' mathematical connection abilities in solving HOTS questions on systems of linear equations in two variables material.

METHOD

This research is included in the qualitative research category, which uses research methods to observe the condition of natural objects. In this case, the research approach used is a descriptive approach, which aims to provide an overview of existing conditions. This qualitative research method helps in collecting data consisting of written or spoken words and observed behavior. This research aims to describe students' mathematical connection

abilities in solving mathematics problems, especially questions with high-level thinking abilities (HOTS).

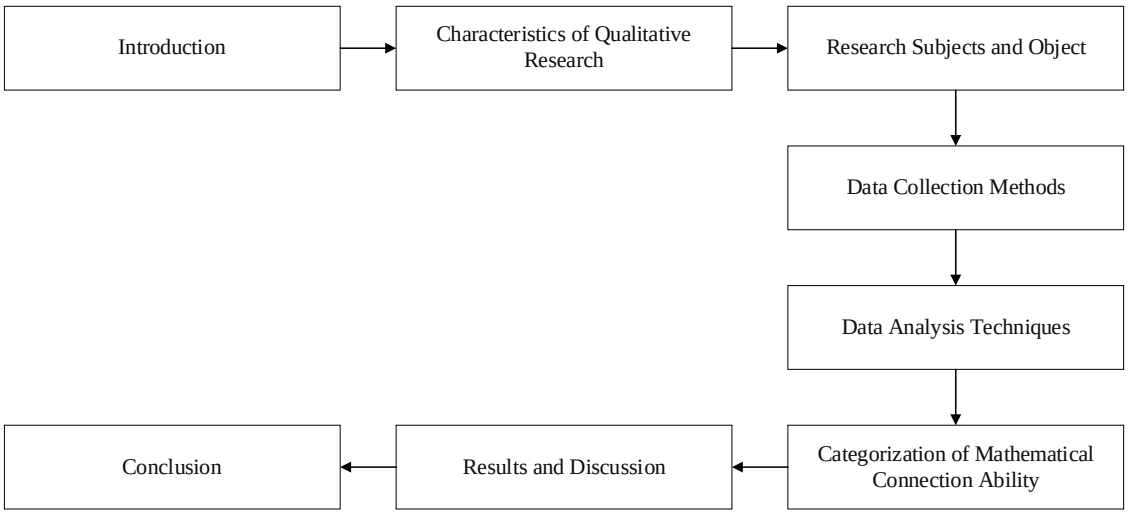

Figure 1. Research Flow

The research conducted was qualitative in nature. According to Creswell (2009), qualitative research is characterized by several key features: (1) It explores a problem and provides a detailed understanding of the issue at hand, (2) literature plays a less significant role and is mainly used to frame the research problem, (3) the objectives and research questions are broad, based on the experiences of the research subjects, (4) data is collected from a small number of respondents to capture their perspectives, (5) data analysis is conducted through description and thematic methods, using text analysis to understand broader themes, and (6) research reports are structured flexibly, taking into account both the subjective reflections and potential biases of the researcher.

The subjects in this research were class VIII A students of MTs Negeri 4 Wonogiri. The subjects in this research were 3 students taken from a total of 30 students. The object of this research was the mathematical connection ability of Class VIII A MTs Negeri 4 Wonogiri with material on Systems of Linear Equations with Two Variables in mathematics learning.

Data is factual information collected and analyzed as material for taking action in research. In this research, the data obtained includes information regarding the mathematical connection abilities of class VIII A students at MTs Negeri 4 Wonogiri. The subjects were selected using purposive sampling, a technique where specific individuals are chosen based on predefined criteria relevant to the research objectives. This method ensured that the selected students had the appropriate characteristics to provide meaningful insights into the study of mathematical connection abilities in solving HOTS systems of linear equations in two variables questions. The type of data used in this research is primary data. Primary data sources are direct sources from informants who provide information relevant to the study. The data obtained directly were the results of the description test and the results of interviews with 3 students selected as subjects based on the description test given. The data collection method used is through a written test in the form of three essay questions related to indicators of mathematical connection

ability, namely based on (Fitriani, Winarti, & Andriyana (2022), which consists of three aspects, namely (1) linking the relationship between formula concepts, (2) connecting mathematical concepts with other mathematical concepts, and (3) applying mathematical concepts in everyday life.

According to Miles and Huberman (as cited in Sugiyono, 2015), the interactive data analysis technique consists of three components: (1) Data Reduction, (2) Data Presentation, and (3) Drawing Conclusions. In this research, data reduction was carried out by analyzing the data collected from interviews and documents to extract key points and focus on aspects relevant to the research questions. Then, data presentation was done in the form of descriptive narratives, complemented by tables, diagrams, and graphs to make the data easier to understand. Finally, conclusions were drawn based on the reduced and presented data, serving as answers to the research questions posed at the outset. The categorization of students' mathematical connection abilities follows the framework proposed by Romiyansah, Karim, & Mawaddah (2020).

RESULTS AND DISCUSSION

In the research conducted to test students' mathematical connection abilities, systems of linear equations in two variables material was chosen because it involves concepts that differ from both general mathematics and everyday life. After giving a mathematical connection ability test to 3 class VIII students in systems of linear equations in two variables material, the validity test of the data used in this research was using triangulation. Source triangulation to test the credibility of the data is carried out by checking data that has been obtained through several sources.

Table 1. Benchmark for Determining Students' Mathematical Connection Abilities

Ability Level	Range of Scores
High Ability	$-X + SD \leq X \leq X\_Max$
Moderate Ability	$-X - SD \leq X \leq -X + SD$
Low Ability	$0 \leq X \leq -X - SD$

In Table 1, students' mathematical connection abilities are categorized based on their scores relative to the mean ($\bar{X}$) and standard deviation (SD).

Students' Mathematical Connection Abilities Have High Mathematical Abilities

Based on the tests conducted, Student A demonstrates their problem-solving process by first noting down the known information and then asking questions to clarify the problem. To better understand the equation, Student A uses examples, such as representing "Pineapple" as the variable x and "Sago" as the variable y. By doing so, Student A can form a mathematical equation that relates these variables, making it easier to comprehend the problem at hand. Students can solve the connection questions given by writing down the existing information in the form of examples and determining what is known and what is asked as in Figure 2.

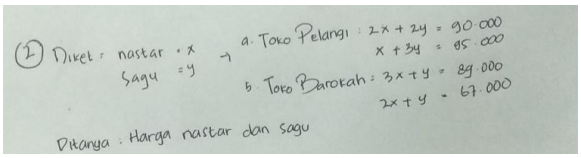

Figure 2. Mathematical Connections

Based on Figure 2, it was found that students were able to understand the relationship between mathematical ideas by showing what is written by giving examples in equations so that the solution is easier. This makes it easier for students to solve the problems they face.

Apart from taking the test, student A interviewed to gain more information regarding the results of the test. The following are the results of the interview

with student A: (P: researcher, and SA: Student A)

P : What do you know from this question?
SA : What I know from the question is the number of Pineapple cakes and Sago cakes and the prices after adding them up. Then what I ask is the price per jar of Pineapple and Sago cakes and where does Salsa buy the cakes at cheap prices?
P : How did you solve the problem?
SA : I'll do an example first, sis, so it's easier.
P : What do you mean by example?
SA : For example, pineapple is x, then Sago is y, sis.

As a result of the interviews conducted, it was found that Student A could understand the questions and explain the information in the questions well. Based on the tests and interviews conducted, student A can understand the relationship between mathematical concepts; this is proven by the student being able to write and explain what he knows in the questions.

Next, the results of the work obtained are on the student's answer sheet. Write the information gathered from the problem as an equation. Students perform multiplication operations to obtain the same value. In the next stage, students use the elimination method to find the value of one of the variables, namely y, then students use the substitution method to find the value of the variable x by entering the value of y in one of the equations to get the value of both variables.

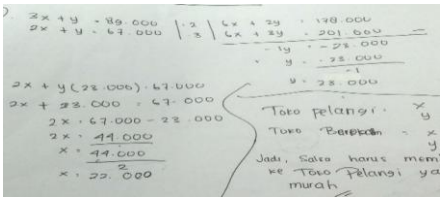

Figure 3. Mathematical Connections

Based on Figure 3, students can apply the relationships between mathematical concepts. This is evidenced by their ability to find the value of the variable (y) through accurate calculations and by their skill in connecting existing concepts with other relevant concepts to solve the problem.

The following are the results of the interview with student A:(P: researcher, and SA: Student A)

P : After doing the example, what is the next step?
SA : Next, I did the multiplication, sis, because I was going to find the value of y, so I used up the value of x. The way to lose it was to equalize the x, sis; the result was the top one multiplied by 2 and the bottom one multiplied by 3.
P : What method is that called?
SA : Elimination, sis.
P : Yes, then after getting the y value, what next?
SA : Next, enter the y value, sis; enter it in one of the equations, and then the x value will be obtained.
P : Well, does this system of linear equations in two variables material have anything to do with the other materials?
SA : Yes, sis, you need to find the y value before doing the multiplication operation, sis.

Based on interviews with students, it is clear that students can understand how mathematics is combined with other mathematics material. Student A can use mathematical symbols effectively to complete assignments and get answers that make sense. This is in line with the exam results, which show their ability to understand the questions well.

In the next stage, student A works on the solution part by calculating the price of cakes at each shop. Student A answered that Salsa had to buy cakes from Toko Pelangi because the price was cheaper. The results of all existing calculations are

used to answer questions from the questions that form the conclusions of the students' answers. The results were obtained and can be seen in Figure 4.

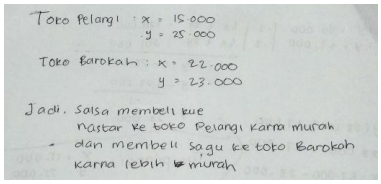

Figure 4. Mathematical Connections

Based on Figure 4, the information that students can understand is the aim and purpose of the question, namely showing where Salsa will buy cakes at a cheap price. Based on the results of the answers, students can use mathematics in everyday life.

P : If you enter a value into one of the expressions, what is it called?
SA : The name is substituting, sis.
P : OK, then what's the next step after that?
SA : Next, I wrote down the price of the cake at each shop, Sis, and then I looked for which one was cheaper, so Salsa bought the Nastar at the Pelangi shop, while the Sago cake went to the Barokah shop, Sis, because the price was cheaper.
P : Is this question related to everyday life?
SA : Yes, sis.
P : Why is it related to everyday life?
SA : Because you can find that in everyday life, sis, like the price of that cake.

From these interviews, students can explain and apply mathematical concepts in everyday life. This ability not only helps them in academic contexts but also in real situations they face every day.

Mathematical Connection Abilities of Students with Moderate Mathematical Abilities

From the answers in solving mathematical connection problems, student B wrote about what he knew in the problem. Student B equates nastar with x and sago with y. Next, students are able to write the information obtained from the problem into an equation like in Figure 5.

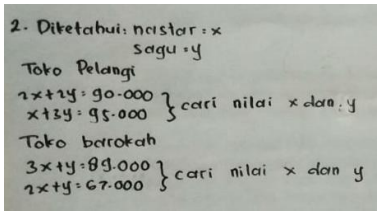

Figure 5. Mathematical Connections

Based on Figure 5, it shows that students are able to understand existing problems by making examples in mathematical models. Students are able to understand the relationship between the data in the problem and the data to solve existing problems or are able to connect ideas from the problem so that it makes solving it easier. This is proven by students being able to show what is written using examples and being able to understand the next steps by changing the information from the problem into a mathematical model and an appropriate equation.

Apart from taking the test, student A conducted an interview to gain more information regarding the results of the test. The following are the results of the interview with student B (P: researcher; and SB: Student B).

P : What do you know from the question?
SB : That's it, sis, the Pineapple and Sago cake that Susi bought with Dila, sis.
P : So, after you know the information from the question, what are the next steps?
SB : There are Nastar and Sago cakes, for example, sis, Nastar is x and Sago is y.
P : OK, then in that question, what is actually being asked?
SB : Cheap price, bro.
P : Why don't you write?
SB : Oh yes, sis, I forgot.

Based on the interviews that have been conducted, students understand what is in the question. Students can explain what they know and what is asked even if students forget not to write it in the answer.

Next, students write down the information obtained from the problem, which is used to create an equation. Students create mathematical equations based on what is found in the problem. After creating the equation, students use the multiplication operation to equate one of the variables to find the value of the variable they are looking for. From the answers, students use the elimination method to find the value of x by eliminating the variable y. Students take the next step, namely finding the value of the variable y, by entering the value of x into one of the equations to get the value of y as seen in Figure 6.

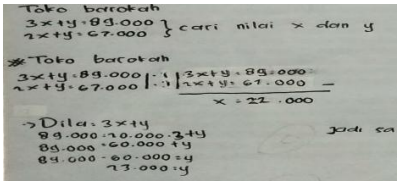

Figure 6. Mathematical Connections

Based on Figure 6, students can apply the relationship between mathematics and other mathematical material. This is demonstrated by students carrying out appropriate calculations to obtain the value of one of the variables by carrying out multiplication operations and being able to connect mathematical concepts using elimination and substitution methods.

P : What's the next step for you?
SB : I'm looking for the x value, sis.
P : How do you do it?
SB : I removed the y sis, I first equated the y value to the same, I multiplied it by 1, and then I multiplied it.
P : What's next after getting the x value?
SB : I already have the x value, then plug it into the equation, so I can find the y value.
P : So, is this question related to other material?
SB : I don't know, sis.

Based on the interviews conducted, students were able to explain the steps to solve the questions. However, Student B struggled to understand the relationship between the material in the questions and other related mathematical concepts. This difficulty likely stems from a lack of a solid understanding of how different mathematical ideas are interconnected, which affected their ability to apply previously learned concepts to the current problem. As a result, Student B had trouble forming a complete solution, indicating a gap in their mathematical connection skills.

The next stage is that student B completes the questions by summarizing the results of the questions they have worked on. Student B wrote that Salsa had to buy cakes from Toko Pelangi because the price was cheaper based on the calculations that had been made.

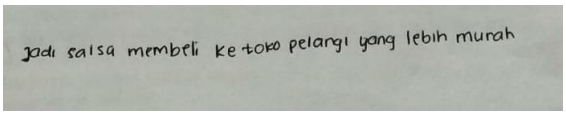

Figure 7. Mathematical Connections

Based on Figure 7, Student B was able to understand the intent and purpose of the question, which was to find the most affordable price for a cake that Salsa would buy at a cake shop. However, Student B's answer was incorrect. The mistake occurred in the calculation process, where Student B misapplied the formula for determining the price, resulting in an incorrect value. This error highlights a gap in the student's ability to correctly execute mathematical procedures, even though they understood the context of the problem.

P : Is this question related to everyday life?

SB : I think yes, sis.
P : Which part shows its relevance to everyday life?
SB : That's what we usually see a lot of times. When we want to buy something, we look for the cheapest price.

Based on interviews with students, it was found that students were able to understand the relationship between questions and everyday life well.

Mathematical Connection Abilities of Students with Low Mathematical Abilities

Based on the tests that have been carried out, student C writes down what he knows. Previously, Student C wrote an example, namely x is nastar and y is sago. Student C writes down information in the form of mathematical equations obtained from questions like the following.

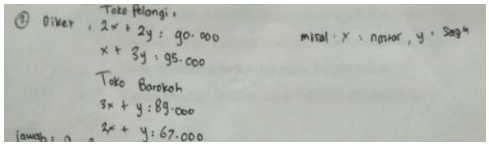

Figure 8. Mathematical Connections

Based on Figure 8, students are able to understand the relationship between mathematical ideas by showing what is written by doing examples and understanding the next steps to make an appropriate equation so that it makes solving it easier. This makes it easier for students to solve the problems they face.

Apart from taking the test, student C conducted an interview to gain more information regarding the results of the test. The following are the results of the interview with Student C: (P: researcher, and SC: Student C)

P : What do you know about this question?
SC : What I know is the pineapple cake and sago cake at the Pelangi and Barokah shop, Sis.
P : Once you understand the question, what's the next step?
SC : I'll make an example, ma'am; Pineapple is x and Sago is y to make it easier, ma'am.
P : Previously, what was asked in the question?
SC : The price of cakes in each shop, ma'am.

Based on the interviews that were conducted, students were able to understand what was meant in the question by explaining what they knew and what was asked in the question, even though the students did not write it completely on the answer sheet.

Next, students write their answers by performing calculations on the equation that has been created. Student C attempts to eliminate the variable x to find the value of variable y by manipulating the equations. Specifically, Student C multiplies the first equation by 2 and the second equation by 3 in order to create coefficients for the variable x that are equal. This process allows the variables to be eliminated through subtraction, ultimately leading to the value of variable y. The next stage is that student C finds the value of the variable x by entering the y value obtained and replacing it in one of the equations so that the value of the variable x is obtained as in the following results.

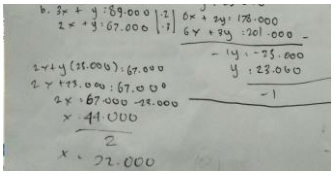

Figure 9. Mathematical Connections

Based on Figure 9, information is obtained that students know the steps that must be taken to find the value using the elimination and substitution method. Even though the students' answers were still inaccurate, based on the results of the students' answers, they were able to use the relationship between mathematical material, which was proven by the students being able to operate existing

concepts with other concepts and carry out calculations to find results from the data they had.

P : What are the next steps?
SC : Next, I look for the y value, sis, I first remove the x.
P : After getting the y value, what next?
SC : I put the y value into the equation, sis, to get the x value.
P : So, is this system of linear equations in two variables question-related to other material?
SC : I don't know, bro, just remember how to do it.

Based on the results of the interview, students did not understand the relationship between the material and other material, students only remembered how to do it without understanding the relationship in the questions.

The next stage is that student C works on the solution section by writing down the results obtained from the calculations that have been carried out. Student C wrote down the prices of Pineapple cakes and Sago cakes found in each shop as in Figure 10.

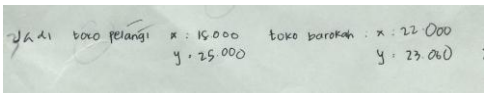

Figure 10. Mathematical connection

Based on Figure 10, information is obtained that students have not been able to understand the purpose and objectives of the questions they have worked on. Students only wrote down the prices at each shop without concluding where Salsa went to the shop to buy cheaper cakes.

P : From the questions you have worked on, is this question related to everyday life?
SC : I don't know, sis.
P : Do you have difficulty understanding it?
SC : I'm confused, sis, what you mean by relating to everyday life.

Based on interviews that have been conducted, students do not understand the relationship of the questions to everyday life, this is proven by students still not understanding or being confused about what is meant by connection with everyday life.

Mathematical Connection Ability in Solving HOTS Questions for Students with High Mathematical Ability

In analyzing students with high mathematical ability, the following aspects of mathematical connection ability were evaluated:

1. Ability to Understand the Relationships Between Mathematical Ideas

Students with high mathematical ability demonstrated a strong understanding of how different mathematical concepts are related. They were able to identify the connections between formulas, theorems, and operations, allowing them to solve problems more efficiently.

2. Ability to Apply the Relationship Between Mathematical Material

These students showed an advanced ability to apply mathematical relationships across various topics. When solving HOTS questions, they were able to transfer knowledge from one area to another, using previously learned concepts to approach new problems effectively.

3. Ability to Relate Mathematics to Everyday Life

Students with high mathematical ability excelled at applying mathematical concepts to real-world situations. They were able to recognize how the material related to everyday life and used this understanding to solve problems, enhancing their overall problem-solving skills.

Based on the results of tests and connection interviews that have been carried out, students are able to

understand the relationship between mathematical ideas; this is demonstrated by students being able to write examples and determine what is known and what is asked in the problem to make it easier to solve. Students are able to understand and apply the relationship between mathematical material; this is proven by students being able to find the value of the y variable or the price of one of the variables being searched for correctly and being able to operate and use the ability to connect existing concepts with other concepts according to what they are looking for, such as using the results of calculations using the elimination and substitution method to find variable values. Students are able to understand the relationship between mathematics and everyday life, which is shown by students being able to understand the intent and purpose of the questions in relating existing calculations to existing events or related to everyday life. According to Fitriani et al. (2022), students with high mathematical abilities have very good connections by fulfilling every indicator of mathematical connection.

Research by Ansari et al. (2020) shows the importance of developing HOTS questions, especially in the context of probability and statistics, to improve the mathematical literacy skills of middle school students. This is relevant to students' ability to understand and apply complex mathematical concepts. Furthermore, Ibrahim, Kuswidi, & Arfinanti (2020) emphasize developing a guide for preparing HOTS-based mathematics questions, which not only improves cognitive abilities but also strengthens character education for junior high school teachers. This shows that the HOTS approach can help students connect mathematical material with everyday life values. Lastly, research by Santoso (2020) revealed that an analysis of the National SMP/MTs Mathematics Examination questions from a HOTS perspective shows a year-on-year increase in the number of questions meeting HOTS criteria, signaling a significant shift in the approach to teaching and evaluating mathematics at the secondary school level. This finding aligns with existing research, such as that by Hasbi et al. (2019), which emphasized the importance of developing higher-order thinking skills (HOTS) through realistic and contextual learning approaches. However, Santoso's study highlights a shift in evaluation, suggesting that the examination system is evolving to better assess HOTS, while previous studies have focused more on teaching strategies to enhance HOTS development.

Mathematical Connection Ability in Solving HOTS Questions for Students with Medium Mathematical Ability

Based on test results and interviews, students can understand the relationship between mathematical ideas, demonstrated by their ability to apply concepts to solve problems. However, they struggle to fully grasp the connections between different mathematical topics, as they can apply relationships without fully understanding them. Students do understand how mathematics relates to everyday life, as shown by their ability to make conclusions based on real-world contexts (Darmayanti, Sugianto, & Muhammad, 2022). Research by Sari, Mardiyana, & Pramudya (2020) highlights that students' abilities to connect mathematical concepts, especially in algebra, are still low. Studies by Hasbi et al. (2019) stress the importance of contextual and realistic approaches to enhance students' mathematical connections, confirming that integrating such approaches in learning can significantly improve students' understanding and readiness to solve HOTS questions.

Mathematical Connection Ability in Solving HOTS Questions for Students with Low Mathematical Ability

Based on the results of tests and interviews that have been conducted, students are able to understand the relationship between mathematical ideas; this is proven by Students are able to show what is written using examples and are able to understand the next steps by changing the information from the problem into a mathematical model and an appropriate equation (Fatahillah, Liyandri, & Monalisa, 2021). Students have not been able to understand the relationship between mathematical material; this is shown by interviews that have been conducted that students do not know the relationship between the material and other materials; students only know the method or steps to do it (Firmansyah, Mubarika, & Saniah, 2021). Based on the results of the tests and interviews conducted, this difficulty arises because students struggle to understand how abstract mathematical concepts relate to real-world situations (Badriani, Wyrasti, & Tanujaya, 2022). Many students expressed confusion when asked about the connection between mathematics and daily life, indicating a lack of practical examples or contextual learning in their education. This gap may be due to inadequate teaching strategies that fail to demonstrate the relevance of mathematics in everyday contexts, preventing students from making these crucial connections.

Research by Quilang & Lazaro (2022) found that teachers' ability to connect mathematical concepts to real-world contexts is crucial for helping students make mathematical connections. At Muhammadiyah University of Surakarta, Amaliah et al. (2021) revealed that students struggled with HOTS questions on systems of linear equations in two variables material, particularly due to their limited understanding of the relationships between mathematical concepts. Sumadi, Putra, & Istiqomah (2020) emphasized the significance of recognizing students' multiple intelligences and interests in mathematics to enhance their mathematical connection abilities. Overall, developing these abilities requires an interdisciplinary approach, understanding real contexts, and considering each student's uniqueness in learning. This aligns with research by Wicaksono (2018), which highlighted the importance of metacognition in solving mathematical problems. Additionally, Ocy, Rahayu, & Makmuri (2023) found that students faced challenges in solving algebra problems, underscoring the need for a deep conceptual understanding to strengthen mathematical connections.

CONCLUSIONS AND SUGGESTIONS

Based on the data analysis, it can be concluded that students with high problem-solving abilities demonstrate proficiency in all indicators of mathematical connection, including understanding and applying the relationships between mathematical ideas, connecting mathematics to other subjects, and linking mathematics to everyday life. Students with moderate abilities meet two of these indicators, showing an understanding of mathematical relationships and their real-life applications. However, students with low abilities only meet the basic requirement of understanding mathematical ideas. This suggests that varying levels of problem-solving skills correlate with students' grasp of mathematical connections, highlighting the importance of targeted interventions in teaching practices.

Future research could explore the effectiveness of diverse teaching strategies in enhancing students' mathematical connection skills, particularly focusing on how varied

exercises can strengthen students' problem-solving abilities across different skill levels. It would be beneficial to investigate the role of personalized learning and the impact of technological tools in improving students' understanding of mathematical concepts. Additionally, research could examine the long-term effects of these interventions on students' confidence and performance in solving more complex mathematical problems.

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