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Problem Solving Analysis on Hots Problems in terms of Early Mathematical Ability

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Abstract. The purpose of this study is to analyze problem-solving on HOTS problems in terms of early mathematical ability. This research method uses qualitative methods. The subjects in this study were students of class XI MIPA. The technique of determining the subject in this study began by grouping students into three groups of early mathematical abilities, namely high, medium and low. Then 3 students were taken as subjects, namely one subject for each group whose problem-solving steps met the problem-solving steps of Krulik & Rudnick. The data collection technique begins by grouping the categories of early mathematical abilities, giving math problem-solving tests and interviews on selected subjects to describe mathematical problem-solving and achievements on the HOTS indicator. Based on the results of math problem-solving tests and interviews on the subject, the results of this study showed that subjects with high early mathematical abilities were able to fulfill the read the problem step, explore step, select a strategy step, solve step and look back step so that the subject reached the indicator of analyzing, evaluating and create. Subjects with the medium category of initial mathematical ability were able to fulfill the read the problem step, the explore step, then select a strategy step, and the solve step, so the subject had not yet reached the creating indicator. Subjects with low mathematics initial ability category were only able to fulfill the read the problem step, the subject did not achieve all of the HOTS indicators.

Key words: Problem Solving, HOTS, Early Mathematics Ability

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INTRODUCTION

Higher-order thinking skills are important and are now a concern in the field of education. Schraw and Robinson (2011) define Higher Order Thinking Skills in the current context as abilities that promote deeper and conceptual forms of understanding. Higher-order thinking skills have become a curriculum goal internationally (Tan and Halili, 2015). The Partnership for 21st Century Skills (P21) also states that higher-order thinking skills such as critical and creative thinking can help students succeed in their future careers (Alismail and McGuire, 2015).

The importance of HOTS for students resulted in HOTS being taught and trained in every lesson at school, including in learning mathematics. Law Number 20 of 2003 concerning the National Education System Article 3 reads "National education functions to develop and shape the character and civilization of the nation, aiming to develop the potential of students to become human beings who believe and fear God Almighty, have noble character. , healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens" implicitly wants students' HOTS to be developed and one of them is through the learning process (Riadi and Retnawati, 2014). The importance of higher-order thinking skills is expressed by Fensham and Alberto (2013) that to compete in the world of work and personal life. Therefore, one indicator of educational success is that students have good higher-order thinking skills. This is following the main goal of learning in the 21st century to develop and improve students' higher-order thinking skills (Arifin & Retnawati, 2015).

The fact that occurs in schools, the questions tend to test more aspects of memory that do not train HOTS or higher-order thinking skills of students, some Competency Standards (SK) and Basic Competence (KD) in mathematics subjects can be developed HOTS questions. Thompson (2008, p.96) stated that the interpretation of mathematics teachers from 32 people had difficulty interpreting thinking skills in Bloom's Taxonomy and making test items for higher order thinking. The low ability of higher order thinking among students has attracted educators and researchers of mathematics education as implied in the statement of Henningsen & Stein (1997, p.524) "Much discussion and concern have been focused on limitations in students' conceptual understanding as well as on their thinking, reasoning, and problem-solving skills in mathematics", meaning that much discussion

and attention has been focused on the limitations in students' conceptual understanding, as well as on thinking, reasoning, and problem-solving skills in mathematics. In Indonesia, the low mathematical knowledge of students has always been a hot topic of conversation in society. Students often cannot use the mathematical knowledge they have in everyday life, even if they are given questions that are slightly different from what they are learning. Based on the results of Kamal's research (2019) students still have difficulty in analyzing, evaluating, and dominantly experiencing difficulties in the level of creating, especially creating a new formula based on the available standard formulas. Characteristics of HOTS revealed by Resnick (1987, p.3) include non-algorithmic, complex nature, multiple solutions (many solutions), involving variations in decision making and interpretation, application of multiple criteria (many criteria), and being effortful (requires a lot of effort). Conklin (2012, p.14) states the characteristics of HOTS as follows: "characteristics of higher-order thinking skills: higher-order thinking skills encompass both critical thinking and creative thinking" meaning, the characteristics of higher-order thinking skills include critical thinking and creative thinking.

Thorne & Thomas (2009:2) states that High Order Thinking Skills (HOTS) are a process of thinking at a higher level than just remembering facts or re-explaining something they have learned to others. HOTS requires a person to understand, conclude, relate facts to concepts, categorize, manipulate, look for facts in an event that occurs, and find a solution to a problem that occurs. Schraw and Robinson (2011: 2) define Higher Order Thinking Skills in the current context as abilities that promote deeper and conceptual forms of understanding. King, Godson, & Rohani (1998: 11) state that higher-order thinking involves various thought processes that are applied to complex situations and have many reasons.

Higher Order Thinking Skills (HOTS) include two main characteristics, namely the ability to think critically and think creatively (Conklin, 2012). The characteristics of HOTS revealed by Resnick (in Budiman & Jailani, 2014) include non-algorithmic, complex nature, multiple solutions (many solutions), involving variations in decision making and interpretation, application of multiple criteria (many criteria), and being effortful (requires a lot of work). effort). According to Brookhart (2010), higher order thinking skills (HOTS) include the ability to analyze, evaluate and create, logical reasoning, decision making (judgment), critical thinking, problem-solving, creativity, and creative thinking. Arwood (2011) states that the thinking ability of each individual can combine concepts, from one concept to another by assembling a frame of mind, speaking, writing, reading, seeing, and counting. Brookhart and Nitko (2011), the cognitive domain is divided into two parts, namely Lower Order Thinking Skills (low-level thinking) and High Order Thinking Skills (high-level thinking). The cognitive domains included in Lower Order Thinking Skills are remembering, understanding, and applying, while High Order Thinking Skills include analyzing, evaluating, and creating (Anderson & Krathwohl: 2001).

According to Chairani (2016) "problem-solving is a mental process which is the largest part in a process including the process of finding and forming to find problem-solving" (p. 65). Meanwhile, the mathematical problem-solving ability is an important mathematical ability and needs to be mastered by students who study mathematics (Herdiana, H., Rohaeti, EE, and Sumarmo, U., 2017). This is in line with the National Council of Teachers of Mathematics (NCTM) that by learning to solve mathematical problems, students acquire a way of thinking, accustomed to being diligent, curious, and confident in facing new problems they face, both in math problems or problems. other. (NCTM, 2000).

However, behind the importance of problem-solving, students' mathematical problem-solving is still considered lacking. This is in line with the results of Ayu, Mulyono, and Isnaini's research (2019) entitled "Mathematical Problem Solving Ability of Class X Students" which revealed that "Although most students can understand the problem well, in the planning stage, solving problems, and re-examining it is still experienced many errors, especially at the stage of re-examining the solution steps that have been worked on.

According to Tohir et al (in Tohir, 2019) a mathematical problem is a problem that requires certain techniques to solve it both in the form of routine and non-routine questions (p. 2). Non-routine questions are more complex than routine questions. Therefore, one of the strategies needed to solve non-routine problems is a problem-solving strategy to get a solution. This is in line with Krulik & Rudnick (1989) who

argued that problem-solving is a process. The process or way in which individuals use previously acquired knowledge, skills, and understandings are synthesized to meet the demands of unfamiliar situations. The process begins by reading the problem (read the problem), exploring (explore), choosing a strategy (select a strategy), and ending when the answer has been obtained (solve) and is considered (look back) by taking into account the initial conditions. Students are required to synthesize what they have learned and apply it to new and different situations that lead to non-routine questions given by the teacher. Bell (in Talhah, 2018) put forward the definition of the problem as follows "A situation is said to be a problem for someone if he is aware of the existence of the situation, admits that the situation requires action, and cannot immediately find a solution". (p.34).

According to Karunia Eka Lestari and Mokhammad Ridwan Yudhanegara (2015, p.84), mathematical problems include:

(1) Routine problems, namely problems whose solution procedures are simply repeated algorithmically.

(2) Non-routine problems, namely problems whose settlement procedures require a planning solution, not just using formulas, theorems, or theorems.

(3) Applied routine problems, namely problems related to the real world or everyday life.

So, it can be concluded that a mathematical problem is a question or problem that shows a challenge, is not easy to solve using known procedures, and requires proper planning in the completion process.

Problem-solving is a very important part of the mathematics curriculum because in the learning process students can gain experience using the knowledge and skills they already have to be applied to non-routine problem-solving. According to Polya (in Kurniawan & Setiawan, 2019) problem solving is an attempt to find a way out of various difficulties, where the method is still surrounded by many obstacles and to achieve this goal requires an effort that is not easy to achieve immediately.

The ability to solve problems must be owned by a student to be able to solve problems, be it routine or non-routine that require high-level thinking skills in solving them and can help develop other mathematical thinking skills. As stated by Gagne (in Hendriana, 2018) that problem solving is the highest and most complex type of learning compared to other types of learning that require students to have the ability to create new ideas or ways regarding the problems they face. So that every student who has problem-solving skills has the opportunity to develop and improve other thinking skills through solving various problems (p. 45).

Besides the importance of solving mathematical problems, one of the factors that influence mathematical problem-solving is early mathematical ability. Siswono (2018, p. 44) states that problem-solving ability is influenced by several factors, namely initial experience, mathematical background, desire and motivation, and problem structure. This is also in line with the results of Purnamasari and Setiawan's research (2019) which explains that students with the high early mathematics ability group have better mathematical problem-solving abilities than students with medium early mathematics ability and low early mathematics ability. Erni Apriani et al (2017) also stated that the initial ability of students affects the learning process because the initial ability of students is a prerequisite that must be possessed so that the learning process can run well. In this study, the researcher aimed to analyze the students' Higher Order Thinking Skills in solving problems in terms of their initial mathematical abilities.

METHODS

This research method uses qualitative methods. The subjects in this study were students of class XI MIPA. The technique of determining the subject in this study began by grouping students into three groups of early mathematics abilities, namely high, medium and low. Then 3 students were taken as subjects, namely one subject for each group whose problem-solving steps met the problem-solving steps of Krulik & Rudnick. The data collection technique begins by grouping the categories of early mathematical abilities, giving math problem-solving tests and interviews with the selected subjects to describe the subject's mathematical problem-solving.

The test instrument in this study was made by the researcher and validated using content validity. The math problem-solving test questions in this study were first validated by experts consisting of two lecturers of mathematics education at Siliwangi University before being given to the research subject. The results of the first validation show that the

questions can be used but need a little revision, namely in terms of identifying the steps to read the problem and correcting sentences so that they are not ambiguous. In the second validation, the validator stated that the questions could be used.

RESULTS AND DISCUSSION

The description of the research data is divided into 3, namely solving mathematical problems for students with high early mathematical abilities, mathematical problem solving for students with moderate early mathematical abilities, and mathematical problem solving for students with low early mathematical abilities. Subject S28 which is included in the category of high early mathematics ability, in the read the problem step, subject S28 seems to be able to understand the given problem quite well. The subject wrote the information on the question quite completely, it's just that the subject forgot to write down what was asked.

To find out more, the researcher asked him in the following interview excerpt.

Researcher: "Okay, can you explain the problem again?"

S28: “So someone wants to build an aquarium with a volume of 4 m3 and a width of 1 m. Now the cost to make the base is 30,000 and the cost for the walls is 15,000, if the cost of the aquarium is to be as cheap as possible, then how long, high, and the cost?"

In the interview excerpt above, it can be seen that the subject of S28 can rephrase the problem in his own words correctly. Apart from that, subject S28 also understood what was asked, only that subject S28 forgot to write it down on the answer sheet. This is stated in the following interview excerpt.

Researcher: "Oh yes, good, what was asked in the question earlier?"

S28: "Oh yes, sir, what he asked was long, high, and the lowest cost. I forgot I didn't write it down."

In the explore step, subject S28 examines the information provided, subject S28 considers that the information provided is sufficient even though previously he had doubts as in the following interview excerpt.

Researcher: "Does S28 ensure that the information provided is sufficient or not to answer the question?"

S28: "Checking sir, at first I thought it wasn't enough, but after remembering it turned out to be enough information."

In addition, the subject of S28 also made a quite good modeling, although it was incomplete in writing down the intentions of several variables in the modeling. In writing, the subject of S28 immediately wrote “*V*” and “l” without explaining what and l were. After being confirmed through interviews, S28 saw that Volume, length, width, and height are generally symbolized by and l. Here's an excerpt from the interview.

Researcher: "Can you explain the purpose of writing = 4 m^3 and = 1m."

S28: "Oh, that means in the matter that the volume is 4m 3 and the width is 1 m. So I just wrote = 4 m^3 and = 1m to be fast, because it's common for = volume, p = length, l = width and t = height."

In the select, strategy step, the subject of S28 will initially carry out a strategy of trying one by one the possibilities, but the subject of S28 feels that this is not possible and the results are not necessarily correct, this is stated in the following interview excerpt.

Researcher: "What is the initial plan of S28 in solving this problem?"

S28: "At first I wanted to find it without an equation, sir, so I just wanted to use numbers like that, try one by one how many are possible."

Researcher: "Why not use that method?"

S28: “When you try it, it seems like it will be difficult, the result will not be correct, sir.

After that, I just remembered that I also encountered a problem like this, how to use derivatives.”

From the interview quote, the subject of S28 had no idea how to complete it. This also seems to have caused subject S28 to think that the information provided was insufficient at first. After realizing that he had encountered a problem of this kind and remembering that it could be solved with derivatives, the subject of S28 continued by forming an equation in the variable which would then be derived.

In the solve step, subject S28 does it according to the plan in the previous step. In the process, subject S28 immediately concludes t = 2, after being confirmed regarding this through interviews, subject S28 can explain this as in the following interview excerpt.

Researcher: "Why did S28 immediately conclude that t = 2 is fulfilled".

S28: "Because if the value is high, it can't be negative, sir, so t = 2 for sure."

In addition, the researcher also tries to

provide other conditions for this problem in the following interview excerpts.

Researcher: “In another case, S28 finds that there are many possible values and there are some that have positive values. How does S28 determine its value?”

S28: "Maybe by trying by substituting one pack at a time."

Researcher: "S28 substitutes it for costs that have been lowered or those before they are lowered?"

S28: “To those who haven't been sent down, sir, so later we will take the one with the lowest value because what is asked for is the minimum. Because I still remember to find the maximum and minimum values by substituting the values from the stationary to the initial function, the largest is the maximum and the smallest is the minimum.

From the excerpt of the interview, it can be seen that the subject of S28 has quite mastered the material related to this derivative so that in other conditions the subject of S28 knows how to solve it as well.

In the look-back step, the subject of S28 did not write it down in the answer sheet. To find out, the researchers explored it through the following interview excerpts.

Researcher: "Okay fine, after S28, is finished, do you re-examine the work or not?"

S28: "Checking it out, sir, to make sure what the question is, I'm afraid I've miscalculated too. I also tried the substitution of x = 2 and the result is bigger.”

From the interview excerpt above, it can be seen that the subject of S28 examined the work. Regarding whether or not there was another way, the researcher tried to ask the subject of S28 through the following interview excerpt.

Researcher: "Then S28 apart from the ones just mentioned, has another way or not to solve this problem?"

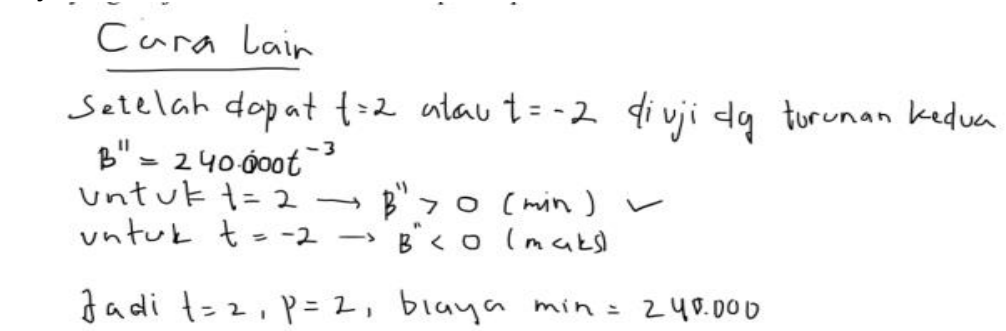
S28: "Yes, sir, I've learned that using the second derivative, but I don't use it because I think it's easier to test one by one."

From the interview excerpt above, it can be seen that the subject of S28 knows another way to solve this problem. It's just that the subject of S28 sees that this method is not easier than the method he is currently using. To be sure, the researcher asked the subject of S28 to do it this way. The following is an excerpt

researcher's interview: "Okay, can you try now to do it this way? Or if you do a test, can you show the results of the work?"

S28: "I guess I'll just do it again, sir, my scribbles have disappeared too."

Researcher: "Okay, please try it while sharing the screen."



Then the subject of S28 did the solution in that way. Here's the work

Subjects with high early mathematical abilities met the HOTS indicators in analyzing information, identifying problems, organizing, and looking for relationships between elements and problems being solved. In evaluating, students can conclude, distinguish, decide, interpret, and connect, and can solve problems in different ways.

The results of the work on the subject of S07 which is included in the category of moderate early mathematical ability, in the read the problem step, the subject of S07 seems to be able to understand the given problem quite well. To find out more, the researcher asked him in the following interview excerpt.

Researcher: "Okay, can you explain the problem again?"

S07: “Want to build an aquarium with a volume of 4 m3 and a width of 1 m. Now the cost to make the base is 30,000 the same as the cost for the walls is 15,000, the cost of the aquarium wants to be as cheap as possible. Asked for length, height equals the cost.”

In the interview excerpt above, it can be seen that the subject of S07 can rephrase the problem in his own words correctly. In addition, from

what the subject said, S07 also understood what was asked.

In the explore step subject S07 revealed that he did not check enough or not the information provided to answer the given problem. This is stated in the following interview excerpt.

Researcher: "Did S07 check whether the information provided was sufficient or not?"

S07: "No sir, I'm working on it right away."

However, subject S07 in Figure 4.4 seems to be able to make an appropriate mathematical model even though in its manufacture, subject S07 does not make an explanation for each variable. To find out, the researcher confirmed through the following interview excerpts.

Researcher: "Can you explain the purpose of writing V, p, l, t, 1, and 2."

S07: "That means = volume, p = length, l = width, and t = height, then the volume of the block is = p × l × t, the problem is that it is usually like that. So for the other variables, = total cost, 1 = the cost of the base, and 2 = the cost of the wall, sir, should you be informed, sir?"

Researcher: "Oh okay I understand. Well, yes, that's right, information should be given first so that the reader's answer is not mistaken."

S07: "Oh yes sir, next time I will explain."

From the interview excerpt above, subject S07 also sees that volume, length, width, and height are generally symbolized by, p, l, and t.

In the Select a strategy step, subject S07 immediately sets the chosen strategy from the start without thinking about other plans. In addition, the subject of S07 has encountered a problem that is somewhat similar although not the same, this is expressed in the following interview excerpt.

Researcher: "What was the initial plan of S07 in solving this problem?"

S07: "The initial plan is already direct as it was done, sir, want to use derivatives."

Researcher: "Have you ever found the same type of question before?"

S07: "When it comes to the same questions, sir, at least there is a different story

when studying the derivative material of algebraic functions."

In the solve step, subject S07 does it according to the plan. In the process, subject S07 stated that "it can't be negative", after being confirmed this through interviews, subject S07 could explain this in the following interview excerpt.

Researcher: “Why does S07 state that it cannot be negative?”

S07: "Because the high value cannot be negative, sir, so it must be t = 2"

In addition, the researcher also tries to provide other conditions for this problem in the following interview excerpt.

Researcher: “In another case, S07 finds that the t-value has many

possibilities and there are some that have positive values. How does S07 determine its t value?”

S07: "Maybe by trying by substituting one pack at a time, then

the smallest one will be taken."

Researcher: "S07 substitutes it for costs that have been lowered or those

before they are lowered?"

S07: "To those who have not been sent down, sir"

From the interview excerpt, it can be seen that the subject of S07 has quite mastered the material related to this derivative so that in other conditions the subject of S07 knows how to solve it as well.

In the look back step, subject S07 did not write it down in the answer sheet. To find out, the researchers explored it through the following interview excerpts.

Researcher: "Okay fine, after finishing S07, do you re-examine the work or not?"

S07: "No sir, is there something wrong with my answer, sir?"

Researcher: "Oh okay, that's right. Why didn't S07 recheck the

workmanship?"

S07: "Because I'm pretty sure about my answer, sir."

Researcher: "Oh yes, good, next time, if there is still time, just check it again."

S07: "Okay sir, next time I will check again."

From the interview excerpt above, it can be seen that S07 did not carry out a re-examination of the work. This is because the subject feels quite sure of the answer. Regarding whether or not there are other ways, the researcher tries to explore them through the following interview excerpts.

Researcher: "Well, lastly from me, S07 knows another way or not to solve this problem?"

S07: "I don't think there is any, sir, as far as I know, just try to substitute every value obtained from the derivative."

From the interview excerpt, it can be seen that the subject of S07 does not know any other

way to solve the problem.

Subjects with early mathematical abilities are meeting the HOTS indicators in analyzing information, identifying problems, organizing, and looking for relationships between elements and problems being solved. Even in evaluating students, they can conclude, distinguish, decide, interpret, and connect, but the subject has not been able to solve the problem differently.

The results of the work on the S24 subject, which is included in the category of low early mathematical ability, in the read the problem step, based results, it can be seen that the S24 subject can understand the information provided, it's just that the S24 subject does not write down what is asked or asked. To explore this, the researcher interviewed the subject of S24, the following are excerpts from the interview.

Researcher: "Try S24 to explain this problem."

S24: "Want to make an aquarium in the form of blocks with a volume of 4 and a width of 1. The cost of the walls is 15,000 and the cost of the base is 30,000, he asked for the cheapest cost."

From the interview excerpt above, the subject of S24 understands the problem given, it's just that there are shortcomings in what is asked, namely not mentioning length and height.

In the explore step, based on the results of the S24 subject, create a block image and an equation whose final result is "p x t = 4". Similar to other subjects, subject S24 also did not provide any prior information regarding these symbols. Then regarding checking the adequacy of the information or not, the researcher explores it through the following interview excerpts.

Researcher: "Okay, before doing S24, do you make sure that the information is sufficient or not?"

S24: who doesn't understand?

In the Select a strategy step based on the results, it can be seen that the subject of S24 did not write it down, only that there were words "p = 4" and "t = 1". The researcher assumes that the subject of S24 chooses a trial and error strategy to solve it. To explore this, the researcher asked this question through the following interview excerpts.

Researcher: "What is the initial plan for S24 in this work?"

S24: "I'm confused, sir, I don't know what method to use, so I'll just guess"

From the interview excerpt, it can be seen that the subject of S24 chose a strategy by trial and error. In the solve step, subject S24 performs a cost calculation for the base, wall, and total. Subject S24 uses p = 4 and t = 1. This becomes a question for researchers on how the subject decides that these values are fulfilled. To explore this, the researcher asked through interviews, the following are excerpts. Researcher: "Okay fine, try to explain the steps for working on S24."

S24: "So firstly, because volume 4 is the same width as 1, then the possibility is that the height and length can be 2 and 2 or 4 and 1. Because usually, the length of the beam is longer than the width and the same height, I just choose the length 4 and the height 1. After I immediately calculated the cost of manufacture, namely the cost of the base plus the cost of the wall."Based on the interview excerpt above, it can be seen that the reason for the subject of S24 is in determining p = 4 and t = 1. Then the researcher asked further regarding this matter while at the same time trying to straighten the statement of the subject of S24, along with the interview excerpt.

Researcher: Does S24 calculate that the length and width are 2?

S24: No, sir, because as I said earlier, the beam cannot be the same length and height

Researcher: Oh yes, just for information, yes for S24, the length of the beam is not always greater than the height value

S24: Oh yes, sir

In the look back step subject S24 did not write in the answer sheet. To find out, the researcher asked through the following interview excerpts.

Researcher: "After the work, is it checked again?"

S24: "No sir. I'm not sure about this answer, but I'm also confused about what else to do."

From the interview excerpt, it can be seen that the subject of S24 did not re-examine. Regarding whether or not there is another way, the subject of S24 does not have another way.

Subjects with low initial mathematical abilities met the HOTS indicators in analyzing information, identifying problems, organizing, and looking for relationships between elements and problems being solved. In evaluating students, they have not been able to conclude, distinguish, decide, interpret, and connect, and are not able to solve problems in different ways.

Based on the results of the analysis in this study, subjects with high early mathematical ability categories found that in the read the problem step, the subject was able to complete

this step well. Based on the work on the answer sheet and through the results of the interview, the subject can understand the meaning of the question, can analyze the data on the question, and can determine the follow-up afterward. This is in line with the results of research by Irma Purnamasari and Wahyu Setiawan (2019) which states that students with high initial mathematical abilities can understand problems well.

In the explore step, subjects with high category early mathematical abilities can complete this step. Based on the results of the work, the subject can do examples, and group data, can predict and create mathematical models and make pictures based on the questions being tested. However, in the example, sometimes the subject does not provide a fairly complete description of the example even though the final result of the modeling is correct. In addition, through the interview, the subject also revealed that the subject checked the adequacy of information related to whether or not the information obtained was sufficient to be able to answer the questions given.

In the select, strategy step, subjects with high initial mathematical abilities are also able to complete this step. Based on the results of the work, the subject can determine the follow-up and complete the calculations from the previously obtained mathematical model. In addition, from the results of the work, it can also be seen that the subject can parse the problem into a simpler form and can determine the right strategy to solve the problem. One of the reasons that enable the subject to determine the right strategy to use is the experience of the subject in solving mathematical problems related to derivatives. This is in line with the opinion of Nurfatanah et al (2018) which states that to get the ability in problem-solving, one must have a lot of experience in various problem-solving.

In the solve step, subjects with high early mathematical abilities can complete this stage. Based on the results of the work on the answer sheet, the subject can find answers according to the calculations carried out. In addition, the subject can also perform calculations according to the problem instructions, and expand the mathematical model according to the chosen strategy. Through interviews, the subject can also provide answers to problems whose conditions are different from the questions given. This shows that the subject understands correctly the resolution of the given problem.

In the look-back step, subjects with high initial mathematical abilities were able to complete this step well. Through the interview, the subject revealed that the subject re-examined the work to make sure there were no errors in calculations or anything else. In addition, the subject also has other ways to solve the given problem even though the subject does not write it down on the answer sheet given. Through interviews, the subject reveals other ways that can be used to solve the problems given. This shows that the subject with the high initial mathematical ability category performs the look-back step quite well. The results of this study are different from the results of research conducted by Yetty and Isnaeni (2020) which concluded that students with high early mathematics ability categories made mistakes in the look-back step.

Furthermore, based on the results of the analysis in this study, subjects with the category of moderate early mathematical ability found that in the read the problem step, the subject was able to complete this step. Both are based on the answers on the answer sheet and through the results of interviews. From the answer sheet, it can be seen that the subject can understand the meaning of the question and can analyze the data on the question. Meanwhile, from the results of the interview, the subject can understand the problem given and can re-express the problem in his language. This result is in line with the results of research conducted by Irma Purnamasari and Wahyu Setiawan (2019) which states that students with moderate early mathematical abilities can understand some of the information from the problem even though they do not find the right solution. The difference with this research is that the subject can find the right solution.

In the explore step through interviews, subjects with moderate early mathematical abilities revealed that they did not check whether or not the information provided was sufficient to answer the questions. The subject immediately decides the next steps to be taken. However, from the answer sheet, it can be seen that the subject can make mathematical models quite well and make supporting pictures. It's just that in making a mathematical model, students with moderate mathematical initial abilities do not provide information regarding the variables used. One of the reasons is that the subject is used to using symbols without giving information first to the variables.

In the select, strategy step, based on the

answer sheet, subjects with early math skills are choosing to use algebraic derivatives. Subjects did not experience problems in choosing strategies. Through interviews, the subject revealed that he had solved problems related to derivatives. This is what makes the subject have no difficulty in choosing a strategy. This is in line with the opinion of Nurfatanah et al (2018) which states that to get the ability in problem-solving, one must have a lot of experience in various problem-solving.

In the solve step, the subject does not have problems in this step. From the answer sheet, it can be seen that the subject can complete the work according to the plan. In addition, through interviews, the subject can explain the work well, and even when given other problems the subject can find a solution to solve them. This shows the subject understands how to solve this problem. In addition, the subject is quite thorough in doing calculations, so there are no errors. There are very few things that need to be confirmed and the subject can explain.

In the look back step the subject is unable to complete this stage. Based on the answer sheet, it does not appear that the look-back step has been carried out. In addition, from the results of the interview, the subject stated that he did not re-examine the work. The subject also stated that he had no other way to solve it. The reason the subject did not re-examine the work was that the subject felt quite sure. The results of this study are in line with research conducted by Annisa & Ellya (2017) which concluded that the error in the look-back steps made by students was because they did not re-check the answers. After all, they were sure of the answers obtained, forgot, and wanted to finish quickly. Subjects with early mathematical abilities are meeting the HOTS indicators in analyzing information, identifying problems, organizing, and looking for relationships between elements and problems being solved. Even in evaluating students, they can conclude, distinguish, decide, interpret, and connect, but the subject has not been able to solve the problem differently.

Furthermore, based on the results of the analysis in this study, subjects with low mathematical initial ability categories in their work in the answer sheet, in the read the problem step the subject can understand the given problem, the subject knows the meaning of the question, the subject can analyze the data in the problem and write down what is known in the problem. question. However, the subject did not write down what was asked on the answer sheet. Through the interview, the subject can state the problem in his own words, but the same as on the answer sheet, the subject also has errors in expressing what is asked in the question. The subject did not mention what was asked in the question.

In the explore step, subjects with low initial mathematical abilities felt unsure of the information obtained. So the subject is confused about what to do next. Subjects are only able to make pictures as illustrations of the questions given. During the interview, the subject stated that he did not know at all how to solve the given problem so he was only able to make an image and an equation obtained from the information on the problem.

In the select, strategy step, subjects with low initial mathematical abilities were not able to complete this stage. Based on the answer sheet, the subject had difficulty in choosing the strategy to be used in solving the problem, did not write a plan, and did not explore the initial problem. The cause of the subject making mistakes is experiencing a lack of confidence and difficulty in using strategies to solve problems. This is in line with research by Abdul & Abidin (2015) which states that 27.58% of students have difficulty in using the strategies used in the completion process, this is the most common compared to difficulties in the calculation process, difficulties in identifying mathematical operations, and difficulties in solving mathematical problems. in understanding the problem.

In the solve step, subjects with low initial mathematical abilities were not able to complete this stage well. Based on the answer sheet, the subject made an error in writing the answer in the form of incorrectly assuming that the length and width of the beam should not have the same value. The cause of the subject making a mistake is that the subject does not know the whole process that must be done. This is in line with Annisa & Ellya's research (2017) which states that students make mistakes in the completion process because students do not know the overall completion process.

In the look-back step, subjects with low initial mathematical abilities were not able to complete this stage. Based on the answer sheet the subject does not fill in the look back step. In addition, through interviews, the subject also stated that he did not re-examine the work and had no other way to solve it. The cause of the

subject doing this is that the subject does not know at all what to do. Subjects only rely on feeling confident after finding an answer. Subjects with low initial mathematical abilities met the HOTS indicators in analyzing information, identifying problems, organizing, and looking for relationships between elements and problems being solved. In evaluating students, they have not been able to conclude, distinguish, decide, interpret, and connect, and are not able to solve problems in different ways.

From the descriptions above, it can be seen that all subjects were able to complete the read the problem step, it's just that subjects with low initial mathematical abilities made mistakes in this step. The results of this study are in line with the results of research conducted by Yetty and Isnaeni (2020) which states that students with low early math abilities make mistakes in the read the problem step, explore step, select a strategy step, solve step, and lookback step. In addition, the results of this study also found that only subjects with high initial mathematical abilities were able to complete the look-back step. These results are different from the results of research conducted by Irma Purnamasari and Wahyu Setiawan (2019) which concluded that students did not master the look back step, both in the high mathematics initial ability category, medium early mathematical ability category, and low early mathematical ability category.

CONCLUSION

The results of the research and discussion in this study can be concluded with several things. Subjects with the category of high early mathematics ability can fulfill every step of solving mathematical problems based on Krulik & Rudnick's steps, namely the read the problem step, explore step, select a strategy step, solve step and step look back. Subjects did not experience significant difficulties in solving problems. This is because the subject never solved the problem solving the problem. Subjects with the medium category of initial mathematical ability were able to fulfill the steps of solving mathematical problems based on the Krulik & Rudnick steps in the read the problem step, explore step, select a strategy step and solve step, the subject was unable to carry out the look back step. In the explore step the subject does not check the adequacy of information and does not provide information in the example, however, the subject can make good modeling so that he can solve the problem correctly. The subject did not carry out the look-back step because he was quite sure of the answer.Subjects in the category of low mathematical initial ability were only able to fulfill the mathematical problem-solving step based on the Krulik & Rudnick step in the read the problem step, while for the other four steps, namely the explore step, then select a strategy step, the solve step and the look back step the subject was unable to solve it. This happened because the subject was confused about the solution to be carried out, so they did not know the strategy to solve it.

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