Journal of Education and Learning Mathematics Research (JELMaR)

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Analysis Of Students' Creativity In Solving Numeracy Literacy Problems On Higher Order Thinking Skills (HOTS) Material On Lines And Angles

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Abstract: The aim of this research is to determine students' creativity in solving numeracy literacy problems on Higher Order Thinking Skills (HOTS) questions on lines and angles. The type of research used is descriptive research. The approach used in this research is a qualitative approach because the research was carried out on systems thinking, namely in the form of an analysis of creativity in solving student problems on Higher Order Thinking Skill (HOTS) questions which will then be processed in depth according to facts obtained in the field or research location. Researchers focus on creativity, ability to solve problems on Higher Order Thinking Skill (HOTS) questions in accordance with student creativity. This research uses various data collection methods, including tests, interviews, and documentation. These three methods are used to collect data and information that helps solve research difficulties by supporting and complementing each other. Students with high mathematical abilities can fulfill all indicators of problem-solving creativity, students with moderate mathematical abilities have one indicator of problem-solving creativity that is not met, students with low abilities cannot fulfill several indicators of problem-solving creativity. So it can be concluded that mathematical abilities can influence students' creativity in solving problems.
Key words: analysis, creativity, problem solving, literacy, numeracy

INTRODUCTION

The ability to apply the various numbers and symbols associated with basic mathematics to solve real-world problems, evaluate given data in a variety of ways, and interpret the findings to forecast and make decisions is known as numerical literacy. In everyday life, all the activities we do are closely related to mathematics, ranging from simple to the most complex problems (Anas & Saldi, 2022). The ability to read, understand, solve, inform and assess mathematical problems is referred to as mathematical literacy (Panglipur, 2023). According to (Aura, Khafidin, & Himmatul, 2022) the ability to use the idea of numbers and the ability of counting operations in everyday life, as well as the capacity to interpret quantitative information in learning settings, is known as numerical literacy. The current situation is that many students underestimate the knowledge of numeracy literacy, even though numeracy literacy is a very important knowledge in education.

To face a world that is becoming more complex and crucial in terms of development, education is a vital investment. According to the idea of human capital, investing in education yields many benefits in terms of improved welfare, increased productivity, and better working conditions. (Nafiati, 2021). Therefore, education plays an important role in creating quality human resources. The quality of resources in question includes having high intelligence and skills, as well as creativity that is balanced with their intelligence.

The capacity to discover and create something new, a new approach, or a new model that benefits individuals and society is known as creativity. (Astuti & Aziz, 2019). The new thing does not have to be something that has not existed before, but it can be something that already exists but is further developed. According to Karkockiene in

(Hardiani, 2022) argues that creativity involves characteristics related to the ability to find or do something new.

Problem solving ability is a must-have for students. As stated by Bernard, 2018 in (Yuaida, Balkist, & Mulyanti, 2022) that one way to think about problem solving as a teaching strategy is to use learning exercises to help students develop their ability to solve math problems. Math and problem solving are two things that go hand in hand. One of the tasks of Higher Order Thinking Skills (HOTS) is to train the ability to solve math problems. Critical thinking and cognitive skills are very important during the teaching and learning process because problem solving is a cognitive talent as well. Therefore, a teacher is fully responsible for implementing learning according to the needs of students and more interesting so that it can bring out critical thinking in students (Panglipur & Mahendra, 2022).

Higher Order Thinking Skills (HOTS) is the ability to think more complexly in dealing with problems or issues such as the ability to analyze, evaluate, and create (Irsyadi, Kristiani, Nisa, Yunaini, & Ayubi, 2022). With HOTS, students can be more critical and also have better problem solving skills so that they can support students' academic achievement. (Ramli, Ma'rup, & Arsyad, 2021) stated that HOTS can play a big role in supporting the improvement of students' academic achievement, with HOTS students are able to solve problems, give ideas or opinions wisely, hypothesize, and be able to master and control more complicated situations.

Based on information from one of the mathematics teachers, it is revealed that students' problem solving skills at school are still not good as seen from the daily life of students in solving math problems, especially in solving HOTS-type problems that students have not usually encountered before. This is caused by many factors, namely first, the form of problem exercises given to students during learning still often uses basic level problems and problem exercises with HOTS types are very rarely done and given by teachers. Problems that are simple to understand but difficult to solve by students should be given frequently as according to (Panglipur & Putra, 2019) that repeated and continuous practice is needed for learning so that students become accustomed to solving challenging problems so that creativity is formed in solving them. Second, some students are still not fluent in reading and counting. This condition triggers students' lack of ability to understand literacy and numeracy during the learning process. Lack of enthusiasm for learning caused by an unhealthy environment, where they lack the important role of parents. Based on the background description of the problem above, it is very important to conduct a study related to the analysis of student creativity in solving numeracy literacy problems on Higher Order Thinking Skills (HOTS) questions.

METHOD

This research aims to characterize students' creativity in answering Higher Order Thinking Skill (HOTS) questions thoroughly and methodically based on information obtained qualitatively and descriptive data. Thus, the type of research used is descriptive research. The approach used in this research is a qualitative approach because the research is carried out on a system of thought, namely in the form of analyzing creativity in student problem solving on Higher Order Thinking Skill (HOTS) questions which will then be processed in depth according to the facts obtained in the field or research site. Researchers focus on the ability to solve problems on Higher Order Thinking Skill (HOTS) questions in accordance with student creativity.

In this research, there are two types of data that will be obtained, namely primary data and secondary data. Primary data is obtained from the results of taking the Higher Order Thinking Skill (HOTS) test and interviews with students after taking the test. While secondary data is obtained from the results of documentation during the research process in the form of written materials, objects, gestures, documents, archives or the like that are

related to research problems. In qualitative research, data collection is carried out in natural conditions (natural setting).

This study used a variety of data collection methods, including tests, interviews, and documentation. These three methods are used to collect data and information that help solve research difficulties by supporting and complementing each other. (a) Written test, the purpose of the test in this study is to collect information about students' ability to solve problems related to lines and angles, Higher Order Thinking Skill (HOTS) in mathematics. This test is in the form of a description question (essay). The number of questions used was 3 questions. The questions given to students are adjusted to the indicators of Higher Order Thinking Skill (HOTS) type questions with levels C4 (analyze), C5 (evaluate), C6 (create) and are adjusted to the line and angle material based on the basic competencies and core competencies. Through this test students are guided to compile answers in a decomposed manner so that they can express their creativity and ideas through their own written language completely and clearly. (b) Interviews, Interviews were also conducted in this study in order to obtain data. Interviews were conducted after students finished working on the test questions. The purpose of this semi-structured interview was to collect comprehensive and in-depth information about the interviewee's mathematical problem solving ability, as well as additional supporting information that could not be obtained only through testing to obtain the desired data. The interview guidelines were systematically organized according to Polya's problem-solving indicators. Semi-structured interviews are helpful as they allow some degree of freedom of implementation, which helps the researcher identify more open issues relating to the research subjects' beliefs, concepts or ideas. After preparing the test, the interview took place on the same day. This was done to ensure that students remembered what they did. The media used during the interview were a recorder and the interview guidelines that had been prepared. (c) Documentation, Documentation is also used in this study because it can be useful for obtaining the data desired by the researcher. Data obtained through documentation is written material, which can be in the form of photographs or drawings, data on problem solving ability test results, student data, and data that can be used to meet the needs in this study.

RESULTS AND DISCUSSION

The subjects of this study were seventh grade students consisting of 6 students with 2 low ability students, 2 medium ability students and 2 high ability students. The determination of research subjects based on ability was obtained from the results of the researcher's discussion with the VII grade mathematics teacher at the school based on student grades, abilities and daily characteristics of students. This is based on considerations made by researchers and the school considering the importance of understanding the characteristics of new students of SMPN 6 Tanggul Jember.

Based on the results of the Higher Order Thinking Skill (HOTS) test to 6 students who have been selected as research subjects, data has been obtained. The 6 students have also been interviewed by researchers to obtain the data needed in this study. The information collected about students' findings in solving numeracy literacy problems in Higher Order Thinking Skill (HOTS) questions is detailed in full below.

1. **The results of the work of subject S-1 with high mathematics ability in showing creativity in solving HOTS (Higher Order Thinking Skill) problems.**

   The results of working on HOTS problems for subject S-1 in order to solve numeracy literacy problems in line and angle material are shown in the following figure.
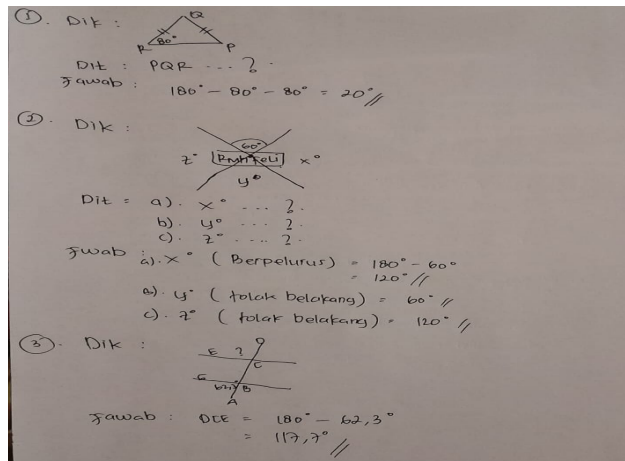
Based on the results of working on HOTS problems, subject S-1 can answer more than one answer correctly. This subject uses good and correct working steps by drawing what is known from the given problem. The following are the results of the researcher's interview with subject S-1:

Researcher : Do you understand the problem?

S-1 : Yes, I understand the meaning of the problem. I understand the meaning and what is asked by the question.

Researcher : What steps should you take to solve this problem? Try to describe the action you plan to take.

S-1 : What I have to do first is first determine what is known from the problem, then determine what is asked from the problem. After we know what is known and asked from the problem, then we can work on the problem according to our understanding.

Researcher : Are there any obstacles in solving the problem?

S-1 : So far there has been no problem, but I also don't know if my answer is correct or not.

Researcher : After your efforts, are you sure that your response is accurate or not?

S-1 : Not sure yet, but there are some problems that I'm really sure are correct.

Based on the excerpts of the interview results above, it is known that subject S-1 can convey his opinion in solving the HOTS problem. By clearly and deeply describing the process in the process and describing what is known and asked in the problem. This shows that subject S-1 can show signs of detail (elaboration), fluency (fluency) when following instructions to solve problems in the problem.

Researcher : How do you solve the problem?

S-1 : I only found one way to do the problem. In accordance with what I have learned during learning

Subject S-1 can also solve the problem in only one way. This can be seen from the subject's answer. This shows that subject S-1 did not show the flexibility indicator.

2. **The results of the work of subject S-2 with high mathematics ability in showing creativity in solving HOTS (Higher Order Thinking Skill) problems.**

The results of working on HOTS problems for subject S-2 in order to solve numeracy literacy problems in line and angle material are shown in the following figure.

Based on the results of working on HOTS problems, subject S-2 can provide more than one correct answer. This subject used good and correct steps. The work is also neat and detailed in accordance with what has been taught at school. The following are also the results of the researcher's interview with subject S-2

Researcher : Do you understand the problem?

S-2 : Yes ma'am, I understand what is asked in the problem, but it's just that problem number 2 needs repetition to understand the meaning of the problem.

Researcher : What steps should you take to solve this problem? Try to describe the action you plan to take.

S-2 : What I have to do is understand the meaning of the problem, then after understanding, write down what is known and then answer the question properly.

Researcher : Are there any obstacles in solving the problem?

S-2 : Yes, I am a little confused about question number 2, it takes reading and understanding repeatedly so that I can understand the meaning of question number 2.

Researcher : After your efforts, are you sure that your response is accurate or not?

S-2 : A little sure, it's just that for problem number two there are a, b and c that must be answered. That's what makes me a little hesitant

Based on the interview excerpt above with subject S-2, it can be seen that the research subject S-2 already understands what is asked in the problem and S-2 also understands what to do first to solve the problem given. It's just that there is a little confusion to understand problem number 2. This shows that subject S-2 can show signs of detail (elaboration), fluency (fluency) when following instructions to solve problems in the problem.

Researcher : How do you solve the problem?

S-2 : I used the methods that I have learned before in the line and angle material. Although in problem number 2 I was not so sure about my answer and the way I did the problem, but I understood the meaning of the problem.

Subject S-2 can also solve the problem in only one way. It can be seen from the interview above and from the subject's answers in working on the problem. This shows that subject S-2 did not show the flexibility indicator.

3. **The results of the work of subject S-3 with moderate mathematical ability in showing creativity in solving HOTS (Higher Order Thinking Skill) problems.**

The results of working on HOTS problems for subject S-3 in order to solve numeracy literacy problems in line and angle material are shown in the following figure.
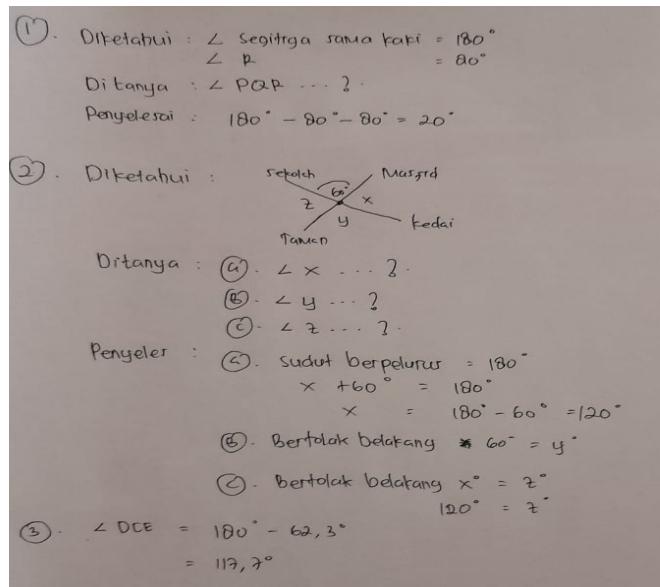
Based on the results of working on HOTS questions, subject S-3 can solve all the problems, but the work is still not correct and the process of working is also not good and correct, it looks less detailed and some are answered immediately without working steps. The following are also the results of the researcher's interview with subject S-3

Researcher : Do you understand the problem?

S-3 : Yes, I understand the meaning of the problem that the mother gave earlier, both questions number 1-3 I understand ma'am.

Researcher : What steps should you take to solve this problem? Try to describe the action you plan to take.

S-3 : Yes, working with the formula of line and angle material. In problem number 1, there is a picture of an isosceles triangle, which means that all the angles are 180. Then what is asked is the wrong angle of the triangle so later just subtract it.

Researcher : Are there any obstacles in solving the problem?

S-3 : Yes, I was confused about working on problem number 3, I didn't understand the meaning of the problem and there was a picture I also didn't understand the meaning of the picture.

Researcher : After your efforts, are you sure that your response is accurate or not?

S-3 : I'm not sure about all of them, number 3 is difficult. For number 1 and 2 I am sure because I can do it but I don't know if my answer is correct or not.

According to the excerpt from the interview with subject S-3, it is evident that the research subject S-3 knows the problem posed and knows what needs to be done to answer it. It just shows that subject S-3 can show signs of detail (elaboration), fluency (fluency) when following instructions to solve problems in the problem.

Researcher   : How do you solve the problem?

S-3   : I used the methods that I have learned before in the line and angle material. Although in problem number 3 I was not so sure about my answer and the way I did the problem, because I did it just like that and the time was running out.

Subject S-3 was also limited to one method of problem solving. Both the interview mentioned above and the subject's response to the problem show that there is no flexibility marker present in subject S-3.

4. **The results of the work of subject S-4 with moderate mathematical ability in showing creativity in solving HOTS (Higher Order Thinking Skill) problems.**

The results of working on HOTS problems for subject S-4 in order to solve numeracy literacy problems in line and angle material are shown in the following figure.
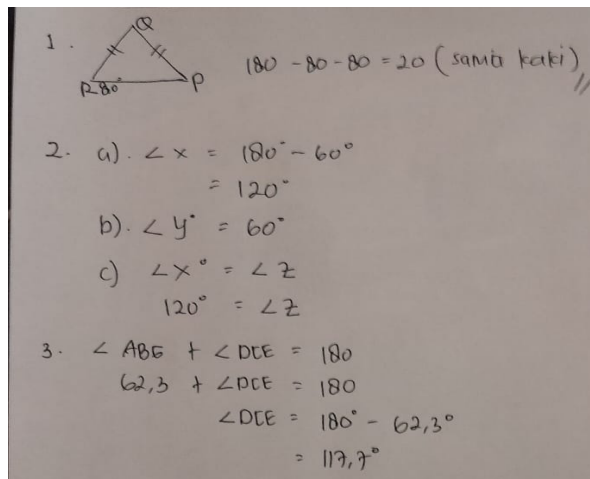
Based on the results of working on HOTS problems, subject S-4 can solve all the problems correctly, but the process of working is not good and correct, it looks less detailed and some are answered immediately without working steps such as known, asked and answered. The following are also the results of the researcher's interview with subject S-4

Researcher   : Do you understand the problem?

S-4   : Yes, I understand the meaning of the questions in the problem that you gave earlier, both questions number 1-3 I understand ma'am.

Researcher   : What steps should you take to solve this problem? Try to describe the action you plan to take.

S-4   : Yes, I used the formula for lines and angles. But I did not write down what is known, asked and others. I immediately answered the problem that the mother gave me and I didn't know if it was right or wrong.

Researcher   : Are there any obstacles in solving the problem?

S-4   : Yes, I was a little hesitant to work on problem number 2, I forgot a little about the material of congruent, opposite and

other angles. I was working on problem number 2 just remembering.

Researcher : After your efforts, are you sure that your response is accurate or not?

S-4 : I'm not sure about all of them, number 2 is difficult. For number 1 and 3 I am sure because I can do it but I don't know if my answer is correct or not.

Based on the interview excerpts above with the subject S-4, it can be seen that the research subject S-4 already understands what is asked in the problem and S-4 also understands what to do first to solve the problem given. It's just that there is a little confusion to understand problem number 2. This shows that subject S-4 can show indicators of fluency, which is fluent in responding to commands to solve problems.

Researcher : How do you solve the problem?

S-4 : I used the methods previously learned in the line and angle material. Although in problem number 2 I was not so sure about my answer and the way I did the problem, because I forgot the material about opposite, backward, parallel angles and others.

Subject S-4 can also solve the problem in only one way. It can be seen from the interview above and from the subject's answers in working on the problem. This shows that subject S-4 did not show the flexibility indicator.

5. **The results of the work of subject S-5 with low mathematics ability in showing creativity in solving HOTS (Higher Order Thinking Skill) problems.**

The results of working on HOTS problems for subject S-5 in order to solve numeracy literacy problems on lines and angles are shown in the following figure.
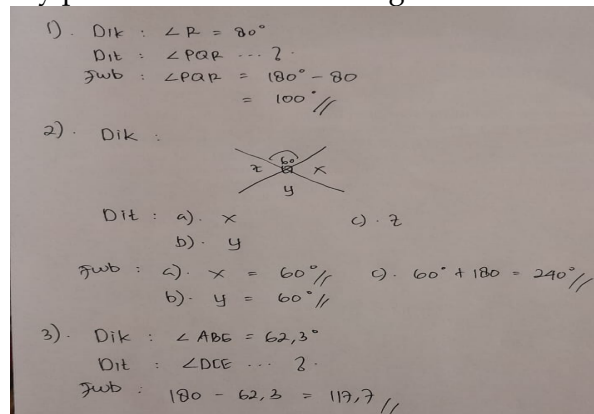
Based on the results of working on HOTS problems, subject S-5 can solve all the problems even though the answers are not all correct, look less detailed and some are answered immediately without any explanation of the process of origin of the results he wrote on the answer sheet. The following are also the results of the researcher's interview with subject S-5

Researcher : Do you understand the problem?

S-5 : not all questions I understand what is meant or asked in the problem.

Researcher : What steps should you take to solve this problem? Try to describe the actions you plan.

S-5 : First I wrote down what was known from the problem then wrote down what was asked and finally answered the problem by using the formula that I had learned from the line and angle material.

Researcher   : Are there any obstacles in solving the problem?

S-5   : I was confused for problem number 2, I didn't know what method or formula to use in solving the problem. Finally, I just guessed to answer the question.

Researcher   : After your efforts, are you sure that your response is accurate or not?

S-5   : Not sure about everything ma'am, number 2 is difficult ma'am.

It is evident from the previous interview excerpt that the research subject S-5 understood what was asked in the question and what to do to answer it. It's just that there was a little confusion to solve problem number 2. This shows that subject S-5 can show signs of detail (elaboration), fluency (fluency) when following instructions to solve problems in the problem.

Researcher   : How did you solve the problem?

S-5   : I solve the problem according to what I know and understand. If I don't know, I just do it casually.

Subject S-5 can also solve the problem in only one way. It can be seen from the interview above and from the subject's answers in working on the problem. This shows that subject S-5 did not show the flexibility indicator.

6. **The results of the work of subject S-6 with low mathematics ability in showing creativity in solving HOTS (Higher Order Thinking Skill) problems.**

The results of working on HOTS problems for subject S-6 in order to solve numeracy literacy problems on lines and angles are shown in the following figure.
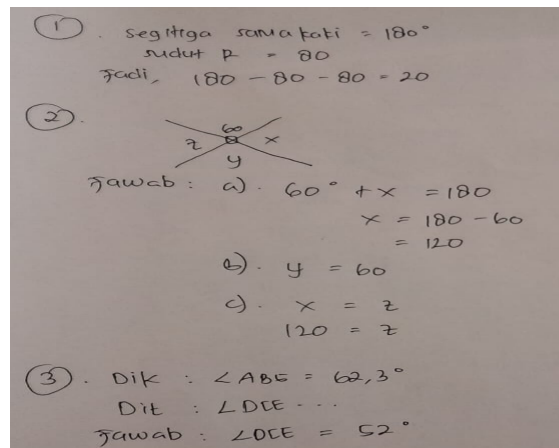
Based on the results of working on HOTS problems, subject S-6 can solve all problems even though the answers are not all correct, look less detailed and the steps used by subject S-6 are not unique like other subjects. The following are also the results of the researcher's interview with subject S-6

Researcher   : Do you understand the problem?

S-6   : Yes, I understand what is meant in the problem that the mother gave, some are told to find the angle in the picture, the line, and the opposite straightening angle and others.

Researcher   : What steps should you take to solve this problem? Try to describe the action you plan to take.

S-6   : First I have to understand what is asked from the problem then I have to understand what is known in the problem and then answer the problem correctly.

Researcher   : Are there any obstacles in solving the problem?

S-6	: The obstacle is that I don't understand the material that has been taught about lines and angles, so I am confused to answer the questions given by the mother.
Researcher	: After your efforts, are you sure that your response is accurate or not?
S-6	: Not sure about everything ma'am, there are questions that I just do ma'am.

Based on the interview excerpts above with the subject S-6, it can be seen that the research subject S-6 already understands what is asked in the problem and S-6 also understands what to do first to solve the problem given. However, he was confused about what formula to use because S-6 did not understand the material about lines and angles. This shows that subject S-6 can show signs of detail (elaboration), fluency (fluency) when following instructions to solve problems in the problem.

Researcher	: How do you solve the problem?
S-6	: I solve the problem according to what I know and understand. If I don't know, I just do it casually.

Subject S-6 can also solve the problem in only one way. It can be seen from the interview above and from the subject's answers in working on the problem. This shows that subject S-6 did not show the flexibility indicator.

Based on the results presented above, it can be observed that subjects with high level abilities, namely S-1 and S-2, can achieve or fulfill all indicators of problem solving creativity because these two subjects can explain what is known, asked in detail, well and correctly. These two subjects also fulfill the fluency indicator because they can answer all questions correctly and well. Whereas in the medium ability subjects, namely S-3 and S-4, there is one indicator that is not fulfilled, namely the flexibility indicator. This subject mostly still uses one way and there is no other way that distinguishes it from other subjects. And in low ability subjects, namely S-5 and S-6, there are several indicators that are not met such as flexibility indicators, detail indicators. These two subjects still do a lot of original work, do not include the correct steps such as known, asked and even suddenly directly answer.

The results of this study indicate that students' creativity in solving numeracy literacy problems on HOTS problems can be influenced by students' mathematical abilities. The results of the study inform that students with high mathematical ability can fulfill the indicators of problem solving creativity, namely originality, flexibility, fluency, detail, and elaboration. This can be commensurate with research findings (Ahadiyah & Fanni, 2017) which found that students with strong mathematical abilities may also show strong creative thinking skills. Whereas in students with moderate and low mathematical abilities not all indicators were met, only some indicators were met, and each student met different indicators.

CONCLUSIONS

Based on the results of the study, it is found that students' creativity in problem solving is based on students' mathematical ability. The higher the students' mathematical ability, the more creative the students are in solving problems. In this study, students with high mathematics ability have high creativity in solving numeracy literacy problems on HOTS questions for line and angle material. To prevent students from becoming too dependent on a single approach provided by teachers or schools, teachers should provide opportunities for students with medium and low levels of mathematical ability to solve problems independently.

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