Journal of Mathematics Education
Website: http://usnsj.id/index.php/JME
Email: pengelolajme@gmail.com
p-ISSN 2528-2468; e–ISSN 2528-2026

DOI: https://doi.org/10.31327/jme.v9i1.2118

CRITICAL THINKING CHARACTERISTICS OF SMPN 14 PALU STUDENTS IN SOLVING GEOMETRY PROBLEMS BASED ON GENDER

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Article Info

Article history:

Received Feb 02, 2024
Revised Marc 06, 2024
Accepted Mei 07, 2024

Keywords:

Critical thinking,
geometry problems,
gender

ABSTRACT

The aim of this research is to describe the critical thinking characteristics of male and female students in solving geometric problems. The type of research used in this research is qualitative research, because this research aims to describe and analyze phenomena or events individually or in groups. The approach used is a qualitative descriptive approach, because the results of this research are in the form of descriptions, namely descriptions in the form of words or sentences regarding the characteristics of students' critical thinking in solving geometry problems based on gender. Improving critical thinking skills in mathematics learning is very necessary because critical thinking and mathematics are an inseparable unit. The results of this research show that the critical thinking characteristics of subjects in solving geometric problems are: (a) in the clarification category, MA and FN subjects can formulate problems and appropriate information to solve problems precisely and clearly (b) in the assessment category (assessment) MA and FN subjects tried to collect relevant information, but MA identified the problem incorrectly (c) In the inference category, MA and FN subjects made wrong conclusions. (d) In the strategies category, MA subjects do not propose other alternatives, while FN subjects propose other strategies or alternatives when solving problems.

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How to Cite:

Widiastuti, K., Sukayasa., Ismaimuza, D. (2024). Critical Thinking Characteristics of SMPN 14 Palu Students in Solving Geometry Problems Based on Gender. JME: *Journal of Mathematics Education*, 9(1), 34-46

1. INTRODUCTION

Mathematics is one of the subjects that in the learning process is able to train students' critical thinking skills. In accordance with what was stated by (Jafar et al., n.d.) by studying mathematics a person can be trained to think rationally and can take into account carefully

and precisely when making a decision. In addition, (Azizah et al., 2018) also revealed that mathematics is needed to equip students to become independent learners and be able to overcome problems that arise in life. Given the importance of mathematics, the government has set content standards for primary and secondary education units in mathematics. The implementation of mathematics learning is not enough to provide information in the form of memorized theories or concepts, but needs to be oriented towards developing the skills needed in problem solving, one of which is critical thinking.

Improving critical thinking skills in mathematics learning is necessary because critical thinking and mathematics are inseparable. In line with what is stated by (Sulistiani & Masrukan, 2017)that mathematical material is understood through critical thinking and critical thinking is trained through a series of processes in mathematics learning. Then (Assaly & Smadi, 2015) in his research stated that students cannot understand Mathematics lessons if they do not read critically. Learning should emphasize critical thinking skills so that students can practice and transfer their understanding.

Geometry is one of the materials that is still difficult for students to understand, because geometry is a branch of mathematics that has abstract objects. This is in accordance with what is stated by (Hanafi, n.d.) that understanding geometry material requires relatively high visualization because of its abstract nature. Geometry is higher in difficulty because of the understanding of more complex concepts, such as the ability of imagination and the ability to examine the intent of the problem. Studying geometry can foster the ability to think logically, critically and develop problem-solving skills. In line with the opinion (Setiawan, 2020) which states that geometry material has a relationship with critical thinking skills.

According to (Setyawati, n.d.) the characteristics of someone who has critical thinking skills, namely being able to solve a problem with a specific purpose, being able to analyze and generalize ideas based on existing facts, and being able to draw conclusions and solve problems systematically with correct arguments. If someone is only able to solve problems without knowing the reason the concept is applied, then he cannot be said to have critical thinking skills.

The thinking characteristics of each student are different in solving a problem. This is because there are many factors that can affect students' thinking characteristics, one of which is gender differences. As revealed by (Pebianto et al., n.d.) that the abilities of men and women are different due to differences in the brains of boys and girls. It is known through observations that boys are superior in abstract reasoning, mathematical and mechanical thinking while girls are superior in terms of language use, memorization, accuracy, precision, accuracy and accuracy of thinking.

(Leach et al., 2011) in his research also showed that gender significantly affects the average critical thinking ability. Based on this opinion, it can be seen that male and female students have many differences in their thinking processes so that gender differences can also affect the characteristics of students' critical thinking.

Based on the description above, it is important for an educator to know how the differences in critical thinking characteristics of male and female students in solving math problems, especially geometry. Therefore, the researcher conducted a study with the topic "Characteristics of Critical Thinking of SMPN 14 Palu Students in Solving Geometry Problems Based on Gender"

2. METHOD

The type of research used in this research is qualitative research, because this research aims to describe and analyze phenomena or events individually or in groups. The approach used, namely a qualitative descriptive approach, because the results of this study

are in the form of a description, namely a description in the form of words or sentences about the characteristics of students' critical thinking in solving geometry problems based on gender.

The subjects in this study were 1 male student and 1 female student who had high mathematical ability in class IX Ki Hajar Dewantoro SMP Negeri 14 Palu in the academic year 2023/2024. The research subjects were determined by the researcher by looking at the students' mathematics report card scores in the previous semester, namely the even semester of the 2022/2023 school year. The number of students in the class was 31 people.

To determine students who have high mathematical abilities, students' report card scores are analyzed by standard deviation or standard deviation by finding the average value (mean) and standard deviation. For the average value (mean) of students, namely $\bar{x} = 78.42$ and for the standard deviation, namely SD = 3.9. Students who have high math ability have a report card score $\geq (\bar{x} + SD) = (78.42 + 3.9) = 82.32$. So that students who have a report card score ≥ 82.32 are students who have high abilities, namely students with the initials FN (female students) with a report card score of 91, and students with the initials MA (male students) with a score of 93.

The data in this study are presented in written form from critical thinking tests I and II and transcripts of interview recordings from each subject about the tests and the results of solving critical thinking problems I and II.

Critical thinking test I	Critical thinking test II
A wire of 6 m length is provided, from which beam frames of 13 cm, 9 cm, 8 cm will be made. How many beam frames can be made from the wire?	A 4 m long wire is provided, and a beam frame of 11 cm, 5 cm, 4 cm is to be made. How many beam frames can be made from the wire?

Data collection techniques in this study were carried out using test methods and interview methods. Validation in this study uses time triangulation. Triangulation is done by giving 2 problems, namely problem 1 and problem 2 at different times. Data analysis in this study was carried out by referring to qualitative data analysis according to (Miles et al., 2014)

3. RESULTS AND DISCUSSION

3.1. Results

3.1.1 Data Analysis of Subject FN (Female Subject)

This section will show how the subject FN in solving geometry problems based on critical thinking indicators according to (Jacob & Sam, 2008), namely clarification (clarification), assessment (assessment), inference (inference), and strategies (strategies) through the results of tests and interviews Data Analysis of Subject FN (Female Subject) that have been reduced. The results are as follows:

A. Clarification Category

The following are excerpts of answers and transcripts of recorded interviews conducted with FN in clarification.

FN M1 015 P: okay from the problem you can understand yet?
FN M1 016 S : A little understanding mom
FN M1 017 P : Yes... Okay then I ask. What is asked from the problem?

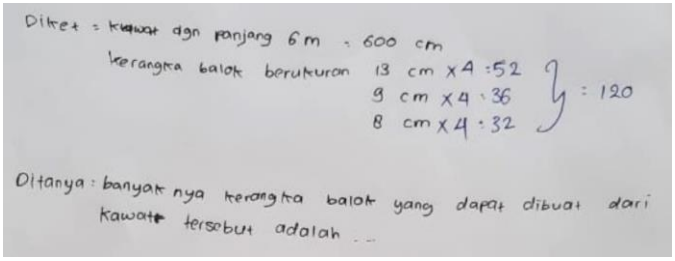

Figure 1. Excerpt of FN's answer in the clarification category

FN M1 018 S : What is asked is the number of blocks that can be made from the wire
FN M1 019 P : Then what is known. ?
FN M1 020 S : A wire with a length of 6 m is known as the frame of the beam which measures 13 cm in length, 9 cm in width and 4 cm in height.

Based on the excerpts of written answers and interview results above, the FN subject in understanding M1 in the clarification category is as follows: (1) Subject FN wrote and showed what was asked in the problem precisely and clearly according to the facts. This can be seen in the results of the interview FN M1 18 S. (2) FN subject wrote and mentioned what was known in the problem precisely and clearly according to the facts. This can be seen in the results of the interview FN M1 020 S.

B. Assessment Categories

The following are excerpts of answers and transcripts of recorded interviews conducted with FN in the assessment indicators

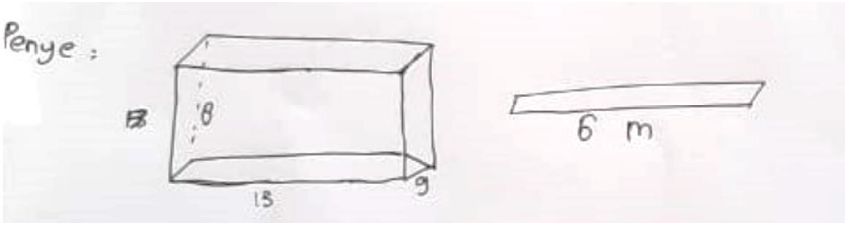

Figure 2. Excerpt of FN's answer in the assessment category

FN M1 021 P : Okay how do you know that 13 is the length, 9 is the width and 8 is the height. ?
FN M1 022 S : Because from the formula of length times width times height, 13 is the length, 9 is the width and 8 is the height.
FN M1 023 P : Okay kid, you said you understood the problem, now that you have understood the problem, what steps do you take next?
FN M1 024 S : The first step is to find what is known and then what is asked and then the third is to find the solution.
FN M1 025 P : Okay, you have looked for what is asked and what is known, right? Now what is the first step you take to find the solution?
FN M1 026 S: The first thing I did was draw the beam and then draw the length of the height and width. After that I looked for the circumference formula.
FN M1 027 P: Okay, son. Why do you have to use the perimeter formula? Why not the area or the volume?

FN M1 028 S : Because the skeleton is asked, and what relates to the skeleton is the perimeter.
FN M1 029 P : Oh yes, when did you get the idea to use the perimeter formula? Did you get the idea when you read the question?
FN M1 030 S : No, mom, the problem is that I read it, then I understood it first, then I drew the block, and then I looked for a formula related to the skeleton.
FN M1 031 P: What is that formula?
FN M1 032 S : The circumference formula.

Based on the description, answer excerpts and transcripts of the researcher's interview recordings with the FN subject, it can be seen that the FN subject collected relevant information by identifying information that was in accordance with the problem, (FN M1 022 S). Furthermore, FN subject drew the beam in order to get the relationship between the beam frame (problem command) and the appropriate solution steps (FN M1 26 S). Subject FN also provided logical reasons in answering the researcher's questions, thus providing a solution to solve the problem precisely and clearly (FN M1 030 S).

C. Inference Categories

The following are excerpts of answers and transcripts of interview recordings conducted on FN in the Inference indicator.

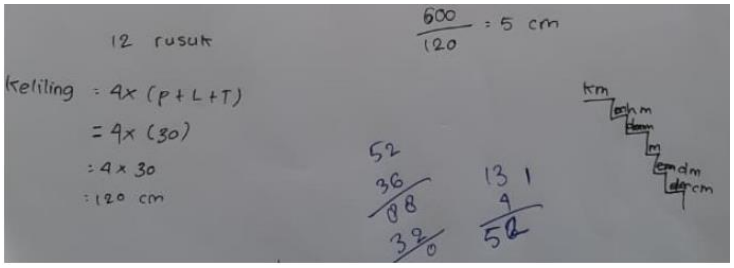

Figure 3. Excerpt of FN's answer in the inference category

FN M1 033 P : Now try to explain this first to find the circumference. Try to explain!
FN M1 034 S : To find the perimeter I look for the formula first. The perimeter formula is 4 times in brackets Length plus width plus height. Then the next step is 4 times the length 13 the width 9 the height 8 and then bring it 4 x 30 because 13 + 9 + 8 equals 30 and then the same as 4 x 30 equals 120 after that 600 / 120 to 5 cm.
FN M1 035 P : Okay, you explained 4 times 13 + 9 + 8 why don't you write it here?
FN M1 036 S : Because I immediately wrote the amount mom, so I didn't write the addition.
FN M1 037 P : Oh, that means you got this from here.
FN M1 038 S : Yes
FN M1 039 P : Okay, mom asked again, where is this 600 from? What does 600 / 120 mean?
FN M1 040 S : The number of frame beams mom.
FN M1 041 P : Then what is this 600?
FN M1 042 S: 600 is from a wire with a length of 6 m equals 600 cm. because the length width height of the beam is cm then we have to find the cm from the wire.

FN M1 043 P: So what is the result?
FN M1 044 S: So the result is 5 cm.
FN M1 045 P: So what is the conclusion?
FN M1 046 S: So in conclusion, the number of beam frames that can be made from 6 m of wire is 5 cm.
FN M1 047 P: Are you sure about your answer?
FN M1 048 S : Actually, I'm not sure but I'm sure.

Based on the written answers and interview transcripts, it can be seen that the subject FN can solve M1 well. FN subject explained well the steps of completion that FN did, although FN subject did not write the complete steps of completion on the answer sheet, but FN subject could explain it during the interview (FN M1 034 S - FN M1 036 S). FN did and explained the step-by-step solution very well and correctly (FN M1 040 S - FN M1 042 S), but in the final result or conclusion, FN subject was a little less careful by answering that the back frame that can be made from 6 m wire is 5 cm (FN M1 044 S - FN M1 046 S), which should be a beam frame that can be made from 6 m wire.

D. Strategies Categories

The following are excerpts of answers and transcripts of interview recordings conducted on FN in strategic indicators.

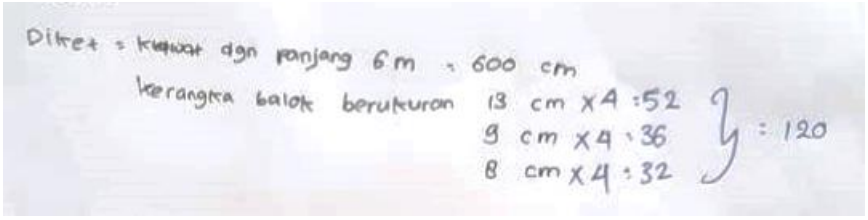

Figure 4. Excerpt of FN's answer in the strategic category

FN M1 049 P : Do you think there is another way to get the answer?
FN M1 050 S : hmmm, I think there is mom.
FN M1 051 P : How do you think you can do that? Try to think about it first.
FN M1 052 S : (....) (mmm) There are 4 ribs in the beam, there are 4 ribs in length, 4 ribs in height, 4 ribs in width, so I think 13 x 4, 9 x 4, 8 x 4, 9 x 4 is the same as (....) I'll scratch my mom first. So 13 x 4 = 52, 9 x 4 [....] = 36. 8 x 4 [....] = 32 so 52 + 36 + 32 = 120. So 600 can be directly divided by 120.
FN M1 053 S: Yes, the result?
FN M1 054 P: The result is 5.
FN M1 055 P : 5 what?
FN M1 056 S: 5 cm.
FN M1 057 P: Are you satisfied with your result?
FN M1 058 S: a little satisfied mom.

Based on the written answers and interview results, FN subjects can propose, predict, use and explain other ways of solving M1 problems, namely using the direct method by multiplying the length, width and height of the beam with their respective ribs (FN M1 052 S). Although the FN subject took a very long time when thinking of other strategies to solve M1, the FN subject managed to get the right way, but in the interview results it can be seen

that the FN subject still made mistakes when explaining the units used (FN M1 054 P - FN M1 056 S).

3.1.2. Data analysis of subject MA (Male Subject)

This section will show how MA subjects solve geometry problems based on critical thinking indicators according to Jacob and Sam through the results of tests and interviews that have been reduced. The results are as follows:

A. Clarification Categories

The following are excerpts of answers and transcripts of interview recordings made by MA subjects in clarification.

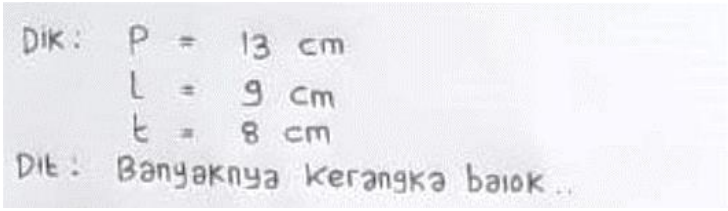

Figure 5. Excerpt of MA's answer in the clarification category

MA M1 003 P:	try to read the question well first.
MA M1 004 S :	Provided with a wire that is 6 m long, a beam frame measuring 13 cm, 9 cm, 8 cm will be made. How many beam frames can be made from the wire?
MA M1 005 P :	Already done
MA M1 006 S:	already.
MA M1 007 P :	Now I ask you, have you ever gotten a problem like this before?
MA M1 008 S :	Never
MA M1 009 P :	In what grade?
MA M1 010 S :	Grade 8
MA M1 011 P :	What semester was it?
MA M1 012 S :	2nd semester.
MA M1 013 P :	Are the questions exactly the same or perhaps there are different ones?
MA M1 014 S:	If you look at it, it's the same.
MA M1 015 P :	Like this?
MA M1 016 S :	Yes
MA M1 017 P :	Okay, then what do you think this question is asking?
MA M1 018 S :	What is asked is the number of beam frames
MA M1 019 P :	Then what is known?
MA M1 020 S:	It is known that the length is equal to 13 cm, the width is equal to 9 cm and the height is equal to 8 cm.

Based on the excerpts of written answers and interview results above, it can be seen that in understanding M1 in the clarification category, MA subjects can write and show what is asked in the problem correctly (MA M1 018 S). Subject MA can also write and mention what is known in the problem correctly (MA M1 020 S).

B. Assessment Categories

The following are transcripts of the recorded interviews conducted with MA in the assessment indicator.

MA M1 021 P : Okay, let me ask you again, how do you know that the length is 13, the width is 9 and the height is 8? How can you determine that?
MA M1 022 S : Because 13 is longer, so the length is 13 cm, then 9 is bigger than 8, so I give the width as 9 cm. Then 8 is the lowest so I just give the height.
MA M1 023 P : That's right. Okay, do you understand the question.
MA M1 024 S: I did
MA M1 025 P : Well if so, what steps do you take next after you determine the known and asked, what steps do you take next?
MA M1 026 S : Find the solution with the formula.
MA M1 027 P : Now what is this formula called?
MA M1 028 S : circumference of the beam.
MA M1 029 P : Then how do you solve it? Why did you use the circumference formula and not something else?
MA M1 030 S: Because of that. The frame is like the ribs. So I just used the perimeter formula.
MA M1 031 P: ohh I see. . . When did you come up with the idea of using the perimeter formula? Was it after understanding the problem or how?
MA M1 032 S: eeee from understanding this problem, what is asked is the frame so I used the perimeter formula.

Based on the description and transcript of the researcher's interview with subject MA, it can be seen that subject MA can collect relevant information even though only by guessing the length, width and height of the beam only by the difference in numbers (MA M1 022 S). The next step MA subject can find the appropriate solution idea, namely using the perimeter of the beam and identifying the problem properly and correctly (MA M1 030 S - MA M1 032 S).

C. Inference Categories

The following are excerpts of answers and transcripts of interview recordings conducted on MA in the Inference indicator.

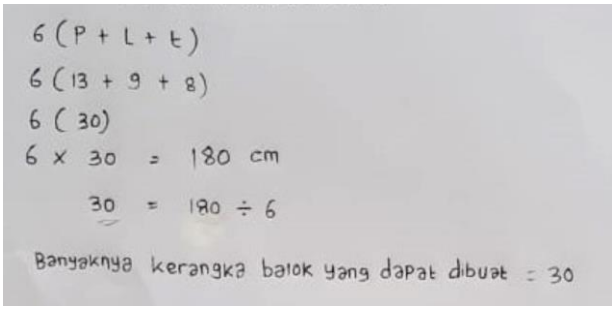

Figure 6. Excerpt of MA's answer in the inference category

MA M1 033 P : Oh hiya, try to explain the steps of this solution?
MA M1 034 S : (mmm) 6 times the length plus the width plus the height.
MA M1 035 P : Wait a minute, 6 times the length plus the width plus the height is what?
MA M1 036 S : (mmm) the circumference formula.
MA M1 037 P: try to explain again!

MA M1 038 S : It's equal to 6 times the length of 13 plus the width of 9 cm plus the height of 8 cm. It's equal to 6 times 13 plus 9 plus 18 gives 30. 6 times 30 equals 180.
MA M1 039 P : So what's the next step?
MA M1 040 S : (mmm) 30 equals 180 because 5 times here is converted to divide, so 180 in part 6.
MA M1 041 P : Okay. now I'm asking where did you get this value of 6?
MA M1 042 S : This value of 6 is from the question asked
MA M1 043 P : You mean the 6 that is formulated by the circumference is also from the question. ?
MA M1 044 S : (mmm) yes.
MA M1 045 P: Yes?
MA M1 046 S: yes
MA M1 047 P : Well okay from all that you have done what can you conclude?
MA M1 048 S : So the number of beam frames that can be made is equal to 30.

Based on the excerpts of answers and interview transcripts of MA subjects in the inference category, it can be seen that MA subjects tried to use the steps in solving M1, but the circumference formula that MA subjects wrote down was wrong. MA explained that 6 (p + l + t) is the circumference formula (MA M1036 S), and when the researcher asked the MA subject explained that 6 in the circumference formula he obtained from the problem, which is based on the length of the wire (MA M1 042 S - MA M1 044 S). because the completion process from the beginning was wrong so MA also made the wrong conclusion (MA M1 048 S).

D. Strategies Categories

The following are excerpts from the recorded interviews conducted with MA in strategic indicators.

MA M1 049 P: Mom asked again, do you think there is another way to get this solution?
MA M1 050 S : I think there is, but I don't know yet.
MA M1 051 P : Oh yes, you're sure you're not sure about this answer.
MA M1 052 S : Yes, I am sure with this answer.
MA M1 053 P : Are you satisfied with this answer?
MA M1 054 S : (mmm) satisfied.

Based on the transcript of the researcher's interview with subject MA, it can be seen that in solving the first problem in the strategy category, subject MA cannot propose another way or another solution in solving the problem. This can be seen from the MA M1 050 S interview transcript.

3.2. Discussion

3.2.1 Critical thinking characteristics of female students

A. Clarification Category

Critical thinking of female subjects in the clarification category, namely female subjects can understand the problem well, can write, mention and show what is known and what is asked precisely and clearly. In accordance with the opinion (Schoenfeld, n.d.) Click or tap here to enter text., when students understand a problem, they can indirectly categorize

what is known and what is asked in the problem. Female subjects also quickly understand the problems given and can also show the information in the problem well and quickly.

B. Assesment Category

Critical thinking of female subjects in assessment is that female subjects use important questions and relevant information to connect a problem with other problems. In accordance with the opinion (Jacob & Sam, 2008) states that at the assessment stage students can use important/relevant statements as the beginning of problem solving. The female subject also took the initiative to draw the blocks first to make it easier to get ideas to get the relationship between the questions in the problem and the appropriate solution steps. The subject explained that she got the ideas after reading the problem first, then understanding the problem, then drawing the blocks, and from drawing she got the idea for the next step, namely the solution step.

C. Inference Category

The ability of female subjects in the inference category in solving problems is to use problem-solving steps with the perimeter of the beam formula. The subject explained well the solution steps he took, although the subject did not write the complete solution steps on the answer sheet, but the subject could explain it during the interview. The subject also firmly answered and explained that the meter unit in the problem was changed to centimeters to get the final result. Female subjects get the right final score, in accordance with the opinion(Jacob & Sam, 2008) states that the inference stage can be a stage where students can make correct conclusions based on the information obtained. However, the female subject made a mistake when writing the final unit, as a result it caused a different interpretation, so that the conclusion of the final solution that the subject obtained was wrong.

D. Strategies Category

The critical thinking ability of female subjects in the strategic category is that female subjects can explain other ways of solving problems, namely using direct methods by multiplying the length, width and height of the beam with their respective ribs. In line with the opinion (Jacob & Sam, 2008) the strategy stage is a stage where students think openly in solving problems so that it allows students to be able to find other strategies in solving problems. However, although in the interview results it can be seen that the subject still makes mistakes when explaining the units used, the subject can solve the problem using other strategies and explain it well again.

3.2.2. Critical thinking characteristics of male students

A. Clarification Category

Critical thinking of male subjects in the clarification category, namely male subjects can understand the problem well. The subject can write and explain what is known and what is asked well. The subject can Understand the problem given with just one reading because the material in the problem has been studied before. In line with the opinion (Tobias & Everson, 2002), the ability to distinguish between what is known and what is asked is an important thing to achieve success in all academic settings.

B. Assesment Category

Critical thinking of male subjects in the assessment category shows that male subjects try to collect relevant information even though they only classify the length, width and height

of the beam only with the difference from the largest to the smallest number. In line with the opinion (Wijaya, n.d.) states that students who are able to find relevant sources of information and know how to process this information to solve problems. It can be said that these students have critical thinking skills. The male subject also explained that he could find ideas for the solution steps only by understanding the problem given, namely using the perimeter of the beam.

C. Inference Category

Critical thinking of male subjects in the inference category, namely male subjects trying to use steps in solving problems, but the subject experienced errors in understanding the information in the problem in using the circumference formula, which resulted in the results of the work that MA subjects did making mistakes so that the final conclusion that MA subjects made was also wrong. In line with the opinion (Amir & Risnawati, n.d.)states that examples of behavior due to cognitive strategy capabilities are Arranging the steps of mathematical solution.

D. Strategies Category

Critical thinking of male subjects in the Strategic category (Strategies) in solving problems does not do anything because the subject cannot propose other ways or other solutions in solving problems, in line with the opinion (Wulandari & Kristiawan, 2017) states that in the strategic category students who cannot use other alternatives in solving the problem at hand are included in students who have low abilities. However, the subject is satisfied with the results of his work.

4. CONCLUSIONS

Based on the results of the research and discussion, it can be concluded that:

1. Characteristics of critical thinking of female subjects in solving geometry problems are: (a) in the clarification category, FN subjects can formulate problems and appropriate information to solve problems precisely and clearly. (b) In the assessment category, FN subjects try to gather information using important questions, relevant information, and ideas to connect a problem with other problems clearly and precisely. (c) In the (c) In the inference category, FN subjects solve problems with the right and clear steps, but due to errors in writing units, FN makes inappropriate conclusions. (d) In the category of strategies, FN subject thinks openly in proposing strategies or other alternatives when solving problems.
2. Characteristics of critical thinking of male students in solving geometry problems are: (a) In the clarification category, subject MA can formulate the problem and the appropriate information to solve the problem precisely and clearly. (b) In the assessment category (assessment) MA subjects try to collect relevant information even though the initial way of identifying the problem is less precise. (c) In the inference category, the MA subject in solving the problem made conclusions based on the information that had
3. been obtained but experienced errors to make the wrong conclusion as well. (d) In the category of strategies, MA subjects do not think openly by not proposing other alternatives that may exist in solving problems.

Based on the discussion and conclusions obtained, the suggestions that need to be conveyed are:

1. Mathematics teachers should identify the type of intelligence of the students they teach as early as possible.
2. Further research should be able to utilize the results of this study as a reference in the learning process.

There is a strategic category where students are asked to provide another way of solving the problem, but the researcher did not write the order in the problem, only asked during the interview which resulted in students being confused, thinking for a long time and being stumped in answering the question.

REFERENCES

Amir, & Risnawati. (n.d.). *Psychology of Math Education*. http://

Assaly, I. R., & Smadi, O. M. (2015). Using bloom's taxonomy to evaluate the cognitive levels of master class textbook's questions. *English Language Teaching*, *8*(5), 100–110. https://doi.org/10.5539/elt.v8n5p100

Azizah, M., Sulianto, J., & Cintang, N. (2018). Analysis of Critical Thinking Skills of Elementary School Students in Learning Mathematics Curriculum 2013. *Jurnal Penelitian Pendidikan*, *35*(1), 61–70. http://ojs.cahayamandalika.com/index.php/jomla/

Hanafi, M. A. (n.d.). Description of Geometry Learning Difficulties of Mathematics Education Study Program Students, Faculty of Teacher Training and Education, Cokroaminoto University Palopo. *Prosiding Seminar Nasional*, *03*(1).

Jacob, S. M., & Sam, H. K. (2008). Measuring Critical thinking in Problem Solving through Online Discussion Forums in First Year University Mathematics. *Lecture Notes in Engineering and Computer Science*, *I*, 19–21. http://www.iaeng.org/publication/

Jafar, N., Sukayasa, & Lefrida, R. (n.d.). *Profile of Flat-Sided Space Problem Solving by Junior High School Students In Terms of Visual-Spatial Intelligence*.

Leach, B. T., Box, E., & Good, D. W. (2011). *Critical Thinking Skills as Related to Un iversity Students ' Gender and Academic Discipline* (Vol. 1, Issue 21, pp. 100–106). https://doi.org/https://dc.etsu.edu/etd/1251

Miles, B. M., Micheal, A. H., & Saldana, J. (2014). *Qualitative data analysis. A methods sourcebook.* SAGE Publications.

Pebianto, A., Suhartina, R., Yohana, R., Mustaqimah, I. A., Hidayat, W., Siliwangi, I., & Jenderal Sudirman, J. (n.d.). *Mathematical Critical Thinking Ability of Senior High*.

Schoenfeld, A. H. (n.d.). *Learning to Think Mathematically: Problem Solving, Metacognition*.

Setiawan, Y. E. (2020). Analisis Kesalahan Siswa dalam Menilai Kebenaran Suatu Pernyataan. *Jurnal Didaktik Matematika*, *7*(1), 13–31. https://doi.org/10.24815/jdm.v7i1.14495

Setyawati, R. D. (n.d.). Development of Mathematics Learning Tools for Problem Based Learning Models with Entrepreneurship Orientation and Assisted by Interactive CDs. *Proceedings of Seminar Nasional Mathematics*.

Tobias, S., & Everson, H. T. (2002). Knowing what you know and what you don't know: further research on metacognitive knowledge surveillance. In *College Entrance Examination Board*. www.collegeboard.com

Wijaya, C. (n.d.). *Remedial Education: A means of developing the quality of human*

resources.

Wulandari, Y., & Kristiawan, M. (2017). School Strategy in Strengthening Character Education for Students by Maximizing the Role of Parents. *JMKSP (Jurnal Manajemen, Kepemimpinan, Dan Supervisi Pendidikan)*, *2*(2), 290–303. https://jurnal.univpgri-palembang.ac.id