An Analysis of Critical Thinking Skills of Grade VIII Mts Manbaul Ulum Gembong Materials Build a Flat Side Room from Student's *Self-Confidence*

Yogi Faisal Fahmi,
Postgraduate Program of Mathematics Education, Universitas Sebelas Maret, Indonesia
yogifaisal91@gmail.com,

Budiyono Budiyono, and Farida Nurhasanah

Faculty of Teacher Training and Education, Universitas Sebelas Maret, Indonesia
budiyono@staff.uns.ac.id, farida.nurhasanah@staff.uns.ac.id

Abstract

Psychological aspects must accompany critical thinking skills to solve math problems well, one of which is *self-confidence. Self-confidence* is one that students need because they can understand mathematics well, learn mathematics without giving up and show confidence in their mathematical abilities. This study analyzes grade VIII students' critical thinking skills at MTS Manbaul Ulum Gembong with flat-side building material in terms of students' *self-confidence*. This study used a descriptive method with a qualitative approach. The population in this study were all students of class VIII MTS Manbaul Ulum Gembong. The sample used was *purposive sampling* based on high, medium, and low *self-confidence* criteria for as many as 6 grade VIII students. The data collection technique used a critical thinking skill test instrument, *self-confidence* questionnaire, and interviews. Data analysis used triangulation techniques. This study's results indicate that in analyzing the mathematical material of flat-sided shapes with 1) students who have high *self-confidence* can solve interpretation, analysis, evaluation, and inference indicators. 2) students who have *self-confidence* can complete the analysis indicators, evaluation, and inference. 3) Students who have low *self-confidence* are only able to complete the analysis indicator.

Keywords: critical thinking skills, *self-confidence, problem-solving,* build a flat side room

1. Introduction

Mathematics is a subject that is very important for students in learning at school. In the Regulation of the Minister of Education and Culture of the Republic of Indonesia Number 54 of 2013 concerning the competency standards for Primary and Secondary Education graduates, it is explained that mathematics learning aims to make students have the skills to think in solving a problem, including the ability to understand problems, carry out settlement plans and complete mathematical models, and explain solutions that have been obtained. Today, in the learning process, students' problem-solving abilities become more developed, students are required to be active in teaching and learning activities. The involvement of learning activities increases the likelihood of students' learning process to think higher.

According to Johns (Husnidar, 2014), if students are accustomed to distinguishing between true and false, facts and opinions, and knowledge and beliefs, they will practice their thinking skills. According to Johnson (Mahmuzah, 2015), thinking is a mental activity carried out by a person to help formulate or solve problems in making decisions according to what is desired. Critical thinking is a cognitive ability to make conclusions based on logical reasons and demonstrable evidence (Yaumi, 2012). Facione (in Akliamawati, 2015) states that critical thinking is the ability to do analysis, make conclusions, provide explanations and be confident about the thought process to solve problems. Mathematical critical thinking is the basic process for analyzing opinions and presenting ideas against each explanation to develop logical thinking patterns (Jumaisyaroh, 2014).

In 2011 the *Trend of International Mathematics and Science Study* (TIMSS) showed that Indonesia is ranked 38 out of 42 countries with an average of 386 participants out of an international average of 500. Indonesia 2 is ranked 64th out of 65 countries in the 2012 *Program for International Student Assessment* (PISA) data. The

TIMSS and PISA study results state that students' mastery of critical mathematical thinking skills is still low (Ikhsan et al, 2014). Based on these results, students' mathematical critical thinking skills are high, students are required to solve mathematical problems. Usually, mathematical problems are interpreted into mathematical problems. (Fatmawati et al., 2014) states that the way to see students' critical thinking is to confront it with a problem because when faced with a problem, students will look for solutions or solutions to these problems. The problem-solving step used is problem-solving, according to Polya.

Polya argues that in solving mathematical problems there are four stages, namely understanding the problem, making problem-solving plans, executing the solution plan, and checking again. According to Polya, solving problems is expected to be more coherent and systematic in solving math problems. Critical thinking requires an excellent response to convey the concepts to be used. Kusmanto (2014) explains that the ability to solve mathematical problems affects students' critical thinking. Students' critical thinking patterns will make it easier for them to process each mathematical problem stage. Puspitasari (2017) states a direct positive influence between critical thinking on mathematical problem-solving abilities. In addition to thinking critically, one factor is no less important for students' success in solving math problems: *self-confidence*. *Self-confidence* is a feeling of confidence and attitude in handling the things they face calmly and having strong beliefs so that individuals behave with full confidence (Hanifah Ameliah & Munawaroh, 2016). In this case, students must have a confident and confident attitude towards themselves in solving these math problems (Rosita and Jaenudin, 2016).

In critical thinking, students must have a confident attitude to avoid feeling doubtful and anxious about their abilities. (MZ et al., 2017) said that students who have weaknesses in their fighting attitude when solving their problems, in the end, cannot solve these problems with optimal results. Leonard & Amanah (2017) states that students who have a high sense of trust in themselves will be able to convince themselves to face every problem without giving up quickly. Self-confidence affects students' critical thinking abilities. Nurkholifah et al. (2018) states that there is a significant influence in learning mathematics between *self-confidence* and critical thinking skills. The higher students' self-confidence, the higher their critical thinking ability.

In the learning process, students lack confidence in working on problems, give up easily, are still dependent on friends, and students seem passive in receiving information from their teachers, and when given problems, students are nervous and tense. According to Lintang, Masrukan, and Wardani (2017), problem-solving requires a confident attitude to determine the steps to solve a problem. Ady W ibowo (2010) defines self-confidence as a person's feeling of confidence in one's ability to demonstrate certain behaviors to achieve these targets. In the absence of self-confidence, students will hesitate in solving a problem, so that students will not be maximized in solving problems. Yuanita (2011) states that students with high confidence will be more successful and solve mathematics problems. Fauziah, Maya, and Fitrianna (2018) state a significant relationship between *self-confidence* and students' problem-solving abilities. Based on the background of the problems described above, the problem formulation in this study is how students 'critical thinking skills solve math problems in terms of students' *self-confidence*.

1.1. Objectives

The research objective is based on the formulation of the problem put forward, namely to describe the ability to think critically in solving math problems in terms of students' *self-confidence*. This study's limitation is that researchers focus more on research variables to achieve the research results. The limitations of the problem in this study are (1) The focus of the study is on the ability to think critically in solving mathematical problems, namely analyzing students' critical thinking skills through test questions based on indicators of critical thinking skills (2) The attitude to be measured in this study is *self-confidence*. students towards mathematics. (3) This research was conducted in class VIII students at MTS Manbaul Ulum Gembong, and the material used in this study was a flat side room building material.

2. Literatur Review
2.1. Critical Thinking Ability

Thinking is a process that produces knowledge. According to Hasbullah (2011), thinking is a person's personal activeness, resulting in discoveries directed at a goal. Johnson (2010) argues that critical thinking is a planned mental activity process used to solve problems, make decisions, study predictions, and carry out scientific research. Critical thinking is an essential cognitive ability that cannot be separated from education so that schools will continue to strive to improve students' critical thinking skills (Zhou et al., 2013). (Badawi, 2015) argues that critical thinking is one of the abilities to be developed in the educational process, especially mathematics

education. Setyawati (2011) states that the characteristics of people who think critically are (1) solving problems with a specific purpose, (2) studying, generalizing, arranging ideas according to existing information or facts, and (3) making conclusions from correct opinions and set regularly.

Critical thinking skills are logical, and reflective thinking skills focused on making reliable decisions (Hidayanti et al., 2016). Santrock (2014) said that in learning mathematics, thinking critically is very important, and teachers are expected to motivate students to create new ideas and try to solve the problems they face. tates that critical thinking skills must be in the mathematics curriculum to learn and apply their critical thinking skills to develop their thinking skills by providing logical reasons and opinions and solving problems in a structured manner.

Facione (Karim, 2015) states that critical thinking's core ability includes interpreting, analyzing, evaluating, and making inferences. Interpretation is to understand, explain and make sense of a problem or a mathematical statement. The analysis defines and develops the relationship between the information given to solve the problem settlement plan. Evaluation is testing the truth of the problem-solving that has been implemented. The inference is to make conclusions and provide reasons/opinions that are important and logical. Explains puts forward the results, gives the reasons for the procedure used, presents an argument based on the results, and Self-Regulation is checking and re-evaluating.

2.2. Problem Solving

Problems are questions or questions that must be answered or responded to (Sadiq, 2014). However, not all questions will be a problem. Isnaeni (2014) says a problem in mathematics is when a person faces a mathematical problem but cannot immediately find a solution. Thus, a math problem is a problem with no direct way to solve or solve it so that students are challenged to solve the problem.

Noor & Norlaila (2014) stated that solving problems is a step and process in finding the correct answer. Problem-solving is an activity carried out by students by connecting previous knowledge to obtain a solution to a problem that has not yet known the steps for solving it (Romli, 2016). Thus, it can be concluded that problem-solving is a process that will be carried out to obtain solutions to problems whose solutions are unknown. Sumartini (2018) said that problem-solving skills are significant for every student because problem-solving is the general goal of teaching mathematics, including methods, procedures, and strategies, which are the core and central processes in the mathematics curriculum.

In problem-solving, there are four phases or stages. According to Polya (Wardhani et al., 2010), the steps in solving math problems are: Understanding the problem is understanding the condition of the question or problem in the problem before solving it.

1. Creating a plan is planning a strategy in solving the given problem appropriately.
2. Carry out a plan is to carry out the planned strategy in solving the problem.
3. Re-checking is reviewing or re-checking the answers to the questions obtained on the questions.

2.3 Self Confidence

TIMSS (Delina, Afrilianto & Rohaeti, 2018) states that *self-confidence* is a sense of trust in their mathematical abilities and can think realistically to learn mathematics deftly and not easily give up. Based on the above definition, it can be concluded that *self-confidence* is a feeling of confidence in someone with their ability in mathematics and applying mathematics in their life.

Lestari and Yhudanegara (2015) suggest several indicators of self-confidence, namely: (1) self-confidence, namely, self-confidence in one's ability to assess and control a fact/reality that occurs (2) make decisions independently is being able to make decisions independently, without any interference from other people to help ensure the actions they take, (3) having a positive self-concept is having confidence in yourself that from the views and actions taken will cause a positive feeling in him, and (4) dare to express an opinion, meaning that there is an attitude to express his thoughts on his own accord to others.

According to Lauster (in Ghufron & Rini, 2011), the aspects of self-confidence are as follows:
   a. Self-confidence
      Self-confidence is a person's positive attitude about himself. He truly believed what he was doing.
   b. Optimistic
      Optimism is a positive attitude of someone who always has a good view in dealing with everything about himself and his abilities.
   c. Objective
      Someone who views the problem according to the truth it should be, not according to himself.
   d. To be responsible

Responsible is a person's willingness to bear everything that has become the consequences.
e. Rational and realistic
Rational and realistic is an analysis of a problem, something, and an event using thoughts that can be accepted by reason and in accordance with reality.

3. Method
3.1. Types and Research Approaches
This research used a descriptive qualitative approach. According to Hamdi (2014), a qualitative approach is an approach that can describe and analyze phenomena, events, social activities, beliefs, perceptions of people or groups. This study aims to describe the ability to think critically in solving math problems when viewed from students' *self-confidence* using a qualitative approach.

3.2. Place and Time of Research
This research was carried out at MTS Manbaul Ulum Gembong, and data collection was carried out in January 2021. The time in data collection is adjusted to the ongoing learning time. The material this research was Build a Flat Side Space.

3.3. Research Subject
This study's subjects were six students in class VIII MTS Manbaul Ulum Gembong on the material of flat-sided building. Questionnaire *self-confidence* is given to all students in grade VIII before working on the written test. Then six students were selected based on the criteria for student *self-confidence*, namely two students who had high *self-confidence*, two students who had moderate *self-confidence*, and two students who had low *self-confidence*.

4. Data Collection
4.1. Data collection technique
The data collection techniques used were written tests, questionnaires, and interviews. The following are techniques used in collecting data, including:
a. Test
A test is an assessment tool used to answer oral and written form questions (Sudjana, 2012). The ability to think critically of students in solving mathematical problems in the form of questions on space material is the goal of this test. This test consists of two questions that already cover the building material. Test questions are done individually at a predetermined time.
b. Questionnaire
A questionnaire is a tool that contains written questions that must be answered by respondents who are used to collect data for research purposes (Husamah et al., 2018). This study used questionnaires to determine the level data group *self-confidence* of students consisting of *self-confidence* high, *self-confidence* being, and *self-confidence* is low. Before taking the written test, the students first filled out a questionnaire conducted by all VIII graders.
c. Interview
The type of interview used in this research is semi-structured. After the test data was collected, the researcher grouped them according to the answers' completeness and accuracy and then conducted interviews. The interview stages in this study included (1) looking for subjects based on the students' critical thinking abilities, (2) the researcher designed a question design, (3) conducting interviews according to the topic and recording the six answers of students who were the research subjects. The Interview aims to strengthen the statement from the research results on the first day to the end of the study.

4.2. Data analysis technique
The data analysis technique used is in descriptive analysis, namely data analysis techniques *by* describing or describing data in written tests, interviews, and questionnaires. Triangulation is a data collection technique that combines various data collection techniques and existing data sources (Sugiyono, 2016). Sugiyono (2014) states that qualitative data analysis consists of three components, as follows:
1) Data Reduction
Data reduction is selecting things that are considered essential and removing items that are deemed unimportant. After receiving the questionnaire data, the next thing to do is to analyze the questionnaire data. The data collected from the Questionnaire results will be selected based on the criteria for student *self-confidence*,

namely two students who have high *self-confidence*, two students with moderate *self-confidence*, and two students who have low *self-confidence*, and unnecessary data will be eliminated.

2) Presentation of Data

Presentation of data was compiling information obtained from the results of written tests and interviews in written form. The questionnaire criteria used to select students each took two people in each self-confidence criterion (high, medium, low). Test sheets and interviews that have been given are based on indicators of students' critical thinking abilities.

3) Conclusion Withdrawal

Conclusion drawing is the process of summarizing all the data that has been obtained as a result of research. Based on the types and approaches used in this study, this study's conclusion is to describe the ability to think critically in solving mathematical problems in building space material when viewed from students' *self-confidence.*

5.   Results and Discussion

This study focused on mathematical critical thinking skills in terms of students' *self-confidence*. In critical thinking ability, students must have an attitude of *self-confidence* to avoid feeling doubtful and anxious about their abilities. (MZ et al., 2017) said that students who have weaknesses in their fighting attitude when solving their problems, in the end, cannot solve these problems with optimal results. Leonard & Amanah (2017) states that students who have a high sense of trust in themselves will be able to convince themselves to face every problem without giving up quickly. Self-confidence affects students' critical thinking abilities. Nurkholifah et al. (2018) states that there is a significant influence in learning mathematics between *self-confidence* and critical thinking skills. The higher the student's *self-confidence,* the higher the critical thinking ability they have.
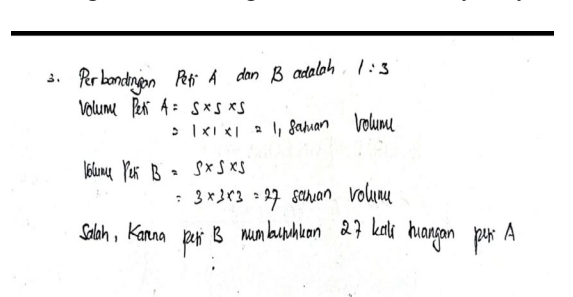

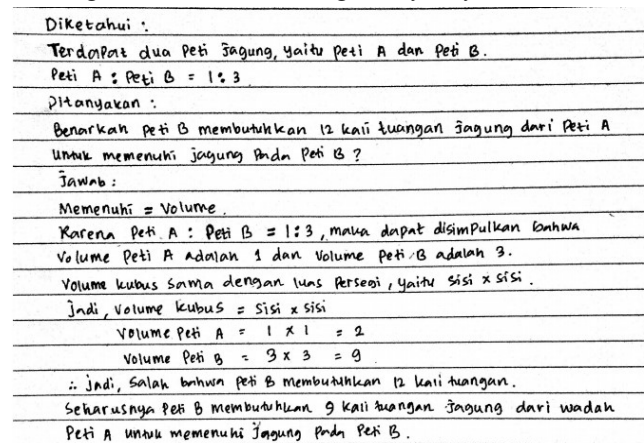Figure 1. Low Self Confidence Student's Worksheet

Figure 2. Medium Self Confidence Student's Worksheet

In figure 1 students have analyzed the volume comparison problem. Students analyze known shapes for their volume. In Figure 1 students have not been able to find the right volume. It can be seen from the wrong formulas and calculations. In Figure 1, it can be said that students only meet the level of analysis but have not been able to evaluate properly. In Figure 2 students can write the truth on the problem and calculate the volume correctly. Students in this condition are categorized in low self-confidence. Misinterpretation appears in the use of the volume formula (Figure 1) and does not understand the questions (Figure 2). In Figure 2 students can write the truth on the problem and calculate the volume correctly. The student in Figure 2 is able to analyze, evaluate, and conclude based on what is known. Students with this stage can be categorized in moderate self-confidence
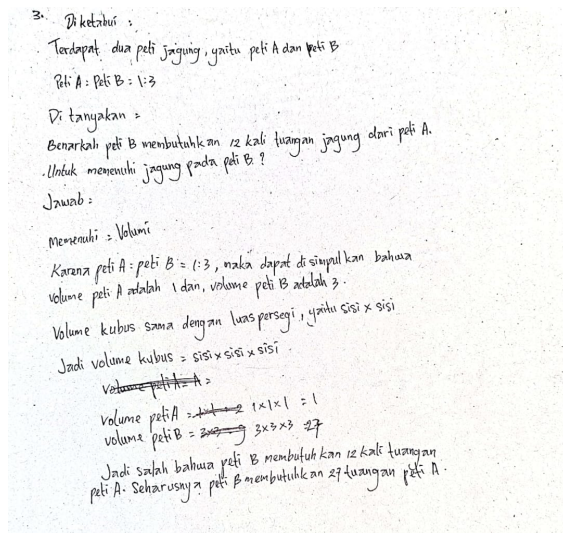
Figure 3. High Self Confidence Student's Worksheet

When compared with figure 3, students with this answer managed to understand the problem. They write down any available information and describe concepts for problem solving. Student develop strategies by writing formulas to solve problems. The use of formulas and calculations are also carried out correctly. Student also relate the answers to what was asked, so that it is not only a calculation but also looks back at what was asked to get the right conclusion.

Based on the data obtained from the distribution of questionnaires to all eighth-grade students at MTS Manbaul Ulum Gembong, totaling 80 students, the results are as follows:

Table 1. Questionnaire Results from Student *Self-Confidence*

No.	*Self Confidence* Level	Frequency	Percentage (%)
1	High	28	35
2	Moderate	36	45
3	Low	16	20
	Amount	**80**	**100**

From table 1, students with high *self-confidence* are 35%, moderate *self-confidence* with 45%, and the remaining low *self-confidence* is only 20%. The next step is to select each of the two students for the three categories of the high, medium, and low confidence to test critical thinking skills in mathematics with flat-sided shapes. The indicators of critical thinking skills, problem-solving, and the relationship between the two will be described as follows:

Table 2. Indicator of Students' Critical Thinking Ability

Aspect of Critical Thinking Ability	Indicator
1. Interpretation	a. Understanding intent about the true b. Jot down what is known and asked the question precise and clear.
2. Analysis	Formulate the concepts given in the problems shown by making mathematical models or illustrating pictures of the questions and providing complete and precise explanations.
3. Evaluation	Jot problem solving by using a strategy that is complete, accurate, and correctly according to the calculations are performed.
4. Inference	Draw and make conclusions correctly and logically.

(Adopted from Karim & Normaya, 2015)

In this study, researchers focused on using four indicators: interpreting, analyzing, evaluating, and making inferences. Researchers used four indicators because the research was more specific to subjects at the junior high school level. The four indicators taken were following the subjects' abilities at the junior high school level. The selection of indicators is also based on considering that not all indicators can be seen (easily measured) from students' answers to a test. Therefore, the four indicators listed in the table 2 are indicators of critical thinking skills that can be seen (easily measured) using a test instrument.

Table 3. Troubleshooting Indicators

Polya's steps	Indicator
Understand the problem	Able to understand the problem, know the description of the problem, and write down information on the questions that have been given.
Make a plan	Able to make a given plan or strategy to solve a problem.
Carry out the plan Completion	Able to carry out the plan according to the strategy that has been used appropriately.
Look back at the results	Able to write/check the correctness of the results or answers according to the conclusions referred to in the questions.

(Adopted from Wardhani et al., 2010)

At the problem-solving stage put forward by Polya, our critical thinking abilities or skills are needed in solving these problems. It can be seen from the following table that researchers will use the relationship between critical thinking skills and problem-solving.

Table 4. Relationship Critical Thinking Ability in Problem-Solving

Aspect of Critical Thinking Ability	Solution to problem
Interpretation Understand the meaning of the question correctly, write down information in the form of what is known in the problem clearly and precisely, write down what is being asked about the question clearly and precisely.	**Understanding the Problem** Write down / mention the information provided from the questions asked.
Analysis Formulate the concept given in the problem shown by making a mathematical model or picture illustration of the problem appropriately and providing a complete explanation.	**Create a Completion Plan** Make a problem-solving plan by creating a mathematical model and selecting a strategy to solve the given problem.
Evaluation Input the information in the questions and write down the right strategy in solving the problems entirely and correctly when doing calculations.	**Carry out the Completion Plan** Solve problems with the strategies used with the right results.
Inference Conclude what is being asked logically.	**Looking Back at the Results** Write down / check the correctness of the results or answers according to the conclusions referred to in the questions.

In developing mathematical skills, especially critical thinking skills, a student must have a confident attitude and believe in his abilities to avoid feeling anxious and doubtful. This attitude can be interpreted as a person's fighting power in solving the problems at hand (Hidayat, 2017). One of the perspectives in solving these problems is self-confidence. The confidence that each individual has in seeing himself regarding the self-concept. Besides, self-confidence will also motivate one to achieve one's success in solving the problems at hand. So that the higher a person's confidence in one's abilities, the stronger the enthusiasm for completing his work (Hendriana, 2014).

Also, conscientiousness is generally owned by someone confident. In solving mathematical problems, accuracy is crucial. Accuracy is essential in solving mathematical problems. The characteristics of someone who has self-confidence are someone who believes in his abilities, tries to carry out his plan by thinking critically, positively, and optimistically (Sofiana, 2008)**.** Through this, there is a relationship between students' critical thinking in solving and answering questions. When students have self-confidence, their creativity will grow in answering assignments in the form of the teacher's questions and tasks at school and home. Based on tests and interviews from each of the two students with high, moderate, and low *self-confidence*, they are described as follows:

Students with High *Self-Confidence*
Student subjects with high *self-confidence* in working on questions 1 and 2 have results with the following descriptions:
1. Independence in acting in understanding the problem shown by writing what is known precisely.
2. Independence in acting in understanding the problem shown by writing what is being asked correctly.
3. Confidence in his ability to identify relationships between statements, questions, and concepts given in the problem.
4. Courage to act in making mathematical models and giving appropriate explanations.
5. Confidence in his ability to use the right strategy in solving problems.
6. Independence in acting in carrying out calculations entirely and correctly and having a positive sense of himself in making correct conclusions.

From the results of the description above, it can be supported by a theory which states that students who have a high level of *self-confidence* can form a belief in themselves about their ability to never give up in facing the problems given (Leonard & Amanah, 2014) as well as the results of research conducted by Nurkholifah et al. (2018) states that there is a positive relationship between *self-confidence* and students' mathematical critical thinking skills, where the higher *self-confidence* students have, the higher their critical thinking skills will be. Based on the result of the translation of the above with associated in theory, it can be concluded that subject students with *self-confidence* high having the ability to think critically mathematically very good, because it is able through 4 (all) phase indicator critical thinking mathematically in resolving questions correctly is an indicator interpretation, analysis, evaluation, and inference.

Students with Moderate *Self-Confidence*
Student subjects with *self-confidence* in working on question number 1 have results with:
1. Independence acts in understanding the problems indicated by writing down what is precisely known.
2. Independence acts in understanding the problems indicated by writing the questions asked by the right.
3. Bravery act in creating a mathematical model and explaining the right, confidence in using the right strategy to solve problems.
4. Independence act in the calculation is complete and correct.
5. However, in working on problem number 1, the subject does not have several things, including:
    a. Believe in his ability to identify relationships between statements, questions, and concepts given in the matter.
    b. Positive feel against him in making the right conclusion.

For question number 2, subjects with the moderate *self-confidence* category were able to have the following criteria:
1. Independence acts in understanding the problems indicated by writing what is known precisely.
2.   Independence acts in understanding the problems indicated asked appropriately.
3. Bravery act in creating a mathematical model and give explanations to the right.
4. Independence act in the calculation is complete and correct.
5. However, in working on problem number 2, the subject does not have the following things, among others:

    a.   Belief in his ability to identify relationships between statements, questions, and concepts given in the matter.
    b.   Belief in his ability to use the right strategies in solving problems.
    c.   Positive feel against him in making the right conclusion.

Based on the results of the research above, it can be supported by the results of the study conducted by Nurkholifah et al. (2018), which states that there is a positive relationship between *self-confidence* and students' mathematical critical thinking skills, where the higher the student's *self-confidence*, the higher it will be students' mathematical critical thinking skills, and vice versa. So based on the results of the study, it can be seen that subjects with moderate *self-confidence* have moderate or good enough mathematical critical thinking skills because they can go through 3 stages of mathematical critical thinking indicators in solving problems correctly. Indicators of critical thinking mathematically pass the subject it is an indicator of analysis, evaluation, and inference.

Students with Low *Self-Confidence*
Student subjects with low *self-confidence* in working on questions number or one and number 2 only have the following description results:
1. Independence act in understanding the problems indicated by writing a pa is known precisely.
2. Independence acts in understanding the problems indicated by writing precisely what is being asked.
3. However, in working on questions 1 and 2, the subject does not have things such as the following:
    a.   Belief in his ability to identify relationships between statements, questions, and concepts given in the matter.
    b.   Bravery acts in making mathematics with the correct explanation.
    c.   Belief in his ability to use strategy appropriately in solving problems.
    d.   Independence act in the calculation is a complete and correct, and positive sense of him making the right conclusion.

Based on this description, it is supported by a theory which states that students who have low *self-confidence* will more readily give up facing the problems faced (Leonard & Amanah, 2014) and are supported by the results of research conducted by Nurkholifah et al. (2018), which states that there is a relationship that is positive between *self-confidence* and the ability to think critically in a student's mathematics, where the higher the student's *self-confidence*, the higher the student's mathematical critical thinking ability, and vice versa. So that based on the results of the study, it can be seen that subjects with low *self-confidence* have low or poor mathematical critical thinking skills because they are only able to go through 1 stage of mathematical critical thinking indicators in solving problems correctly. The indicator of critical mathematical thinking that the subject passes is the indicator of analysis.

6. Conclusion
The results of this study indicate that in analyzing mathematical material, flat-sided shapes with *self-confidence* in critical thinking abilities are as follows:
1. The students who have high *self-confidence* can complete the four indicators of critical thinking skills: interpretation, analysis, evaluation, and inference.
2. The students who have moderate *self-confidence* can complete the three indicators of the critical thinking skills that the analyst is, evaluation and inference.
3. The Students who have low *self-confidence* can only complete one critical thinking skills indicator: analysis.

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Biographies

Yogi Faisal Fahmi is a master student at Master of Mathematics Education, Faculty of Teacher Training Education, Sebelas Maret University, Surakarta, Indonesia 57126. He obtained a bachelor at Ahmad Dahlan University, Yogyakarta, Indonesia 55584. He is highly interested in the mathematics research.

Budiyono is a professor, lecturer and researcher of Master of Mathematics Education, Faculty of Teacher Training Education, Sebelas Maret University, Surakarta, Indonesia 57126. He obtained a bachelor at Teachers Training Institute, Surakarta, Indonesia 57126 in 1977. He obtained a master of science at University of Western Ontario, Canada in 1991. He obtained a doctor at State University of Yogyakarta, Indonesia 55281. He has more than 45 years of experience in teaching and has been a professor for over 15 years. His fields of expertise are in learning and educational assessment.

Farida Nurhasanah is a lecturer and researcher at Master of Mathematics Education, Faculty of Teacher Training Education, Sebelas Maret University, Surakarta, Indonesia 57126. She obtained a bachelor at Sebelas Maret University in 2004. She obtained a master and doctor at Indonesia University of Education, Bandung, Indonesia 40154 in 2010 and 2018. Her research interests for the last decade have been largely concerned with the problems of mathematics education.