Students' critical thinking ability in solving contextual problems at a junior high school

I Kurnia* and Caswita

1Mathematics Education, Postgraduate Program of Universitas Lampung, Jl. Prof. Dr. Sumantri Brojonegoro No. 1, Bandar Lampung 35141, Indonesia
2Department of Mathematics Education, Universitas Lampung, Jl. Prof. Dr. Sumantri Brojonegoro No.1, Bandar Lampung 35141, Indonesia

*Corresponding author’s email: indkurniaa69@gmail.com

Abstract. This research aimed to describe students critical thinking ability in solving contextual problem. Research population were students class VIII SMP Muhammadiyah 3 Bandar Lampung. Subjects used in this research were 29 students chosen with simple random sampling. Method used was descriptive. Data were analyzed qualitatively and quantitatively. Data of critical thinking ability was essay question with contextual problem of flat geometry. The result of the research showed that student’s critical thinking ability was still low. It can be seen from fulfillment of each indicator of critical thinking ability. Interpretation aspect was in moderate category of 55%, analysis aspect was 38% and evaluation aspect was 21% including in low category and interference aspect was 14% in very low category. The conclusion in this research was that student’s critical thinking ability was in low criteria. Thus, teaching innovation to facilitate students’ critical thinking ability is needed.

1. Introduction

The development of science and technology in 21st century causes critical thinking ability is very needed because it will bring an individual to develop their own criteria in learning and try to think logic in solving problem [1]. Critical thinking is a process of deep thinking which helps a person understand what is right or wrong [2]. This will involve the ability of students to practice prior knowledge, reasoning and cognitive strategies. Critical thinking ability is defined as an intellectual process that is actively and abilityfully making concepts, applying, analyzing, synthesizing or evaluating information collected or produced through observation, experience, reflection, reasoning or communication as a guide to beliefs as actions [3].

Student who is able to conduct critical thinking can make more effective decision. The advantages of a critical thinker is able to identify important points in a problem, focus and observe carefully, be tolerant of new perspectives, want to acknowledge the advantages of other people's perspectives and have analytical abilities which can be used in various situations. The attitude of critical thinkers is very required by students during the process of learning mathematics [4]. The benefit of critical thinking in mathematics is that it can build relationships between concepts and decisions in expressing beliefs, draw reasonable conclusions, assess credibility and valuate the strength of relevant information [5].

Critical thinking focuses thought while determining what to believe and what to do [6]. Critical thinking ability is closely related to the indicators. Indicators of critical thinking can be seen from their characteristics so that by having these characteristics one can be said to have the ability to think...
critically. Facione explains the six main critical thinking ability contained in critical thinking processes, namely interpretation, analysis, evaluation, inference, explanation and self regulation [7]. Explanatory ability and regulation mean explaining what they think and how they come to the conclusions that have been obtained during inference [8].

Critical thinking ability is needed by each student. However, in fact, learning mathematics at school has not facilitated students to think critically. The questions given are still routine/general questions that tend to lack training in high-level abilities. Mathematics books at school are also presented monotonously and contain routine questions and do not challenge students to carry out activities of reflection, experimentation, exploration, inquiry, conjecture, and generalization [9]. The purpose of developing critical thinking ability in learning is that students can solve the problems faced in their daily lives. Critical thinking ability directs students to have the ability to solve problems logically and precisely. Other studies show that students still have difficulty in changing sentences into mathematical sentences. Students have difficulty while finishing the problem of the essay question and interpreting what is meant by the matter of the problem. Therefore, making a essay question in a contextual form aims to make students familiar with the problems in daily life [10]. Contextual is defined as a situation that attracts students’ attention in the form of events, facts or concepts which have been known. Thus, it can grow students’ knowledge. Contextual is able to build students' critical thinking ability by letting students to be able to link the material that has been received at school to the context in daily life. Therefore, they are able to build critical abilities. [11]. Based on the description explained above, this research aimed to describe students’ critical thinking ability in solving mathematical contextual problems.

2. Methods

This research was categorized as descriptive research with qualitative approach. This research aimed to describe test characteristic which was developed and described critical thinking ability of students class VIII in solving contextual problem in flat geometry. The population of this research were students in class VIII SMP Muhammadiyah 3 Bandar Lampung. The research subjects were students in class VIII A of 29 students selected by simple random sampling technique. In this research, the data were obtained from the test result of students' critical thinking ability consisting of 2 items essay. Furthermore, Data was analyzed quantitatively. Data was obtained by assessing each student's answer based on the critical thinking ability assessment rubric. Then, it was processed by determining the percentage of fulfillment of each indicator presented in the form of tables and graphs.

3. Result and Discussion

Indicator of critical thinking ability used in this research was interpretation, analysis, evaluation and inference. Test result of critical thinking ability based on indicators are shown in Table 1. It was indicated that student’s critical thinking ability level in each indicator is different. Students’ critical thinking ability level in the medium/moderate category is for the indicator of interpretation, the low category is for indicators of analysis and evaluation, and the very low category is for the indicator of inference. The critical thinking ability in interpretation aspect reaches 55%. This showed that students had the ability to understand and give meaning to data or information from various experiences, situations, data, events, judgments, beliefs, rules, procedures or certain criteria. Students’ critical thinking ability in analysis aspect showed low category of 38%. Test results showed that the analysis aspect required to be trained more on students. Thus, students were accustomed to analyze in order to improve their critical thinking ability. The aspect of analysis meant that students had the ability to identify relationships between statements, questions, concepts, descriptions or other forms of representation used to express beliefs, judgments, experiences, reasons, information and opinions [7].
Table 1. Result of Student’s Critical Thinking Ability

| Indicator   | Standard Deviation | Percentage of Average Fulfillment Indicator | Category  |
|-------------|--------------------|-------------------------------------------|-----------|
| Interpretation | 1.28               | 55%                                       | Moderate  |
| Analysis    | 1.14               | 38%                                       | Low       |
| Evaluation  | 1.68               | 21%                                       | Low       |
| Inference   | 1.38               | 14%                                       | Very Low  |

Aspect of evaluation needed to improve by students because they only reached 21%. To evaluate, it meant that students needed to have the ability to assess the credibility of statements or other representations that explained or described an individual perceptions, experiences, situations, judgments or beliefs and to assess the logical strength of the actual situation or the relationship between statements, explanations, statements, or forms other than representation. Evaluation was was by examining information sources to assess quality as the basis for decision making according to identified criteria [12].

Test result showed the lowest aspect. It was inference aspect of 14%. Inference is the ability to identify and pay attention to the elements needed to draw conclusions, form assumptions and hypotheses to consider relevant information. This ability is also related to the consequences of data, reports, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions or other forms of representation [7]. These results indicated that students’ critical thinking ability were still classified to solve contextual problems. This can be seen in the example of the work conducted by students in the following question.

“Sandra has two water reservoirs, first water reservoir is a triangular prism with 30 cm of base and height 120cm, the height of prism is 150cm. The second water reservoir is beam with length of 50cm, width 30cm and height 150cm. If Sandra wants to pour water of 270 liter and each 1 minute, it can pour 5 liter water. Which water reservoir can hold all the water and how much time does it take to pour the water?”

In interpretation stage, students can’t understand the problem. Students can’t write down what is known and asked. They can’t formulate problems but they are able to identify relationships between statements, evaluate and draw the conclusions. In other case, the students can write what they know and ask. They can identify relationships between statements, but they can’t evaluate. Students can write conclusions from answers even if they are wrong. Some students can write what is known and asked about the problem even though it is incomplete. They are able to formulate problems, but students cannot identify and interpret what is obtained from the problem. They are still confused in determining the further step in working on the problem.

This research revealed that student’s critical thinking ability was still low. Some students were only able to understand the problem by writing what was known and asked. Some students were also only able to analyze by identifying relationships between statements and experiencing difficulties while evaluating and drawing conclusions.

4. Conclusion

Students’ critical thinking ability based on indicators of interpretation, analysis, evaluation and inference show that students' critical thinking ability are still low in resolving contextual problems. It is seen from the achievement of each indicator of critical thinking. At the interpretation stage, it reaches 55%, the analysis stage of 38%, the evaluation stage of 21% and the inference stage of 14%. The results of the analysis of students' critical thinking ability are expected to be the consideration for teacher in making improvements in learning. Therefore, it can improve students' critical thinking ability.
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