Description Of Students' Critical Thinking Skills In Solving Relation And Function Problems

Erwin Anggara¹, Suradi Tahmir², Andi Quraisy³

¹,³University of Muhammadiyah Makassar, Indonesia
²Makassar State University, Indonesia
E-mail correspondence: andiqraisy@unismuh.ac.id
DOI: 10.47435/jtmt.v4i02.1841

Abstract

This research aims to describe the level of students' problem solving abilities in relation and function questions. Using a qualitative approach, data was obtained from tests and interviews. The test instrument measures critical thinking abilities. Three subjects were selected with different levels of ability: high, medium, and low. The research results show that the critical thinking ability of high ability subjects includes all indicators of critical thinking including interpretation, analysis, evaluation and inference; the medium ability subject includes 3 indicators of critical thinking ability including interpretation, analysis and inference; and for low ability subjects only on interpretation indicators.

Keywords: Critical Thinking Ability; Relations and Functions.

1. Introduction

The level of education is a human effort to develop the potential that exists in him, both physically and spiritually, in accordance with the norms and values that apply in society and culture (Abd Rahman, dkk., 2022). Dwijayani (Hadi, 2022), observing education as an industrial revolution that changes the way of thinking and acting following current educational patterns, along with changing times and sophisticated technology. Therefore, human resources (HR) must have the ability to think systematically, creatively, critically, and have good morals.

Nurhikmah & Ernawati, (2020) Noting that the development of the times creates a modern mindset, which has an impact on the progress of education. This is important for creating a creative learning process and developing students' critical thinking skills. Unwakoly (2022) explains that critical thinking helps in decision making by considering conflicting information. Critical thinking skills are also important in problem solving.

Abdullah, (2016) emphasizes that capable people must be able to think logically, rationally, critically, and creatively. Ramdani, et al., (2020) shows that mastery of material concepts affects students' critical thinking skills. (Nuryanti, dkk., 2018) explained that critical thinking is important in facing the challenges of community and individual life. Critical thinking involves assumption analysis, evaluation, inquiry, and decision making (Saputra, 2020).

High-level skills, including critical thinking, should be taught to students to produce quality human resources (Agnafia, 2019). Safrida, dkk., (2018) states that critical thinking skills involve reflection and reasoning in decision making. Mone (Sulistiani &; Masrukan, 2017) emphasizing that learning should focus on developing students' critical thinking, which is also a graduation standard. Mathematics is taught to develop problem-solving skills by thinking critically (Ramadan, 2022). Mathematical problems often require critical thinking in their solution (Mairing, 2018).
However, students often have difficulties due to a lack of understanding of concepts and problems (Rahmawati & Warmi, 2022).

The ability to think critically is an important skill needed to solve problems and make decisions in everyday life (Yulianti dkk., 2022). From the results of the observation that has been done, students do not understand the problem so that when working on the problem, what is asked on the question cannot be solved properly, students can only run what they know in solving the problem so that students are unable to give conclusions to the problem. This was also confirmed by one of the math teachers who had been interviewed. He said that students were still lacking in solving the questions. He also said that critical thinking skills are needed in solving problems.

In the description above is an overview of how students' ability to solve problems. Therefore, efforts are needed to know, investigate and provide an overview of students' critical thinking skills in order to be the basis for improving students' abilities, especially in students' critical thinking. Therefore, this study aims to understand students' critical thinking skills in solving relationship and function problems.

2. Method

The type of research used is qualitative descriptive research. This research was conducted on grade VIII MTs Negeri 2 Bulukumba students. Furthermore, in the selection of subjects, researchers conducted a critical thinking ability test and selected 3 students with different levels of mathematical ability, namely high, medium, and low, based on an assessment of critical thinking indicators.

The steps in the selection of research subjects are as follows:

Data was collected through tests and interviews. The test used is an essay test regarding relation and function material. The test results help in understanding the students' critical thinking process in solving problems. Interview subjects are selected based on written test results as well as their willingness to be interviewed. Interviews were conducted with subjects who had varying levels of ability (high, medium, low) and were conducted using interview guidelines that had been prepared.

In this study, data credibility tests were conducted using triangulation. This involves testing data through different approaches, such as critical thinking skills tests and interviews. The interviews were conducted in three sessions with each subject, lasting three weeks. Data analysis techniques involve data reduction, data presentation, and verification or drawing conclusions.

3. Results and Discussion

The following are presented the results of the number one test of high ability subjects. The data is presented about critical thinking skills in relation and function material both in writing and verbally.
Based on the analysis of test results and interviews related to question number one, subjects with high ability showed excellent understanding of the information contained in the questions. The subject is able to identify and understand clearly what is explained in the question and can respond to the questions asked.

Furthermore, subjects with high abilities are also able to elaborate the concepts involved in the problem very well. The subject can explain in detail where the concepts needed to solve the problem come from. This ability indicates that the subject has a strong knowledge of the material, relations and functions.

In addition, the subject is able to explain the process of solving problems correctly and logically. In his answer, the subject describes the steps taken clearly and relates each step to the relevant concept. This shows that the subject not only relies on the right answer, but also understands the right line of thinking in solving the problem.

Not only that, subjects with high abilities also have the ability to draw the right conclusions from the information in the problem. This suggests that the subject is not only focused on the completion process, but is also able to see the implications and meaning of the solutions found.

Overall, the highly capable subjects in this test showed excellent critical thinking skills. The subject is able to understand concepts, apply knowledge, explain the process well, and draw appropriate conclusions from the information given in the problem.

These results are in line with Erlita & Hakim, (2022) which suggests that siswA with high ability has good critical thinking skills. They are able to analyze the purpose of the problem, understand the concept in depth, and give the right conclusion to their answer. This confirms that the high-ability subjects in the study have solid critical thinking qualities.
Based on the analysis of test results and interviews related to question number two, subjects with high abilities showed excellent critical thinking skills in understanding, analyzing, and responding to the questions asked in the questions.

The subject is able to quickly recognize the relevant information in the problem and is able to identify the concepts needed to solve the problem. In addition, the subject is also able to explain where he got the concept from, showing a deep understanding of the material of relations and functions.

In the answer, the subject is able to explain clearly and systematically the steps taken to solve the problem. The explanation given is also able to connect the concept with its application in problem solving. This shows that the subject is not only able to do the problem correctly, but also has a strong understanding of the right line of thinking in solving the problem.

Not only that, subjects with high abilities are also able to draw the right conclusions from the information given in the problem. This suggests that the subject is not only focused on the technical aspects of completion, but is also able to see the wider implications and meanings of the solutions found.

It is important to note that these results are in line with Erlita & Hakim, (2022) suggests that siswA with high ability has good critical thinking skills. They are able to analyze the purpose of the problem, understand the concept in depth, and give the right conclusion to their answer. This confirms that the high-ability subjects in the study have solid critical thinking qualities.
The following are presented the results of the test of the subject of moderate ability. The data is presented about critical thinking skills in relation and function material both in writing and verbally.

Based on the analysis of test results and interviews related to question number one, subjects with a moderate level of ability (KS) showed adequate ability in several aspects of critical thinking. The KS subject is able to recognize the information contained in the question and understand what is asked in the question. This ability indicates that the subject has a sufficient understanding of the information provided.

In addition, KS subjects are also able to explain relevant concepts to solve problems. This shows that the subject has a basic understanding of the material, relations and functions. In the subject’s answer, the explanation given about the steps to solve the problem is correct and logical. The subject is able to explain the line of thinking used to solve the problem.

However, the subject of KS has not been fully able to draw the right conclusions from the information contained in the problem. This suggests that the subject still needs to develop the ability to see the deeper implications of a given solution. Overall, KS subjects demonstrate adequate critical thinking skills in understanding information, applying concepts, and explaining the process of completion. However, in the aspect of drawing conclusions, the subject of KS still needs to be improved in order to see the implications more deeply.

This is in line with Prasetyo & Firmansyah, (2022) Where subjects with moderate ability have an understanding of material concepts but have difficulty in processing information from questions, which leads to inaccurate answers and inappropriate conclusions. Overall, the moderately skilled subjects in the study showed enhanced potential in articulating the concepts used, providing more in-depth explanations, and drawing more accurate conclusions from the information provided in the problem.
Based on the analysis of test results and interviews related to question number one, subjects with moderate ability showed sufficient understanding of the information contained in the questions. The subject is able to identify and understand what is asked in the questions asked in the question. However, there are several aspects that need further attention. The subject seems hesitant in explaining where he finds the concepts given in the problem to solve it. This results in the subject forgetting to list the concepts that should have been used in the completion. In the subject's answer, although the subject was able to explain the completion process correctly, it did not provide an in-depth explanation of why the steps were taken. This suggests that the subject may have a procedural understanding, but not yet be able to fully articulate the flow of thinking in detail.

Furthermore, the subject also lists conclusions, but these conclusions are not complete and in-depth according to what is asked in the question. This shows that the subject still needs to hone the ability to draw the right conclusions from the information contained in the problem. This is in line with Prasetyo & Firmansyah, (2022) Where subjects with moderate ability have an understanding of material concepts but have difficulty in processing information from questions, which leads to inaccurate answers and inappropriate conclusions. Overall, the moderately skilled subjects in the study showed enhanced potential in articulating the concepts used, providing more in-depth explanations, and drawing more accurate conclusions from the information provided in the problem.

The following are presented the results of the low ability subject test. The data is presented about critical thinking skills in relation and function material both in writing and orally

Based on the analysis of test results and interviews related to question number one, subjects with low ability showed some challenges in terms of critical thinking skills. The subject can only understand the information in the question and understand what is asked in the question. However, the subject faces difficulties in exposing the concepts given in the problem to solve them. This ability does not seem to be well formed, so the subject has difficulty in relating concepts to solving problems. In answering the question, the subject was unable to explain the steps of solving correctly. This suggests that the subject does not yet have an adequate understanding of the mathematical completion process. The subject's ability to draw conclusions from the information in the question is also limited. The subject has not been able to recognize the deeper implications of the solution given in the problem.

This is in line with Rammadan & Budiman, (2022), in which subjects with low abilities face difficulties in critical thinking. This finding shows that the subject does not have an adequate understanding base related to relation and function material, and has not been able to relate concepts to the process of solving problems and drawing appropriate conclusions. Overall, subjects with low abilities need further support and guidance to develop their critical thinking skills, including understanding concepts, explaining processes, and drawing conclusions from the information provided in the problem.
Based on the results of tests and interviews related to question number one, subjects with low ability showed significant challenges in aspects of critical thinking skills. The subject is only able to understand the information contained in the question and understand what is asked in the question. However, the subject is not able to expose where he finds the concepts given in the problem to solve them. As a result, the subject does not list the concepts that should be used in solving the problem. In answering the questions, the subject also faced difficulties in explaining the steps of solving correctly. This indicates that the subject does not yet have an adequate understanding of the process of solving mathematical problems.

The subject's ability to draw conclusions from the information in the question is also limited. Although the subject listed conclusions, they were still incorrect or lacked depth. These results are in line with those expressed in Rammadan & Budiman, (2022), where subjects with low critical thinking skills still face obstacles in providing appropriate explanations in the process of solving problems. They also have not been able to determine appropriate strategies and techniques, and have not been able to make the right final conclusion. Overall, low-ability subjects require extra attention and a deeper approach to developing their critical thinking skills, including understanding concepts, explaining processes, and engaging a more precise conclusion from the information given in the problem.

4. Conclusion

High Ability Subject's Critical Thinking Ability: Subjects with high ability in critical thinking successfully meet all identified critical thinking indicators. The subject is able to make the right interpretation of the information given in the problem, identify the relationship between statements, questions, and concepts in the problem with in-depth analysis, be able to solve the problem with the right strategy and good evaluation, and be able to draw the right conclusions from the information in the problem. It demonstrates solid critical thinking skills on this subject.

Moderate Ability: Subjects with moderate ability in critical thinking successfully meet three of the four identified critical thinking indicators. The subject is able to make the right interpretation of the information in the problem, identify the relationship between statements, questions, and concepts in the problem with a fairly good analysis, and is able to solve the problem with the right strategy and adequate evaluation. Although the subjects were not yet fully able to draw conclusions correctly, they still exhibited fundamental critical thinking skills.

Low Ability Subjects: Subjects with low ability in critical thinking only manage to meet one of the four identified critical thinking indicators. The subject is able to interpret the information contained in the problem, but is unable to perform an in-depth analysis of the relationship between statements, questions, and concepts in the problem. In addition, the subject is also unable to solve the problem with the right strategy and cannot draw accurate conclusions from the information in the problem. This suggests there is a significant need for the development of critical thinking skills in this subject.

In conclusion, the level of critical thinking ability of subjects can be observed from the extent to which they meet these indicators. Good critical thinking skills involve the ability to integrate interpretation, analysis, evaluation, and inference in response to a given question or problem.
Bibliography


