

Analysis of Students Critical Thinking Skills of 5th Grade in Mathematics Learning

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ABSTRACT

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Critical thinking skills are skills that are needed in the face of rapid technological development. The level of critical thinking skills in mathematics learning needs to be researched to analyze the extent to which the culture of critical thinking skills has been carried out. This study aims to describe the level of critical thinking skills of 5th graders in mathematics learning. The type of research used is descriptive research with a qualitative approach. The subjects of this study were grade 5 students at elementary school, as many as 15 students. This study uses a written test in the form of a description question. The data obtained are then analyzed by correcting students' answers. Critical thinking skill instruments contain aspects of critical thinking skills developed by including aspects: providing explanations simply, determining the basis of decision making, concluding, providing further explanations, estimating and combining. The results of the data analysis obtained, 26.7% of students have low critical thinking skills, 46.7% of students have sufficient critical thinking skills, 20% of students have high critical thinking skills, and 6.7% of students have very high critical thinking skills. So it can be concluded that the 5th grade students of Miricinde State Elementary School 1 have a sufficient level of category critical thinking skills.



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A. INTRODUCTION

Rapid changes in various areas of life today are a sign that they are entering an increasingly sophisticated era, namely the era of the industrial revolution 4.0. The use of various artificial intelligence is an indicator of the changing times. The world of education has a big part in the rapid development of artificial intelligence. To deal with this era students must have a variety of competencies and complex skills in order to compete and survive. So that through quality education that is relevant to the needs of society that is always developing following science and technology will produce quality humans. According to (Rahayu & Hidayati, 2018) in the journal that the rapid development of science and technology is due to the support of mathematics. So in the world of education, mathematics has an important role. The existence of mathematics subjects, will make it easier to learn to reason critically, creatively, and actively (Agustien & Razak, 2020). Teachers as educational actors should be able to equip students with complex competencies and skills in mathematics learning, one of which is critical thinking skills. The high-level thinking ability that is needed in the face of rapid technological development in the era of revolution 4.0 is a critical thinking

skill. Critical thinking skills are one of the skills of the 21st century that must be possessed by today's students. This is in line with (Sanabria & Arámburo-Lizárraga, 2017); (Silber-Varod, V., Eshet-Alkalai, Y., & Geri, 2019) that critical thinking skills are one of the abilities to adapt to the rapid development of technology and science in the 21st century that must be possessed by every individual. In the 21st century, everyone must have critical thinking skills, knowledge and abilities of digital literacy, information literacy, media literacy and mastering information and communication technology (Zakiah, L., & Lestari, 2019). 21st century digital skills can be improved through critical thinking so as to influence student performance in today's advanced technological era (Yanuarto & Hapsari, 2022).

Developing critical thinking skills is an important task of mathematics education (Maričić, S., & Špijunović, 2015). Students' critical thinking skills urgently need to be developed for their success in education and community life. Critical thinking skills can be developed or strengthened, through the learning process (H. Saputra, 2020). This is in line with (Mulya et al., 2018) if students are accustomed to having critical thinking skills from childhood, then further education will be easier for students. Critical thinking ability includes part of high-level thinking (Nugroho et al., 2018); (Sapeni, M. A.-A. R., & Said, 2020); (Saprudin et al., 2019).

Critical thinking skills are effective skills that play a role in the development of student thinking and enable students to succeed in a constantly changing world (Aktoprak, A., & Hursen, 2022). Critical thinking lies at the heart of education around the world as a highly valued generic skill (Liang, W., & Fung, 2021). The ability to think critically is the ability to provide a logical argument for processing information that allows each individual to evaluate and justify that information (Kong, 2015); (Sanders, 2016). The critical thinking ability of each student is different, it takes a climate or activity to support it because critical thinking is a mental process that can grow in each individual differently (A. T. Saputra, 2015). To describe students' critical thinking skills, there are indicators in critical thinking skills as a benchmark for research. Critical thinking indicators include several aspects, namely providing a simple explanation, determining the basis of decision making, concluding, providing further explanation, estimating and combining (Ennis, 2015).

There is some research on critical thinking skills that has been done in various places. (Hidayati, 2017); (Nugraha, 2018); (Yuliati et al., 2018); (Misla & Mawardi, 2020); (S Nanda Syah Putra, 2021); (Setyawan & Koeswanti, 2021) concluded that the Problem Based Learning model can improve students' critical thinking skills. (Kristianti et al., 2017) stated that their results showed that students who received discovery learning were better at developing critical thinking skills compared to conventional learning even though the results were not satisfactory. (Santoso, 2018) has confidence that his research will improve students' ability to think critically. Further experimental research is needed to find out if these classroom activities will help the student to improve his or her critical thinking ability. (Wijayanti et al., 2018) stated that students' cryptic thinking skills and learning outcomes can be improved by the implementation of the Team Assisted Individualization model. (Dahlia et al., 2019) results show that problem-solving methods are better than conventional learning in teaching students mathematical critical thinking skills. While the results of (Hidayah et al., 2019) research showed that the application of think pair share (TPS) learning models with puzzle games can improve critical thinking skills. (Mustikasari et al., 2019) the results of the study

showed that the ability to think critically in grade V elementary school students can be influenced by the student facilitator and explaining learning model. (Susilo et al., 2019) explained that teachers can apply the What's In Here game based on the Team Games Tournament model as one of the alternative ways in learning to improve students' critical thinking skills and can have a positive influence on students. While the results of (Suherman et al., 2021) research show that there is an influence of arcs learning models on mathematical critical thinking skills in students.

Based on some of the studies that have been done, it can be concluded that certain learning models can improve critical thinking skills, especially the Problem Based Learning learning model (Kristianti et al., 2017); (Hidayati, 2017); (Santoso, 2018); (Nugraha, 2018); (Yulianti et al., 2018); (Wijayanti et al., 2018); (Dahlia et al., 2019); (Mustikasari et al., 2019); (Susilo et al., 2019); (Mislal & Mawardi, 2020); (S Nanda Syah Putra, 2021); (Setyawan & Koeswanti, 2021). However, the analysis of the level of critical thinking skills at SD Negeri 1 Miricinde, Purwantoro District, Wonogiri Regency, still needs to be researched because critical thinking skills have not been applied properly. This can be seen in the design, implementation, and assessment of learning. The achievement of achievement is based only on low-level cognitive abilities, thus causing students to learn only by memorizing the material.

Based on the background above, the purpose of this study is to describe the level of critical thinking skills of grade 5 students in learning mathematics. This research will be very important for basic education parties in Indonesia in particular and globally, to create effective solutions to this problem. Therefore, students can apply what they learned at school to problems in everyday life. The problem in this study is how the level of critical thinking skills of students is developed in mathematics learning.

B. METHODS

This research uses a descriptive type of research with a qualitative approach that describes students' critical thinking skills. This study examines more deeply the analysis of students' critical thinking skill levels in mathematics learning and provides an accurate picture of the situation under study. The subjects of this study were grade 5 students at elementary school, as many as 15 students.

Data collection techniques in this study are carried out by conducting written tests with the form of a description question on the material volume of space building. The selection of this instrument is intended so that students are able to analyze in depth where students do not just use mathematical formulas in the process of completion. Hots (High Order Thinking Skills) questions presented are expected for students to be able to understand, analyze, evaluate, and conclude the results of the requested settlement. The data obtained is then analyzed by correcting students' answers, scoring according to the criteria contained in the rubric of critical thinking skills assessment that has been made. To obtain student grades using formulas in the following equations:

$$Value = \frac{total\ score}{maximum\ score} \times 100 \quad (1)$$

Each question is grouped based on aspects and indicators of students' critical thinking skills. On the aspect of providing a simple explanation with indicators analyzing arguments, aspects of determining the basis of decision making with indicators of observation and assessing the results of reports, aspects of concluding with indicators making deductions, aspects of providing further explanations with indicators defining and considering, and aspects of estimating and combining with indicators blending in decision making. Furthermore, the percentage is determined on each aspect of critical thinking skills by each student by converting the acquisition of student grades into percentages, then classified into categories of students' critical thinking skills according to Table 1 adapted from (Herunata et al., 2020), as shown in Table 1.

Table 1. Category of Determining Student Critical Thinking Skills Level

Presented	Category
$0 < Value \leq 43,75$	Very Low
$43,75 < Value \leq 62,50$	Low
$62,50 < Value \leq 71,50$	Enough
$71,50 < Value \leq 81,25$	Tall
$81,25 < Value \leq 100,00$	Very High

Source: Adapted from (Herunata et al., 2020)

C. RESULT AND DISCUSSION

1. Result

The findings of this study were obtained from the results of a critical thinking skills test using HOTS questions with a description form. The data obtained is then analyzed and categorized at the level of critical thinking skills. The results of the acquisition of critical thinking skills data can be seen in Table 2 and Figure 1.

Table 2. Description of Student Critical Thinking Skills

Student Critical Thinking Skill Level	Number of Students	Presented
Very Low	0	0%
Low	4	26,7%
Enough	7	46,7%
Tall	3	20%
Very High	1	6,7%

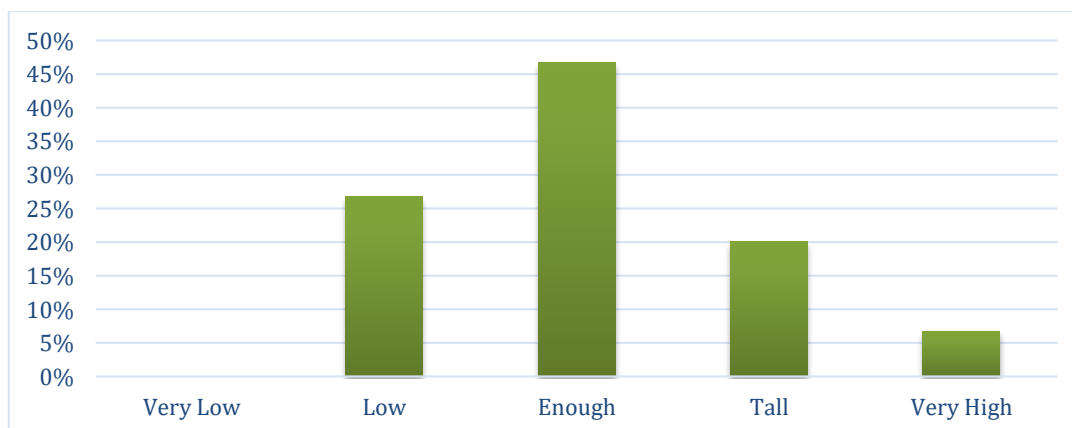


Figure 1. Description of Student Critical Thinking Skills

Based on table 2 and figure 1 it can be seen that no student has very low critical thinking skills (0%). Meanwhile, a total of 4 students have critical thinking skills in the low category (26.7%). 7 students had critical thinking skills in the sufficient category (46.7%). 3 students have critical thinking skills in the high category (20%). There is only 1 student who has critical thinking skills in the very high category (6.7%). In addition to analyzing data on each student's ability, data is also analyzed based on each aspect and indicator of critical thinking skills. The critical thinking skills measured in the study included five indicators from five aspects. The following is a description of students' critical thinking skills of each aspect and indicators presented in Table 3.

Table 3. Description of Students' Critical Thinking Skills for each Aspect and Indicator

Aspects of Student Critical Thinking Skills	Indicator	Category
Give a Simple Explanation	Analyzing Arguments	86,7%
Determining the Basis of Decision Making	Making Observations and Assessing Report Results	80%
Conclude	Making Deductions	73,3%
Provide Further Explanation	Define and Consider	26,7%
Estimating and Combining	Blending in Decision Making	40%

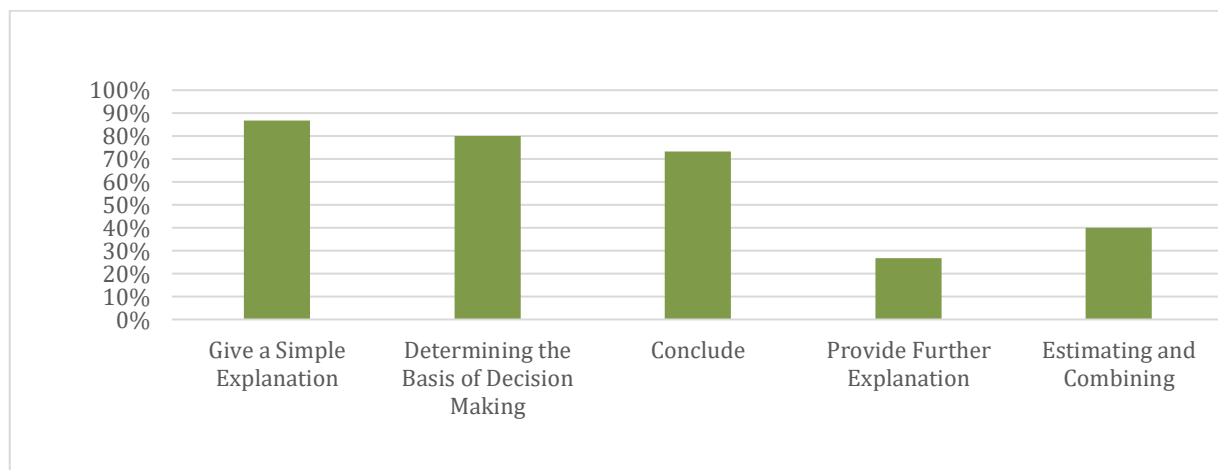


Figure 2. Description of Critical Thinking Skills of each Aspect

Based on the results of the analysis of each aspect of critical thinking skills presented in tables and figures, data was obtained that each aspect of critical thinking skills there are four categories, namely very low, low, sufficient, and high. Of the five aspects analyzed, one aspect is classified as very low, one aspect is relatively low, one aspect is classified as sufficient, and two aspects are classified as high.

2. Discussion

The results of the test are written with the form of a description question on the space build volume material obtained data which is then analyzed. The results of the data analysis stated that there are no students with very low critical thinking skill levels, there are 4 students with low critical thinking skill levels, 7 students with sufficient critical thinking skill levels, 3 students with high critical thinking skill levels, and 1 student with very high critical

thinking skill levels. Furthermore, data analysis is carried out based on aspects and indicators of critical thinking. Aspects of providing a simple explanation with indicators analyze arguments, students are presented with a problem and then asked to give a simple answer related to analyzing the question. Students answer with a variety of answers, some are right, and some are not right. A variety of answers that make students have not been able to provide explanations in accordance with the rubric of the assessment, namely students have given answers with the formula but have not been able to write the mathematical sentences. Students are critical of this aspect, with 86.7% of students already able to analyze arguments by solving problems given by teachers. The next aspect, determining the basis of decision making with indicators to make observations and assess the results of reports, students are given HOTS questions that require twice the thought and twice the completion step. Students are required to solve HOTS questions by linking based on appropriate concepts in the form of analysis. The test results showed that students were already critical, with 80% of students able to determine the basis of decision making. The third aspect is to conclude with the indicator of making a deduction. Students are required to make deductions from various issues presented. Test results showed students were already critical with 73.3% of students able to conclude appropriately. The next aspect is to provide further explanation with indicators defining and considering. Students are asked to explain the variables on the math problem with the appropriate formula. Most students have not been able to answer questions precisely, so students are still low in critical thinking skills on the aspect of providing further explanation. Only 26.7% of students have been able to provide further explanations. The causative factor of students who have not been able to answer precisely is that students do not understand the meaning of the questions given. The latter aspect is in estimating and combining with indicators blending in decision making. Students are presented with problems and asked to provide solutions that can overcome these problems in accordance with mathematics consensus. 40% of students are able to estimate and combine mathematical concepts precisely.

Based on the results of the data analysis above, the level of critical thinking skills in mathematics learning in 5th grade students is classified as a sufficient category. While critical thinking skills in each aspect and indicators obtained the results of analysis that aspects of providing simple explanations are the highest critical thinking aspects that students can achieve. The level of critical thinking skills that are still relatively sufficient is because mathematical learning that civilizes critical thinking skills has not been applied optimally. The tendency to learn is still complete material, so teachers do not have time to get used to critical thinking skills that are considered to consume the allocation of learning time. This is in line with the results of the study (Novitasari et al., 2020) that it occurs because there is a view that mathematics is a ready-to-use tool. This view can be observed from the attitude of the teacher who tends to tell the concepts/theorems/formulas he uses. Teachers transfer their knowledge and learners receive it passively and less critically. Students do not know how the formula was obtained and cannot decipher the reason for the answer, although students can solve mathematical problems well.

Student involvement in math learning will shape meaningful learning experiences for students who cultivate critical thinking skills. Students are not only passive in receiving

learning because they are given the opportunity to express their ideas. But on the results of observations that have been made, the process of learning mathematics at the research site lacks two-way interaction because it is still centered on teachers. The condition of mathematics learning at the place of research occurs paradigm teachers explain and learners listen. Learning outcomes are more important than the learning process. Optimal learning outcomes are basically desired by all parties and logical and critical thinking insights are needed for the development of future progress in learning (Hallatu et al., 2017). When students are able to think critically, optimal learning outcomes will be easier to achieve, while when students only pursue optimal learning results, critical thinking skills cannot necessarily be possessed. So that critical thinking skills will be more beneficial for students than just attaching importance to learning outcomes.

Learning that is beneficial for students is learning that is able to civilize their students to be able to continue to develop as a whole. So to get used to critical thinking, students must often be given questions that require deep thinking. Teachers at the research site have become accustomed to giving problem-based questions. As stated by (Wijayanti, D. A. I., Pudjawan, K., & Margunayasa, 2015) students are given training in critical thinking questions so that students are familiar with the form of the problem. Problem practice can be done during tutoring or at certain times outside of learning in the classroom so that tutoring in school does not only contain material repetition activities. This is in line with (Widiantari, N. K. M. P., Suarjana, I. M., & Kusmariyatni, 2016) students practice more varied math problems to get used to solving various forms of problems so as to improve students' critical thinking skills. These developments will foster confidence and creativity in students.

The culture of critical thinking skills in mathematics learning will be very beneficial for students, both in school and outside the school. This is in line with (Changwong, K., Sukkamart, A., & Sisan, 2018) students at all academic levels will clearly benefit from a curriculum that is steeped in critical thinking strategies and practices. The key to developing creativity begins with the existence of critical thinking skills, problems will require to be able to think creatively as well. The rapid development of science and technology will cause the information received by students to be more diverse. So that students are required to have the ability to choose and sort out information properly and correctly that will enrich the fruits of student thinking.

D. CONCLUSION AND SUGGESTIONS

Based on the research findings, it can be concluded that the level of critical thinking skills in mathematics learning in 5th grade students is in the category of sufficient, critical thinking skills are still not optimal. The conditions of mathematics learning in the research site are less accustomed to critical thinking skills. The tendency of learning is still to complete the material, so the teacher does not have time to cultivate critical thinking skills that are considered to consume the allocation of learning time. When students are able to think critically, optimal learning outcomes will be easier to achieve, while when students only pursue optimal learning results, critical thinking skills cannot necessarily be possessed. Based on these findings, there are suggestions for class teachers to familiarize critical thinking skills, namely: (1) students are accustomed to dare to ask questions when learning, (2) students are

accustomed to working on problem-based questions, (3) students are accustomed to answering appropriately accompanied by how to work, (4) students are accustomed to criticizing the accuracy of answers from the beginning of work to conclusions, (5) students are accustomed to testing by rechecking starting from the way of working, (4) students are accustomed to criticizing the accuracy of answers from the beginning of work to conclusions, (5) students are accustomed to testing by rechecking starting from the way they are done. what is known until the conclusion of the answer, (6) the learning process using Problem Based Learning, (7) learning that prioritizes the culture of learning throughout life, (8) a challenging but fun learning atmosphere, (9) the use of science and technology.

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