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# Analysis of Critical Thinking Skills of Elementary School Students Through Integrated Problem-Based Learning Model with Mind Mapping

**Nurfadila MY[1], Nurlina[2], Ma'ruf[3]**

[1] Universitas Muhammadiyah Makassar, Indonesia; nurfadila.my@student.unismuh.ac.id
[2] Universitas Muhammadiyah Makassar, Indonesia; nurlina@unismuh.ac.id
[3] Universitas Muhammadiyah Makassar, Indonesia; maruf@unismuh.ac.id

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**ABSTRACT**

Background of the rearch is the low critical thinking skills of students. In addition, there is no data related to the distribution of indicators of students' thinking skills, especially in science learning. The research objective was to analyze the critical thinking skills of elementary school students through an integrated problem-based learning model with mind mapping. This type of research is experimental research with a quantitative approach. The research design used was a pre-experimental design of the One-Group Pretest-Posttest Design. The population in this study was class V SDI BTN IKIP I Makassar City. In this study using a purposive sampling technique this study used a purposive sampling technique. Data collection in this study was a descriptive test consisting of 7 questions according to indicators of critical thinking ability. The results of this study are that the basic clarification indicator gets the highest score on the pretest and posttest, with an average score of 60 and 82. Meanwhile, the strategy and tactics indicator receives the lowest score, averaging 52 on the pretest and 75 on the posttest. So it means that the distribution of critical thinking skills indicator scores shows that the basic clarification indicator gets the highest score, and the strategy and tactics indicators get the lowest score.



**Corresponding Author:**
Nurfadila MY
Universitas Muhammadiyah Makassar, Indonesia; nurfadila.my@student.unismuh.ac.id

## 1. INTRODUCTION

Learning in the 21st century has undergone significant changes in response to technological developments and social dynamics that change how we access information and interact with the world. So that the implementation of the learning process now places more emphasis on developing 21st-century skills, which makes students central in the learning process or student-centered (Septikasari,

2018). The teacher is no longer the center of learning but rather a facilitator, evaluator, and motivator (Hasna, Kabiba, & Nurzaima, 2021). One of the characteristics of 21st-century learning is the development of 4C skills, which include critical thinking, creativity, communication, and collaboration (Thornhill-Miller et al., 2023).

Critical thinking skills are 21st-century skills that have an essential role. These skills are the main foundation for students in dealing with the complexities of the modern world, which is full of information and challenges (Sitepu, Nainggolan, & Lumbansiantar, 2023). In the context of 21st-century learning that is more student-centered, critical thinking skills allow students to analyze data in depth, identify assumptions underlying a statement, and construct strong arguments based on relevant evidence(Chouari & Nachit, 2016). Critical thinking also trains students to ask vital and challenging questions to understand a problem from various points of view. In a complex and fast-paced world, sorting out accurate information from invalid information is becoming increasingly important. Critical thinking skills also involve recognizing bias and manipulating information so that students can make decisions based on deep understanding with activities such as analyzing, synthesizing, making judgments creating, and applying new knowledge to real-world situations (Wayudi, Suwatno, & Santoso, 2019).

Critical thinking indicators are essential in measuring and developing a person's ability to analyze, evaluate, and construct an in-depth understanding of the information received. In education and learning, critical thinking indicators help identify concrete steps that show that someone is using critical thinking. Indicators of critical thinking skills can be seen through the behavioral aspects expressed in the definition of critical thinking (Rachmantika & Wardono, 2019). Critical thinking divides indicators into five abilities, namely: providing elementary Clarification, essential support; inferences; advanced Clarification; strategy, and tactic (Ennis, 1996). One of the learning contents that is considered appropriate for developing 21st-century skills is science learning content. This is because science learning emphasizes various aspects of process skills so that students can be encouraged to think scientifically, reason, and think critically (Utami, Saputro, Ashadi, & Masykuri, 2016). Science learning, too is knowledge that having analytical skills or observation to study the universe visible and invisible through the scientific method; that way students can be active and creative in teaching and learning (Sulthon, 2017).

Based on the results of a preliminary study conducted at SDI BTN IKIP 1, especially in class V by giving an initial test according to indicators of critical thinking skills, it was found that the results of the examination related to the material on theme 3, Sub Theme 3 associated with the digestive system of humans and ruminants, there were 12 students who the answer is wrong. The average student obtained from this assignment is class V SDI BTN IKIP 1 classically, namely 69.8. Meanwhile, when viewed from the teacher's learning process, it can be seen that there is a lack of activities that hone students' critical thinking skills. If analyzed from the learning process carried out in this class, the learning process implemented could have been more optimal in involving students to participate actively in the learning process. Thus, making critical thinking skills possessed by students to be low. Therefore, a solution that can be applied in classroom learning is the application of a learning model that can involve students actively. The learning model used is the problem-based, alternative learning model to train students' critical thinking skills to gain a deep understanding. According to (Devi & Bayu, 2020) the problem-based learning model has stages corresponding to critical thinking indicators.

In a previous study, (Nuriyah, 2020) revealed that although the problem-based learning model has various advantages, it also has weaknesses. One of the limitations found is that this approach continues to encourage students to think continuously, which in turn can make them feel reluctant to solve problems. The importance of problem-solving skills in problem-based learning is also recognized, but finding fast and innovative solutions to complex challenges is only sometimes easy for students(Tri Pudji Astuti, 2019). As a more practical alternative, mind mapping is a way to provide clarity and solutions. Thus, the problem-based learning model can be integrated with mind mapping, creating a more critical and exciting approach to identifying problems. Through this combination, the problem

recognition process can be better directed, and students' ability to overcome challenges becomes more optimal, especially in building knowledge competence in Natural Sciences. The purpose of the research for analyze of critical thinking skills of elementary school students through an integrated problem-based learning model with mind mapping.

## 2. METHODS

The research is experimental research using a quantitative approach. The research design was a pre-experimental design type of One-Group Pretest-Posttest Design. In this study, the treatment results can be known more accurately because they can be compared with the conditions before treatment (treatment). The population in this study was class V SDI BTN IKIP I Makassar City, totaling 65, consisting of 32 students in class A and 33 students in class B. In this study using a purposive sampling technique this study used a purposive sampling technique. This approach was chosen because the researcher wanted to choose samples deliberately based on specific characteristics relevant to the research objectives.

The data collection in this study was a descriptive test consisting of 7 questions according to the indicators of critical thinking skills, which were first tested for the validity of the content and declared valid by experts. This research procedure involves several stages. First, pretest data was collected to measure students' critical thinking skills before treatment. Then, the treatment is carried out by applying a problem-based learning model integrated with mind mapping. After that, posttest data was collected to measure the increase in students' knowledge after treatment. Pretest and posttest data were analyzed to see the impact of treatment on critical thinking skills in science.

## 3. FINDINGS AND DISCUSSION

Based on research data that has been obtained from the data collection that has been carried out, the results of analyzing the critical thinking skills of elementary school students through an integrated problem-based learning model with mind mapping.

### The Effect Integrated Problem-Based Learning Model with Mind Mapping for Critical Thinking Skills of Elementary School Students

By building critical thinking skills from elementary school, students can develop a more structured and analytical way of thinking along with the development of students. Critical thinking skills are recognized as an integral part of the learning process from an early age; students begin to acquire the basics to explore thinking independently. Integrating mind mapping in PBL also strongly supports the development of critical thinking skills. Mind mapping allows students to organize ideas, connect concepts, and describe relationships between various pieces of information. By visualizing information in mind maps, students can identify patterns and interrelationships that are not immediately apparent, facilitating a more profound understanding and comprehensive analysis.

The research results obtained showed that the data on student's critical thinking skills was parametric data from one group, so it was tested with the *Paired Sample T Test*, which obtained significant values as follows:

**Tabel 1.** P*aired Sample T Test*

| Variabel | Sig | Description |
|---|---|---|
| Critical Thinking skills | 0,000 | Significant |

The Paired Sample T Test above was carried out with the help of SPSS version 25.0 with the decision that the significant value of the problem-based learning integrated learning model mind mapping on students' critical thinking skills was 0.000 <0.05, which means that H1 was accepted Ho was rejected, that is there was an influence problem-based learning model integrated mind mapping on critical thinking skills of class V SDI BTN IKIP I Makassar.

**Distribution of Critical Thinking Skills Indicators for SDI BTN IKIP I Makassar Students**

Critical thinking divides indicators into five abilities, namely: providing elementary Clarification, essential support; inferences; advanced Clarification; strategy, and tactic (Ennis, 1996). The results of calculating the critical thinking skills scores of SDI BTN IKIP I Makassar students for each indicator are as follows:

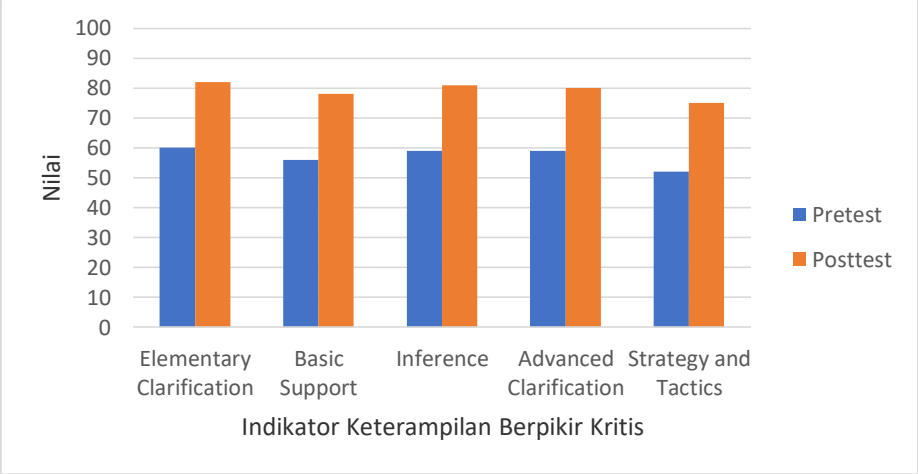


**Figure 1.** Indicators of Critical Thinking Skills for Students of SDI BTN IKIP I Makassar

Figure 1 above shows that the elementary clarification indicator gets the highest score in the pretest and posttest, with an average score of 60 and 82. Meanwhile, the strategy and tactics indicator gets the lowest score, averaging 52 in the pretest and 75 in the posttest.

**Discussion**

The research results obtained from the description test on class VB students at SDI BTN IKIP I Makassar, researchers can present the effect of applying mind mapping integrated problem-based learning on students' critical thinking skills as well as the results of the analysis of each indicator of critical thinking skills in science learning for students at SDI BTN IKIP I Makassar :

**The Effect of Mind Mapping Integrated Problem-Based Learning on Students' Critical Thinking Skills**

These results indicate that the influence of the problem-based learning integrated learning model on mind mapping on students' critical thinking skills has increased significantly based on the results of SPSS 25.0. The Paired Sample T Test above was carried out with the help of SPSS version 25.0 with the decision that the significant value of the problem-based learning integrated learning model mind mapping on students' critical thinking skills was 0.000 <0.05, which means that H1 was accepted Ho was rejected, that is there was an influence problem-based learning model integrated mind mapping on critical thinking skills of class V SDI BTN IKIP I Makassar.

The results of this study are in line with research conducted by(Aiman et al., 2023; Hotimah & Ramadani 2021; Magdalena et al., 2020), which shows that the problem-based learning (PBL) learning model that integrates mind mapping in the learning process has a significant influence on student learning outcomes. Another research is research conducted by Ulla (2019) revealed that there was a significant increase in the critical thinking skills of elementary school students in the experimental group, namely the group that used PBL learning with mind mapping compared to students in the control group who took part in learning using the interactive lecture method. Next, the results of the analysis of each indicator of critical thinking skills in science learning for class V SDI BTN IKIP I Makassar are presented as follows:

**Gives a Simple Explanation**

In the indicator providing simple explanations, there are sub-indicators in the form of focusing questions, analyzing arguments, and asking and answering challenging questions and clarifying questions. This indicator scores 60 on the pretest and 82 on the posttest. In this indicator, students have been able to ask and answer questions made with simple explanations. Students have been able to express problems by the conditions presented.

The indicators above are closely related to the problem-based learning model (PBL), integrated with mind mapping. In the context of PBL, students are invited to understand concepts through independent exploration of relevant issues in authentic contexts. Mind mapping as a visual tool helps to represent ideas and concepts clearly, making it easier for students to organize information and relate it to the solutions to their problems.(Br Sipayung, Susanti, & Dewi, 2019). Overall, the integration between the PBL approach and the use of mind mapping provides a holistic approach to learning. PBL stimulates critical, analytical and collaborative thinking skills, while mind mapping helps organize, relate and communicate information effectively(Septikasari, 2018).

**Basic Support**

In the basic support indicator, there are sub-indicators in the form of explaining the credibility (criteria) of a source. This indicator scores 56 on the pretest and 78 on the posttest. This indicator shows that students can consider information from a reliable source. However, the student's scores have not been maximized because students have yet to find evidence to compile this information to be accurate. Students who think critically will be able to conclude and solve a problem that students can according to the correct sources of information for student answers(Wahyuni et al., 2021).

Students' ability to consider the credibility of a source has a significant positive impact. They become more aware of the importance of checking information sources before receiving and using them. With these skills, students can better avoid spreading false or unreliable information. They can develop a more in-depth and accurate understanding of the topic being studied. Overall, an increase in scores from the pretest to the posttest indicates that effective learning has occurred regarding students' ability to explain the credibility or criteria of a source. This is a positive outcome of efforts to equip students with essential skills in critical thinking and evaluation of information. This will help them become more intelligent consumers of information and aware of the quality of the sources used.

The integration between PBL and the use of mind maps creates a holistic learning experience. PBL encourages students to be actively involved in solving problems and evaluating the credibility of information sources, while mind maps help them visualize, relate, and present information more effectively(Tri et al., 2019).

**Inferences**

In the indicators of making inferences, there are sub-indicators of making deductions and considering the results of deductions or making inductions and considering the results of induction and making decisions and considering the results. This indicator scores 59 on the pretest and 81 on the posttest. Students have concluded the differences between the two pictures presented in this indicator. Students have been able to answer according to the reasoning of students who can mention and elaborate on the events that occurred, but the explanations presented needed to be completed. They are learning that involves methods such as image analysis, talking through inference processes, and applying critical thinking strategies. These results indicate that students have developed essential skills in analyzing information more profoundly and reaching meaningful conclusions(Redhana, 2019).

**Advance Clarification**

In the indicators providing a further explanation (advance clarification), sub-indicators define terms, consider definitions, and identify assumptions. This indicator scores 59 on the pretest and 81 on the posttest. In this indicator, questions can provoke students if the teaching and learning process

is gratifying. Each question is as attractive as possible, with so many students who are very active in learning science. Critical students can be characterized as being more active in asking questions and having the courage to express opinions in their efforts to solve problems. In contrast, in asking questions, students get information clearly to find the right solution and understand the problem so they can conclude.

Using a problem-based learning model integrated with mind mapping, organized learning provides discussion-based learning, in-depth analysis, and constructive feedback. These results indicate that students have developed essential skills in articulating concepts more deeply, understanding definitions, identifying assumptions that underlie a concept, and applying them in fun and interactive learning situations. (Ardhan, 2019).

**Strategy and Tactics**

In the indicators of managing strategy and tactics (strategy and tactical), it is found that sub-indicators formulate and decide on an action. This indicator scores 59 on the pretest and 81 on the posttest. In this indicator, students do not have a good plan for solving problems. Suppose the ability to solve problems and make conclusions is always applied to students. In that case, students will master these abilities so that students can think when students are given more complicated problems. This study aligns with the study's results (Wahyuni et al., 2021)on the indicators of strategy and tactics (strategy and tactics), getting the lowest score with an average score of 31; this is included in the low category.

## 4. CONCLUSION

Based on the results of the research above, there is an influence of the problem-based learning integrated learning model on mind mapping on the critical thinking skills of class V SDI BTN IKIP I Makassar. The distribution of critical thinking skills indicator scores shows that the elementary clarification indicator gets the highest score, and the strategy and tactics indicator gets the lowest score.

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