

The Effect of Project-Based Learning on Critical Thinking Skills of Elementary School Students

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Abstract: Students' critical thinking skills are still relatively low at SDN 34 Palembang, marked by the low results of the pretest held in this research activity. This indicates that it is necessary to make learning innovations that can encourage students' critical thinking skills, one of which is project-based learning. This research activity was conducted at SDN 34 Palembang in class VI with science subjects with a total of 30 students. This research activity was carried out to add insight into interactive learning used for students' critical thinking skills, one of which is project-based learning. Based on the research that has been conducted on the application of project-based learning, it is obtained that students, after receiving this learning, can improve students' critical thinking skills, marked by higher student posttest results than pretest results, with 86% of students achieving essential skills of thinking indicators.

Keywords: Critical Thinking Skills, Primary School, Project Based Learning

A. Introduction

The world of education always faces challenges in responding to the dynamics of technological developments that affect people's lives. Education is at the forefront of shaping the quality and characteristics of individuals essential in preparing generations who can survive and adapt to various societal advances. Multiple elements that form character must be fulfilled, one of which is a critical component that can help create the basis of quality human resources (Winarti et al., 2022).

The economic, political and social development driven by Indonesia today requires a foundation of quality education. Education is a strategy to empower the younger generation to shape superior human resources as a form of community preparation in the competition of positive global dynamics (Ayu Made Dwiyani Putri et al., 2019). The foundation built for the world of education must start from learning in elementary school (Iswantari, 2021). Elementary school is a place to make the character of the nation's children through formal education by providing various knowledge, norms, and abilities that can be used to determine the success of future education (Wulandari et al., 2019).

Education instilled in elementary school students focuses on science, the basic concepts of character education, and the introduction of skills that can support their lives. Elementary school students need to be equipped with a variety of positive character values such as discipline, honesty, responsibility, and cooperation; this is important because it can help form positive characters that benefit themselves and the surrounding environment (Wahid, 2024). The reality in the field is that the learning process has not improved students' positive character, especially in terms of critical thinking skills; this can be seen from the students' critical thinking skills in the low category.

Learning activities in elementary schools aim to help students improve their learning requests. Teaching and learning activities are inseparable from the critical role of a teacher in creating and encouraging a pleasant learning environment so that students feel motivated to learn actively (Wahyuni, 2023). This can be realised through learning methods with active and relevant activities for students through learning while playing or interactive activities. So that students can experience enjoyable learning and increase their motivation (Dewi et al., 2018).

Learning methods that are relevant to the times and innovative will provide opportunities for students not only to gain theoretical regulatory knowledge but also to develop abilities and skills that can support life in the future (Susanti, 2023). The achievements obtained by students from the learning process at school are not only in terms of cognitive aspects but also character building, creativity, and critical thinking skills. These aspects cannot only appear in students but also need habituation by creating various learning strategies to support the Indonesian education system (Asdar et al., 2023).

Effective learning requires transmitting information and creating a learning environment that stimulates critical thinking skills. This dynamic change has become a particular concern in the curriculum system that has been implemented. Project-based learning is one of the methods of division that has become a significant concern in today's educational changes, especially in encouraging the improvement of students' critical thinking skills (Jamaludin, 2017).

The project-based learning method has a meaning as an approach to learning activities by emphasising the application of the theory adjusted to the actual situation in the field through the procurement of real projects or practical tasks; one example of the application of project-based learning methods can be one of the choices of learning methods that improve student learning achievement (Palayukan et al., 2023).

The concept applied in the project-based learning method is a tool for sharing conceptual knowledge, and students can experience learning directly (Palayukan et al., 2023). Learning activities that are carried out directly involve practical activities with the ability to understand profoundly and can form fundamental skills in

everyday life. The project-based learning method involves students directly in aspects of problem-solving, critical thinking, creative thinking, and cooperation and provides fun for students to improve skills that are useful for the real world; this learning method not only emphasises the result but also appreciates the process to achieve the result (Palayukan et al., 2023).

Project-based learning is a learning model that requires teachers and students to develop more critical and in-depth questions (Pratiwi et al., 2018). It encourages students to investigate real problems actively, deepen their understanding of the material, and perform essential and meaningful tasks in the learning process, not just listen to the teacher's lecture (Putri et al., 2023).

Project-based learning applied in learning activities can create an independent student learning environment. This is because students are given a sense of responsibility for the independent project tasks, which creates a sense of independence and initiative towards existing learning tasks. The cooperation aspect, which is also emphasized in the learning method, becomes a forum for students to convey opinions, ideas, and experiences. The creativity component owned by students is essential in project-based learning methods because students must design independently to solve existing problems (Palayukan et al., 2023).

The application of the method given to students can not only increase creative thinking but also provide opportunities for students to gain knowledge contextually (Solissa et al., 2023). So, it can be concluded that the application of project-based learning methods can encourage positive student character building and improve skills and attitudes needed in real-world life. The project-based learning method can be one of the solutions to solve the problem of students' low critical thinking skills.

Implementing project-based learning in schools can be done by taking the following steps as a differentiator from other learning models: First, the teacher chooses a fundamental question related to the discussion. Secondly, students determine the design and schedule for making the given project task. Third, the teacher supervises the project's development; fourth, the teacher evaluates and assesses the completed project (Purbosari, 2016).

Applying project-based learning methods in learning activities certainly has advantages and disadvantages. The benefits of project-based learning are that it can increase student confidence, increase student learning motivation, increase a sense of responsibility and cooperation, and provide opportunities for students to be directly and actively involved in learning activities (Guo & W., 2020). The application of project-based learning also has disadvantages, including the fact that it takes much time to complete the project. If the project is too much, it will cause students to experience boredom and require relatively more costs (Hidayat, 2021).

Project-based learning is one of the learning approaches that make students play an active role in ongoing learning; the project given to students has an orientation on the ability to observe, solve problems and design solutions by life (Dewi et al., 2018). Not only that, project-based learning also helps students develop various abilities that must be honed, such as communication or critical thinking skills (Mahardika et al., 2017). Students are asked to collaborate in a group to complete the project with academic concepts learnt (Puspita et al., 2018). Students can also plan and carry out projects according to their ideas to increase their in-depth understanding of science (Umam & Jiddiyah, 2021).

Education in the 21st century requires students to think creatively and have good problem-solving and qualified critical-thinking skills. Critical thinking skills are needed to help solve problems in everyday life. According to Unaenah, critical thinking is the ability to use one's mind to analyse and evaluate a phenomenon so that it can produce the right decision for the problem at hand. On another occasion, Riti expressed his opinion that critical thinking is a person's cognitive skills in the aspects of observation, analysis, evaluation and determination of the solution framework for existing problems that can be used to solve problems (Riti et al., 2021). Ariani also expressed his view that the definition of critical thinking is a process used to improve the ability to observe problems and solve problems through ideas obtained from the thinking process (Rineksiane, 2022).

Students must achieve several indicators to achieve maximum critical thinking skills, such as asking questions, providing answers to questions, expressing their views, solving problems, evaluating or assessing critically, and drawing conclusions (Andrijati, 2024).

Critical thinking is a skill that represents one's thoughts on problem-solving in a structured and systematic manner. Thinking critically is crucial for students to improve their analytical, innovative, and creative skills and adapt to dynamic and complex changes. From the explanation that has been conveyed, project-based learning is one of the methods that can meet the challenges of the times to improve the critical thinking skills of human resources (Idris et al., 2020).

The activities involved in project-based learning encourage students to be able to apply their ideas so that they can collaborate previous knowledge with new knowledge gained. Critical thinking skills also focus on recognition and problem-solving so that students are encouraged to understand knowledge through essential reading activities and can get the main idea of the reading with the help of inferring skills and combining previous knowledge with new knowledge. (Perdana et al., 2020).

At SDN 34 Palembang, especially for grade VI students in science learning, many students still have low thinking skills. Out of 30 students, only 5, or 17%, pass the KKM on critical thinking skills indicators. This happens because learning still uses

conventional learning (lectures or notes), which tends to be less interactive. Therefore, a lesson is needed to help students be active in the classroom and to encourage their critical thinking skills.

Based on the explanation above regarding the low level of critical thinking skills and solutions that can be used to solve these problems, the author decided to conduct research activities titled "The Effect of Project-Based Learning on Students' Critical Thinking Skills in Elementary Schools."

B. Methods

This research activity uses qualitative research with a literature study method to collect data relevant to the research activities carried out (Natty & I., 2019). Several stages are carried out to analyse data from various sources in this study by finding the literature sources, such as authors looking for books, journals, and modules. The author also uses primary and secondary data, which are classified based on the author's direct experience author's when making observations. The next stage is that the author collects various literature sources and presents them in direct and indirect quotations by reading, observing, analysing and understanding the literature sources so that the author can rewrite the main points of discussion in the framework of this scientific work (Fitri & S., 2018). This research activity was carried out in class VI in science subjects with 30 students. The purpose of this research activity is to add insight into learning that not only focuses on deepening the material but also to develop the abilities that students must possess in the 21st century, one of which is the most important is the ability to think critically.

C. Results and Discussion

Project-Based Learning Model

The project-based learning method has meaning as an approach to learning activities that emphasises the application of the theory adjusted to the actual situation in the field through the procurement of real projects or practical tasks. One example of the application of project-based learning methods can be one of the choices of learning methods that improve student learning achievement (Palayukan et al., 2023).

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result (Palayukan et al., 2023).

Project-based learning is a learning model that requires teachers and students to develop more critical and in-depth questions (Pratiwi et al., 2018). It also encourages students to investigate real problems actively, deepen their understanding of the material, and perform essential and meaningful tasks in the learning process, not just listen to the teacher's lecture (Putri et al., 2023).

Project-based learning applied in learning activities can create an independent student learning environment because students are given a sense of responsibility for the independent project tasks given to develop an understanding of independence and initiative towards existing learning tasks. The cooperation aspect is also emphasized in the learning method, which becomes a forum for students to convey opinions, ideas, and experiences. The creativity component owned by students is essential in project-based learning methods because students must design independently to solve existing problems (Palayukan et al., 2023).

Applying the method given to students can increase creative thinking and provide opportunities for students to gain contextual knowledge (Solissa et al., 2023). So, it can be concluded that project-based learning methods can encourage positive student character building and improve skills and attitudes needed in real-world life. Project-based learning methods can be one solution to solving the problem of students' low critical thinking skills.

Implementing project-based learning in schools can be done by taking the following steps as a differentiator from other learning models: First, the teacher chooses a fundamental question related to the discussion. Second, students determine the design and schedule for making the given project task. Third, the teacher supervises the development of the project; fourth, the evaluation and assessment of the completed project (Yulianto et al., 2017).

Applying project-based learning methods in learning activities certainly has advantages and disadvantages. The benefits of project-based learning are that it can increase student confidence, motivation, and a sense of responsibility and cooperation and provide opportunities for students to be directly and actively involved in learning activities (Azizah et al., 2018). The application of project-based learning also has disadvantages, including requiring too much time to complete the project; if the project given is too much, it will cause students to experience boredom and require relatively more costs (Hidayat, 2021).

Project-based learning is one of the learning approaches that make students play an active role in ongoing learning; the project given to students has an orientation on the ability to observe, solve problems and design solutions by life (Dewi et al., 2018). Not only that, project-based learning also helps students develop various abilities that

must be honed, such as communication or critical thinking skills (Mahardika et al., 2017). Students are asked to collaborate in a group to complete the project with academic concepts learnt (Puspita et al., 2018). Students can also plan and implement projects according to their ideas to increase their understanding of science.

The opinion presented by Santoso states that project-based learning is a learning model used comprehensively that encourages students to learn in a designed environment actively and creatively and be able to solve problems authentically by using ideas or ideas that are independently owned. This learning model also provides opportunities for students to understand learning materials in depth because students can gain learning experiences. This learning model not only emphasizes the ability to solve problems but can also shape students' characters into independent individuals with a systematic mindset (Swandi et al., 2021).

Santoso's opinion states that project-based learning is a comprehensive learning model that encourages students to learn actively and creatively in a designed environment and solve problems authentically by using ideas or ideas that are independently owned. This learning model also provides opportunities for students to understand learning materials in depth because students can gain meaningful learning experiences. This learning model not only emphasizes the ability to solve problems but can also shape students' characters into independent individuals with a systematic mindset (Swandi et al., 2021).

According to Ramadiyanti, project-based learning focuses on conceptual discipline and responsibility and involves students in solving various problems. This approach prepares students to face the times and technological advances so that individuals can adapt optimally and produce real work.

Critical Thinking Ability

Critical thinking is the ability to use one's mind to analyse and evaluate a phenomenon to produce the right decision for the problem at hand. On another occasion, Riti expressed his opinion that critical thinking is a person's cognitive skill in the aspects of observation, analysis, evaluation, and determination of the solution framework for existing problems that can be used to solve problems (Riti et al., 2021). Ridho also expressed his view that the definition of critical thinking is a process used to improve the ability to observe problems and solve problems through ideas obtained from the thinking process (Ridho & P., 2020).

Someone who can think critically is an individual who can conclude something that is known. In this case, the individual can get information to solve problems and find relevant sources to solve the issues faced. Individuals who can think critically have complex reasoning, imagination and problem-solving activities. Individuals with good critical thinking skills will use their ratio or reason so that existing logic is used

to gain knowledge effectively through reasoning patterns (Hairida, 2016).

Critical thinking skills are the focus of learning that cannot be separated from the times and technology; critical thinking is one of the indicators in modern education, which is characterized by the ability of high thinking processes, the use of opinions or arguments and bringing new insights to any knowledge and interpersonal for the development of a logical and comprehensive mindset. It can be concluded that critical thinking skills are not attached to time, but they can be used continuously to get logical and comprehensive problem-solving for high thinking skills.

Table 1. Pretest and Posttest Results of Grade VI Students of SDN 34 Palembang

	0 < KKM < 70	70 < KKM < 100	Number of Students
Pretest	25	5	30
Posttest	4	26	30

Based on table 1. The learning results show the implementation of project learning on critical thinking skills in elementary schools, based on the results of the pretest conducted at the beginning of the study obtained data that students who can solve problems with the concept of thinking logically are only about 17% of students who can have scores above the KKM worth 70. The remaining 83% of students cannot get scores beyond the KKM. Based on this data, it can be seen that the critical thinking skills of elementary school students are still in the low category. After participating in student project-based learning through posttest activities, obtaining student scores in the critical thinking ability indicator category increased significantly, where students who scored above the KKM were 86% and 14% could not exceed the predetermined KKM limit so that the category of critical thinking ability of students who were previously in the low category increased to the medium and high categories.

A significant increase in critical thinking skills in students taught using project-based learning in class VI SDN 34 Palembang can be seen from the results of the posttest average score of students' critical thinking skills higher than the results of the pretest average score. This makes a very positive impression because it turns out that there are changes in the results of students' critical thinking skills after project-based learning is given.

Implementation of Project-Based Learning in Primary Schools

In the teaching and learning process, learning models are fundamental. Learning models include all the approaches, methods, strategies and techniques of learning. Not all learning model features are suitable for every student. One of the characteristics of the project-based learning method is that it can provide problems that are not yet structured and have not yet found a solution so that students can act as process designers to achieve learning objectives. Then, learners are responsible for

obtaining and managing information, and always, evaluate each activity or programme. Learners are also allowed to review what they have done in learning, assessing the product or result of the activity. It also creates a teaching and learning environment that accepts and corrects mistakes (Sutrisna et al., 2020).

The first step is determining the project or problem to be addressed, then designing the method to solve the problem and creating a project schedule. Then, we proceed to design the process that will be used to solve the problem and make a project schedule. We complete the project or problem given to the students, monitored by the teacher, and report and show the results of implementing the PjBl programme. Furthermore, the last one evaluates the activity by reconsidering the practice results (Rineksiane, 2022). Meanwhile, based on the results of research conducted by (Fadriati et al., 2023), there is research on the ICT-based project-based learning model carried out by following the syntax as follows:

Ask Students Important Questions

Research shows that essential questions play an important role in stimulating students' ability to explain their knowledge, understand the context (how), analyse the reason (why), and assess the impact (for whom). In addition, essential questions also facilitate selecting from a range of alternative solutions to address a defined problem.

Designing the Project Plan

This phase is intended to (1) Encourage learners to collect data in a systematic, critical, and creative way; (2) give learners the freedom to choose concepts to find solutions; (3) inspire learners to articulate their opinions through data analysis to determine solutions to the problem at hand; (4) encourage students to engage in learning group formation activities, which aim to facilitate problem analysis more effectively.

Develop an activity schedule

A mutually agreed time limit will be used to organise the process of working on the problem-solving project while encouraging students to develop reasoned explanations for their choice of solutions to their assigned responsibilities.

Recording Student Activities

At this stage, the teacher actively monitors students' activities, focusing on observing the progress of the project or task given to students. The teacher also engages in discussions to identify and discuss the obstacles that students face when they are solving problems related to the functions that have been given.

Assessing Student Success

This process is very significant as it measures the level of achievement and accuracy of the project or assignment that students undertake. Evaluation is done by critiquing students on their learning achievements.

Assessing Student Experience

Assessing students' experiences aims to determine the effectiveness and impact of activities carried out both personally and in groups in the context of project learning (Fadriati, Muchlis, and BS 2023).

Based on the sequence of steps of learning activities, using the project-based learning method above can help students develop their critical thinking skills. Based on the pretest and posttest scores of the critical thinking skills of students in class VI Elementary School, it was found that before project-based learning was given, students' vital thinking was not optimal; this was indicated by the scores of the pretest results of students' skills, which were still low and in the low and medium categories and could improve to a high category. This condition can be seen after being given project-based learning; the posttest results of critical thinking skills are higher.

According to the researcher, student numbers increased significantly, which is why this project learning can dramatically affect students' critical thinking skills. In project-based learning, students are also directed to have the ability to search and obtain information (Improved library research skills) because project-based learning requires students to be able to receive information through information sources quickly. Students' skills to search and get information will increase. This concept is undoubtedly the same as critical thinking skills, where learners are directed to be able to dig up accurate information to analyses arguments clearly and rationally, bring insight into each meaning, and interpret it correctly

D. Conclusions

Based on the results of the research activities that have been carried out, it is concluded that there is an effect of project-based learning to improve student's critical thinking skills at SDN 34 Palembang; this can be seen from the posttest results of students who work on questions after receiving project-based learning treatment have higher scores than the pretest results or before getting project-based learning. This learning model can also be used to develop the positive character of elementary school students in terms of discipline, responsibility and creativity. Learning in elementary school becomes the foundation for the abilities developed by individuals for the benefit of their future lives.

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