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# APPLICATION OF PROJECT BASED LEARNING TO IMPROVE SECONDARY SCHOOL STUDENTS' CRITICAL THINKING SKILLS

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***Abstract***

The aim of this research is to analyze the application of project-based learning (PjBL) in improving secondary school students' critical thinking skills based on a literature review. Critical thinking is an essential skill in 21st century education that allows students to analyze, evaluate and solve problems systematically. However, conventional learning methods are often less effective in developing these skills. This research uses a qualitative method with a literature review approach (library research), by examining various scientific sources such as academic journals, books, conference proceedings and research reports in the last 10 years. The results of the study show that PjBL has high effectiveness in improving students' critical thinking through a process of exploration, problem solving and collaborative work. The main factors that contribute to the success of PjBL include relevant project design, active student involvement, and support from teachers and learning facilities. However, the implementation of PjBL still faces challenges, such as limited time in the curriculum, lack of teacher training, and limited resources in some schools. As a recommendation, training is needed for teachers regarding the implementation of PjBL, flexibility in the curriculum to support project-based learning, and the use of technology as a learning tool. With the right strategy, PjBL can be an effective learning method in equipping students with the critical thinking skills needed in the academic and professional world.

**Keywords:** Project Based Learning, Critical Thinking, Middle School, Literature Review, 21st Century Education.

## INTRODUCTION

21st century education requires students to have skills that go beyond just memorizing and understanding concepts. One very important skill is critical thinking, namely the ability to analyze, evaluate and solve problems rationally and based on evidence. Critical thinking skills enable students to

understand information more deeply, make better decisions, and face real-world challenges more prepared (Zulkarnain et al., 2023). In a digital era filled with information from various sources, this skill is becoming increasingly important so that students can sort out valid information and not be easily influenced by hoaxes or fake news.

Despite its importance, developing critical thinking skills in schools still faces many challenges. One of the main obstacles is conventional learning methods which are still widely applied in schools. Teacher-centered learning models, such as lectures and memorization, tend to make students passive and less trained in critical thinking (Lestari & Sunarso, 2024). In this method, the teacher is more dominant in providing information, while students only receive material without much opportunity to discuss, analyze, or apply their knowledge in real situations. As a result, many students only memorize material for exams without really understanding the concepts and being able to use them in everyday life.

In addition, a dense curriculum often makes it difficult for teachers to apply more interactive and exploratory learning methods. Textbook-based learning and standardized tests that focus on final results tend to stifle students' creativity and critical thinking. Teachers are also often more oriented towards achieving academic grades compared to developing students' thinking skills (Dwijayanti et al., 2023). As a result, learning becomes less contextual and does not provide opportunities for students to explore and find solutions to complex problems.

To overcome this problem, project-based learning (PjBL) has emerged as an innovative solution that can help improve students' critical thinking skills. PjBL is a learning method that emphasizes student involvement in real projects that are relevant to their lives. In PjBL, students are challenged to explore, ask questions, and find solutions to problems given independently or in groups. This method allows students to think more deeply, evaluate various information, and develop creative problem solving skills (Aswan et al., 2024).

One of the main advantages of PjBL is that it provides a more meaningful learning experience for students. Compared to the lecture method, PjBL allows students to directly apply theory in practice through the projects they work on. Students not only learn from books or teacher explanations, but also from direct experience involving analysis, decision making, and reflection. In this way, learning becomes more interesting and motivates students to be active in the learning process (Darussyamsu et al., 2024).

Apart from increasing learning motivation, PjBL also encourages collaboration between students. In many projects, students work in groups to complete complex tasks. This process teaches them how to discuss, share ideas, and defend their arguments in a logical, evidence-based manner. This ability is very important in critical thinking because students must be able to develop systematic thinking and defend their opinions based on valid data and analysis (Mabrur et al., 2024).

Various studies have shown that implementing PjBL has a positive impact on improving students' critical thinking skills. Several studies have found that students who learn using a project-based approach are better able to analyze information, ask relevant questions, and find innovative solutions compared to students who learn using traditional methods (Paidi et al., 2024). Apart from that, PjBL also helps students develop communication and collaboration skills that are much needed in the world of work and social life in the future.

With the various benefits offered, PjBL is a learning strategy that has great potential in improving secondary school students' critical thinking skills. Therefore, it is important for teachers and schools to start considering implementing this method in the learning process (Wardani et al., 2024). However, the success of implementing PjBL also depends on the readiness of teachers in designing appropriate projects as well as support from schools in providing the necessary facilities and resources. With the right approach, PjBL can be an effective tool in building a generation that is more critical, creative and ready to face future challenges.

## RESEARCH METHOD

The research method used in this study is qualitative research with a literature review approach (library research). This research aims to analyze the application of project-based learning (PjBL) in improving secondary school students' critical thinking skills based on previous studies. The literature review was carried out by examining various relevant scientific sources, including academic journals, books, conference proceedings and research reports in the last 10 years. The focus of this research is to identify important findings from previous research that discuss the effectiveness of PjBL in improving critical thinking, as well as comparing various perspectives that have been studied in the literature.

Data was collected through a literature review of various references that had been collected and analyzed using descriptive analysis methods and

synthesis of findings. Descriptive analysis is used to describe concepts, principles and research results relevant to this topic. Meanwhile, a synthesis of findings was carried out by comparing the results of previous research, identifying emerging patterns or trends, and drawing conclusions regarding the effectiveness of PjBL in improving secondary school students' critical thinking skills. With this approach, research can provide a comprehensive picture of how PjBL is implemented and the extent to which this method can contribute to the development of students' critical thinking skills (Earley, M.A. 2014; Snyder, H. 2019).

## RESULT AND DISCUSSION

### Literature Review Results

Various studies have shown that project-based learning (PjBL) can improve students' critical thinking skills. PjBL provides a more contextual learning experience, allows students to be involved in solving real problems, and encourages deeper exploration and analysis of a topic (Hidayat et al., 2022). A study conducted by Thomas (2000) found that students who studied using the PjBL approach showed significant improvements in critical thinking skills compared to students who studied using conventional methods. This is caused by a process of exploration, discussion and reflection which directly trains students' critical thinking skills (Yani et al., 2024).

Other research conducted by Bell (2010) also shows that PjBL can help students develop analysis and evaluation skills. In PjBL, students are not only given information, but are also required to process, compare and draw conclusions from various sources of information. This process makes students accustomed to thinking systematically and questioning existing assumptions, which is the essence of critical thinking (Yulianti & Herman, 2023). Apart from that, PjBL also allows students to make decisions based on collected data, develop logical arguments, and defend their opinions in academic discussions.

One of the main factors contributing to the effectiveness of PjBL in improving critical thinking is a well-designed project design. According to research conducted by Krajcik and Blumenfeld (2006), projects that are related to students' real lives are more effective in improving critical thinking skills. When the projects given are relevant to students' experiences, they tend to be more motivated to explore problems in more depth, look for more creative solutions, and develop a better understanding of the concepts being studied (Adriyono et al., 2023).

In addition to project relevance, active student involvement is also an important factor in the effectiveness of PjBL. In research conducted by Kokotsaki, Menzies, and Wiggins (2016), it was found that students who actively participated in discussion, collaboration, and reflection during the project-based learning process experienced significant improvements in critical thinking skills. Interaction with peers, whether in the form of group discussions or project presentations, allows students to hone their ability to express opinions, consider other perspectives, and develop more complex and innovative solutions (Sukarma, 2024).

However, even though it has many benefits, implementing PjBL in secondary schools still faces various obstacles. One of the main challenges is the lack of understanding and skills of teachers in designing and implementing PjBL effectively. Many teachers are still accustomed to conventional learning methods which are more structured and textbook-oriented, so they find it difficult to adapt more flexible learning models such as PjBL (Yudiana et al., 2024). According to research conducted by Grant (2011), the success of PjBL really depends on the teacher's readiness in designing projects that suit learning objectives and student needs.

Apart from that, lack of time in the curriculum is also an obstacle in implementing PjBL. The project-based learning process usually takes longer than traditional methods, because students must conduct research, collect data, and develop solutions before presenting the results of their projects. In many schools, busy learning schedules and strict curriculum achievement targets make it difficult for teachers to allocate sufficient time for PjBL (Suhirman & Prayogi, 2023). As a result, many projects are only carried out on a limited basis or do not provide enough space for students to truly explore the problems given.

Another factor that becomes an obstacle is the lack of resources and supporting facilities. PjBL often requires various sources of information, tools, or technology to support the project exploration and completion process. However, in many schools, especially in areas with limited access to technology and infrastructure, it is difficult to implement PjBL optimally. According to a study conducted by Tamim and Grant (2013), schools that have limited access to educational resources, such as laboratories, computers or the internet, tend to experience difficulties in adopting the PjBL method effectively (Supit & Winardi, 2024).

To overcome these challenges, training for teachers regarding the design and implementation of PjBL is very important. Teachers need to be

given a deeper understanding of how to design projects that suit students' cognitive levels, as well as how to balance students' freedom of exploration and achieving the competencies set out in the curriculum (Anugrah & Mu'alim, 2022). Apart from that, support from schools in the form of more flexible policies regarding time allocation and integration of PjBL in the curriculum are also factors that can increase the success of implementing this method.

Another solution that can be implemented is the use of technology as a tool in project-based learning. By utilizing digital platforms, students can access various sources of information more easily, collaborate with their peers online, and document their learning process more effectively. According to research conducted by Larmer and Mergendoller (2015), the integration of technology in PjBL can help students to be more independent in exploring their projects, increase engagement in learning, and speed up the process of analyzing and synthesizing information (Firmansyah & Untari, 2024).

Overall, the literature review shows that project-based learning has great potential in improving secondary school students' critical thinking skills, but its implementation still faces various challenges. With the right project design, support from schools, and training for teachers, PjBL can be an effective learning method in preparing students to face future challenges with sharper and analytical thinking skills (Nasrulloh & Amin, 2022).

**Analysis and Synthesis**

Various studies that have been reviewed show that project-based learning (PjBL) has high effectiveness in improving students' critical thinking skills. Studies conducted by Thomas (2000) and Bell (2010) confirm that students who learn using PjBL are more able to analyze information in depth, evaluate alternative solutions, and develop logical arguments compared to students who learn using conventional methods. The results of this research are in line with the findings of Krajcik and Blumenfeld (2006) who stated that a project-based approach provides students with the opportunity to engage in exploration of real problems, which ultimately improves their critical thinking skills (Kause et al., 2022).

However, in comparing studies, some variation in the effectiveness of PjBL was found depending on the context in which it was implemented. Several studies show that the success of PjBL depends greatly on the design of the project provided, the level of student involvement, and support from teachers and schools. For example, research by Kokotsaki, Menzies, and Wiggins (2016) highlights that the effectiveness of PjBL increases significantly

when the projects provided are relevant to students' daily lives and provide sufficient cognitive challenges (Agustin & Shofiyah, 2023).

In further analysis, patterns and trends were found in the research results regarding PjBL. One of the dominant patterns is that the effectiveness of PjBL is higher when students are given the freedom to explore solutions and think creatively. Another trend is that collaboration in projects plays an important role in improving critical thinking. A study conducted by Barron and Darling-Hammond (2008) showed that students who worked in groups in PjBL-based projects had more developed critical thinking skills compared to students who worked individually (Komara et al., 2023).

Another emerging trend is the influence of technology in supporting the implementation of PjBL. Several recent studies show that the integration of technology in PjBL can increase learning effectiveness. For example, the use of digital platforms for research, online discussions, and creating presentations allows students to be more independent in exploring their projects. According to Tamim and Grant (2013), technology can enrich students' learning experiences by providing wider access to information sources and increasing collaboration within teams (Febrianti et al., 2023).

Although there is a lot of evidence supporting the effectiveness of PjBL, there are also several studies that show challenges in its implementation. Factors such as lack of teacher training, limited time in the curriculum, and inadequate resources often hinder the success of PjBL. Grant (2011) emphasizes that one of the main reasons why PjBL is not always successful is because many teachers are not familiar with this method and find it difficult to design and manage effective projects (Fahma et al., 2023).

Based on these findings, several recommendations are needed so that PjBL can be implemented more effectively in secondary schools. First, teachers need to be given special training regarding PjBL, starting from project design to evaluating student learning outcomes. This training must include how to structure projects that are in line with learning objectives, how to facilitate discussions that encourage critical thinking, and how to overcome challenges that may arise during the learning process (Rizmayannudin & Nuroh, 2024).

Second, support from schools and educational policies is needed to ensure that PjBL can be integrated into the curriculum effectively. Schools must provide flexibility in the allocation of learning time so that students have enough time to complete their projects (Kurniawan et al., 2024). In addition,

providing adequate resources, such as access to technology and relevant learning materials, is also an important factor in the success of PjBL.

Third, project design must consider students' cognitive levels and interests. The project given must be challenging enough but still achievable for students, and have relevance to their lives. Thus, students will be more motivated to be actively involved in the learning process and develop their critical thinking skills more effectively (Andari, 2024).

Fourth, the use of technology can be an effective strategy in supporting the implementation of PjBL. Teachers can utilize various digital platforms to provide additional learning resources, enable online collaboration, and facilitate the process of student reflection on their learning. With technological support, PjBL can become more flexible and easily accessible to students, even in distance learning conditions (Permana et al., 2023).

Overall, analysis of various studies shows that PjBL has great potential in improving secondary school students' critical thinking skills. However, in order for it to be implemented effectively, careful planning, support from various parties, and adaptation to existing challenges are needed. With the right approach, PjBL can be a learning tool that not only improves students' conceptual understanding, but also equips them with critical thinking skills that are much needed in the real world (Bandjar et al., 2024).

## CONCLUSION

Based on the literature review that has been carried out, it can be concluded that project-based learning (PjBL) has high effectiveness in improving the critical thinking skills of secondary school students. PjBL provides a deeper learning experience by emphasizing exploration, analysis and real problem solving, which encourages students to think critically at every stage of learning. Various studies show that the success of PjBL depends on several factors, such as relevant project design, active student involvement, support from teachers, and the availability of adequate resources. Apart from that, technology integration also contributes to increasing the effectiveness of PjBL by enriching access to information and increasing collaboration in learning.

Even though it has many benefits, implementing PjBL still faces several challenges, such as lack of teacher training, limited time in the curriculum, and limited resources in some schools. Therefore, appropriate strategies are needed to optimize the implementation of PjBL in secondary schools,

including training for teachers, curriculum flexibility, and the use of technology as a learning aid. With adequate support, PjBL can be an effective learning method in equipping students with critical thinking skills that are much needed in the modern era, so that they are better prepared to face the academic and work challenges of the future.

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