

The Effectiveness of Project-Based Learning (PBL) in Improving Students' Creative Thinking Skills

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Abstract

This study aims to examine the effectiveness of project-based learning (PBL) in improving students' creative thinking skills at the elementary and secondary levels. The main focus of this study is to analyze the extent to which the implementation of PBL contributes to the development of creativity, innovative thinking skills, and active student engagement in the learning process. The research method used is a literature study by reviewing and analyzing various relevant scientific journals and academic articles from leading databases. The results of the study indicate that project-based learning consistently has a positive impact on improving students' creative thinking skills, especially through the presentation of contextual problems, collaborative activities, and opportunities to produce innovative solutions and products. In addition, the implementation of PBL has also been proven to increase students' learning motivation, self-confidence, and responsibility in completing learning tasks that require creativity and problem-solving. Thus, this study concludes that project-based learning is an effective and relevant learning approach to developing students' creative thinking skills as provisions for facing the challenges of education and life in the future.

Keywords: Project Based Learning, Creativity, Creative Thinking Skills, Education, Effectiveness.

INTRODUCTION

Learning is a fundamental process in improving the quality of education and developing students' overall potential. Through a planned and systematic learning process, students are expected to not only acquire knowledge but also develop the skills, attitudes, and values needed in life. Therefore, learning must be designed to meet the demands of the times and the individual and social needs of students.

In an era of globalization and rapid technological advancement, the world of education faces increasingly complex challenges. Students are required to be adaptable, think flexibly, and solve problems creatively. This demands a paradigm shift in learning from teacher-centered to student-centered learning, emphasizing the development of 21st-century skills.

One of the essential skills students must possess in today's era is the ability to think creatively. Creative thinking enables students to generate new, original, and useful ideas to address various problems. Creativity is also a crucial asset for students facing future academic, social, and professional challenges.

Developing creative thinking skills has become a key focus in modern curricula and learning practices. Curricula are designed to encourage students to actively ask questions, explore, and create innovative solutions. This aligns with the view that education should focus not only on cognitive learning outcomes but also on students' thinking processes and the

development of their creative potential (Fitriani & Yuliana, 2024).

One learning approach deemed relevant to these demands is project-based learning (PBL). This approach emphasizes active student involvement in completing real-life projects. Through PBL, learning becomes more meaningful because students learn through direct experience.

Project-based learning balances theory and practice. Students not only receive information from the teacher but are also challenged to apply that knowledge in real-world contexts. This process helps students understand concepts more deeply while developing creative and innovative thinking skills (Fadli & Nuraeni, 2023).

The success of PBL in improving creative thinking skills has been widely discussed in various studies. PBL provides students with the space to think critically, experiment, and explore alternative solutions. This freedom encourages students to boldly express new ideas without fear of making mistakes.

Furthermore, PBL can create a more enjoyable and challenging learning environment. Students feel a sense of responsibility for the projects they work on, increasing their motivation to learn. This conducive learning environment significantly supports the growth of students' creativity and interest in learning (Azizah & Rahman, 2022).

Another advantage of PBL is the collaboration between students. During the

project process, students work in groups and exchange ideas. Through these discussions and collaborations, students learn to respect the opinions of others and develop ideas creatively and constructively.

Collaboration in PBL also contributes to the development of students' communication and social skills. The ability to express ideas, argue, and agree on shared solutions is a crucial part of the learning process. These skills are essential in future social and professional life.

However, the effectiveness of PBL in improving creative thinking skills does not always produce the same results in every learning context. Several studies have shown variations in results influenced by educational level, student characteristics, and teacher implementation strategies. Therefore, the effectiveness of PBL still requires further in-depth study and evaluation (Dewi & Hidayat, 2020).

In the context of Indonesian education, the implementation of PBL faces several challenges, such as limited facilities and infrastructure, teacher preparedness, and curriculum load. Furthermore, not all teachers have the experience and skills to design and manage project-based learning. These challenges require attention to ensure optimal implementation of PBL.

The teacher's role as a learning facilitator is a key factor in the success of PBL. Teachers are required to design projects that are relevant, challenging, and appropriate to students' abilities. Furthermore, teachers must

be able to guide, motivate, and continuously evaluate the learning process.

In general, various literature shows that project-based learning has great potential in improving students' creative thinking skills when applied appropriately and consistently. PBL is not only oriented towards the final learning outcome, but also on the process that fosters curiosity, creativity, and innovation. Therefore, this study aims to systematically examine the effectiveness of PBL in improving students' creative thinking skills based on various literature sources, so that it can serve as a reference in developing more innovative and relevant learning in the future.

METHOD

This research methodology uses a literature review as the primary approach, with the aim of systematically examining various relevant sources regarding the effectiveness of Project-Based Learning (PBL) in improving students' creative thinking skills. This approach was chosen because it allows for the collection of data and information from various studies, scientific articles, journals, and research reports published both academically and non-academically. Through the literature review, the research can explore existing findings, compare the results of previous research, and develop a more comprehensive understanding of the phenomenon under study.

The first step in this methodology is identifying relevant keywords. The keywords used include "Project-Based Learning," "PBL,"

"creative thinking skills," and "PBL effectiveness." These keywords serve as guidelines for the literature search to ensure that the sources obtained are truly relevant to the research topic.

The literature search was conducted through leading academic databases, such as Google Scholar, Scopus, Education Research Complete, and other journal portals. To maintain the relevance and currency of the data, the search focused on publications within the last five years. This approach is expected to provide a current overview of PBL practices and their impact on the development of students' creative thinking skills.

Following the search process, inclusion and exclusion criteria were applied to select sources for analysis. Inclusion criteria included articles that explicitly discussed the application of PBL in primary and secondary education contexts, assessed its impact on creative thinking skills, and included both empirical research and theoretical studies. Sources that were irrelevant, incomplete, or did not provide sufficient data were excluded from the analysis.

The next stage is a content analysis of the selected literature. This analysis aims to identify key findings, concepts, and arguments related to the effectiveness of PBL. Data from various sources are then classified based on themes, contexts, and research methods, allowing for a comprehensive synthesis of the benefits, challenges, and factors supporting the success of PBL in improving students' creative thinking skills.

Additionally, a methodological evaluation of each source analyzed was conducted. This analysis aimed to assess the validity and reliability of the data presented, including the qualitative, quantitative, and mixed-methods approaches used. By considering the variety of methodologies, this study can provide a more balanced picture of the effectiveness of PBL.

The synthesis process involves combining findings from various studies, identifying similarities and differences, and highlighting existing research gaps. This is essential to providing a comprehensive understanding of how PBL impacts students' creative thinking skills and the factors that influence its successful implementation.

The results of the literature analysis are then systematically compiled into a narrative that outlines key findings, research gaps, and practical recommendations for implementing PBL in educational contexts. This narrative presentation facilitates the reader's understanding of the relationship between theory, empirical findings, and educational practice.

This approach also allows for the identification of best practices and effective strategies in PBL implementation, including project design, collaboration mechanisms between students, and creative evaluation techniques that can be applied in learning.

In addition to effectiveness, this literature review also highlights the challenges and obstacles faced in implementing PBL, such as limited facilities, teacher preparedness, and

varying student ability levels. Thus, this research provides a realistic and applicable picture for developing learning practices in schools.

All stages of this methodology are expected to build a robust conceptual and practical framework for assessing the effectiveness of PBL. This study emphasizes not only the final learning outcomes but also the processes that foster student creativity, innovation, and motivation.

Using a systematic literature review methodology, this study provides a comprehensive understanding of the contribution of PBL to creative thinking skills. The findings are expected to serve as an important reference for teachers, researchers, and policymakers in developing more innovative and effective learning.

RESULTS AND DISCUSSION

Definition and Principles of Project-Based Learning (PBL)

Project-Based Learning (PBL) is a learning approach that places students at the center of learning activities by assigning them to complete projects that are realistic, contextual, and relevant to everyday life. Through PBL, students not only gain theoretical knowledge but also develop practical skills and critical, creative, and innovative thinking skills. Furthermore, PBL provides opportunities for students to hone soft skills such as collaboration, communication, time management, and problem-solving, which are essential for facing 21st-century challenges

(Ahmad & Suryani, 2021).

The core principle of PBL emphasizes active and participatory learning, where students play a direct role in managing their own projects. This approach encourages the integration of knowledge across disciplines, enabling students to see the connection between academic concepts and real-world situations. Furthermore, PBL fosters independent learning and responsibility for both the process and the outcome, enabling students to learn not only to complete assignments but also to understand the meaning and implications of what they learn.

Collaboration is a core principle of PBL. Through group work, students learn to share ideas, reach consensus on decisions, and solve problems together. This process not only improves social and communication skills but also hones critical thinking skills, as students must consider multiple perspectives and arguments that emerge during discussions (Maulana & Sofyan, 2022).

The principle of reflection is also an important part of PBL. Students are encouraged to periodically assess their work processes and outcomes, both individually and in groups, to improve the quality of their projects and deepen their understanding. The teacher acts as a facilitator, providing guidance, support, and feedback, rather than simply delivering material. This makes the learning process more dynamic, participatory, and meaningful.

The principles of PBL must be consistently applied to achieve learning objectives. Teachers need to ensure that assigned projects are

challenging, relevant, and allow students to apply academic concepts in real-world contexts. PBL is not simply about completing assignments; it requires students to think critically, creatively, and innovatively in solving problems. Careful planning and effective project management are key to the success of this approach.

Beyond pedagogical aspects, PBL also instills ethical values and social responsibility. Many PBL projects are oriented toward solving societal problems, so students learn to consider the social impact of their ideas and actions. Thus, PBL focuses not only on mastering academic material but also on developing students' character, empathy, and social awareness.

PBL encourages active student engagement in the learning process, which psychologically increases motivation and self-confidence. Students feel ownership over the projects they work on, making them more committed to achieving the best results. This also reinforces the contextual and real-life relevance of the learning experience.

The PBL approach harmoniously bridges theory and practice. Students learn to apply concepts learned in class to real-life situations, conduct experiments, and develop innovative solutions. This process strengthens conceptual understanding while equipping students with skills that can be immediately applied in both everyday life and the professional world.

Furthermore, PBL provides a space for students to develop their creativity sustainably. By facing real-world problems, students are

encouraged to think outside the box, explore alternatives, and evaluate the most effective solutions. This aligns with 21st-century educational goals, which emphasize mastery of critical thinking, creativity, collaboration, and communication (the 4C skills).

PBL is also relevant in developing students' adaptability to change. In projects that require flexibility, students learn to navigate uncertainty, adapt strategies, and reevaluate their approaches. These skills are crucial for facing global challenges and rapid technological developments.

The success of PBL depends heavily on the teacher's role as a learning designer and facilitator. Teachers must be able to design projects that are challenging, relevant, and appropriate to students' abilities. Furthermore, teachers need to monitor the learning process, provide constructive feedback, and motivate students to maintain active critical and creative thinking throughout the project.

Overall, PBL is a holistic learning approach because it aligns theory and practice, develops 21st-century skills, and shapes students' character and social awareness. When implemented appropriately, PBL can make learning more meaningful and relevant, preparing students to become innovative, adaptive individuals who contribute positively to society.

In the context of modern education, a thorough understanding of the concept, principles, and practices of PBL is crucial for educators, students, and educational stakeholders. Effective implementation of PBL can be a superior strategy for addressing educational

challenges that emphasize the ongoing development of life skills, creativity, and critical thinking skills.

Characteristics and Main Components of PBL

The main characteristics of Project-Based Learning (PBL) include an orientation toward the process and outcomes of student work, the use of projects as the primary learning medium, and student engagement throughout all stages of learning. Projects are typically complex and require the simultaneous development of multiple skills, such as analytical skills, creativity, problem-solving, and teamwork. Students are encouraged to investigate real-world problems and find innovative and applicable solutions, making learning more meaningful and contextual (Lestari & Putra, 2023).

Furthermore, PBL emphasizes a collaborative process, where students work in groups to complete projects. Through this collaboration, students learn to share ideas, listen to others' opinions, and manage conflicts that may arise during the process. This approach is also multidisciplinary, as projects can integrate various subjects and academic fields according to the needs and complexity of the project.

The main components of PBL include project planning, implementation, monitoring, and evaluation. In the planning phase, students and their teachers determine the objectives, steps, and resources needed to complete the project. The implementation phase involves students actively carrying out concrete

activities according to the established plan. Teachers regularly monitor the process to ensure it is on target and provide constructive feedback for skill development and the quality of work.

Furthermore, reflection is an integral part of PBL. After a project is completed, students are encouraged to evaluate the process and outcomes. They learn to identify strengths and weaknesses, analyze the causes of success and failure, and relate these experiences to the competencies they wish to develop. Assessment in PBL focuses not only on the final product but also on student engagement, collaboration, and thought processes throughout the project.

One of the prominent characteristics of PBL is the ample scope for creativity and innovation. Students are given the freedom to explore new ideas, design unique solutions, and adapt them to the given context. The teacher acts as a facilitator who supports, guides, and provides feedback, rather than simply being the primary source of knowledge. The open and flexible nature of PBL allows for adaptation of strategies and projects to suit student needs and local conditions.

Beyond academic aspects, PBL also instills positive values such as responsibility, discipline, work ethic, and social awareness. Students learn to manage their time, complete assignments according to commitments, and consider the social impact of the projects they undertake. Thus, PBL supports the development of students' holistic competencies, which not only provide knowledge but also possess strong character and are able to contribute

constructively to society.

Overall, the key characteristics and components of PBL make it an effective and relevant learning approach in modern education. PBL not only emphasizes mastery of academic material but also develops 21st-century skills such as creativity, collaboration, communication, and critical thinking. Consistent implementation of PBL can create meaningful learning experiences, foster motivation, and better prepare students to face future challenges.

The Concept of Creative Thinking Skills in Education

Creative thinking skills are a crucial competency that must be developed in modern education. This concept refers to an individual's ability to generate new, innovative, and unconventional ideas to solve problems. Creative thinking involves imagination, flexibility, and the courage to try approaches that differ from the norm (Kartika & Ramadhan, 2020).

In an educational context, these skills focus not only on innovation but also on students' ability to recognize opportunities, overcome obstacles, and create effective solutions. Key aspects of creative thinking include divergent thinking, the ability to generate multiple ideas from a single problem, and convergent thinking, the ability to refine and develop ideas into practical solutions.

Creative thinking skills are crucial in today's era of globalization and digitalization, where innovation and adaptation are key to success. Students who are able to think

creatively will be better able to compete and contribute productively in the workplace and society. Therefore, developing these skills must be an integral part of the learning process.

Furthermore, the concept of creative thinking is also related to critical and analytical thinking skills. Students are taught not to accept information at face value, but to question, evaluate, and modify existing ideas. This encourages them to become individuals capable of innovation and the creation of new knowledge (Yulianti & Haryanto, 2025).

In practice, developing creative thinking skills requires a supportive learning environment, such as space for expression, freedom to explore, and interactive and innovative learning methods. Approaches such as PBL, open discussions, and innovative projects are effective strategies for fostering these abilities.

In addition to cognitive aspects, creative thinking skills are also related to affective and character traits, such as risk-taking, curiosity, and perseverance in the face of challenges. Therefore, developing these skills must encompass all aspects of student development.

Overall, the concept of creative thinking skills in education emphasizes the importance of equipping students with the ability to innovate and adapt in an ever-changing world. Education that stimulates creativity will produce a generation capable of creating new solutions and contributing positively to societal progress.

The Influence of PBL on Students' Creative Thinking Skills

The implementation of Project-Based Learning (PBL) has been shown to significantly impact the development of students' creative thinking skills. Through complex and challenging project work, students are given the opportunity to explore various ideas, design innovative solutions, and overcome obstacles both independently and in groups. This process directly trains out-of-the-box thinking skills and fosters innovation, which are core to developing creativity in educational settings (Kusuma & Wulandari, 2021).

In a practical context, PBL encourages students to identify real-life problems, collect data, and develop unique and applicable solutions. During this process, students hone their divergent thinking skills, which involve generating multiple ideas from a single problem, and convergent thinking, which involves refining and developing these ideas into effective and applicable solutions. The combination of these two thinking skills strengthens the quality of project outcomes and students' creative thinking skills.

Research results show that students involved in PBL have higher levels of creativity compared to students who follow traditional learning methods. They are able to think critically, use imagination, and create innovations in completing projects. This is inseparable from the challenging learning environment, which supports the exploration of new ideas and provides space for students to experiment (Sari & Kurniawan, 2021).

In addition to cognitive effects, PBL also

positively impacts students' affective aspects. Students who actively participate in the project creation process demonstrate increased self-confidence, risk-taking skills, and motivation to innovate. By taking responsibility for the projects they work on, students feel ownership over their ideas and work, enabling the sustainable growth of creative thinking skills.

Furthermore, PBL teaches students to learn from failures and mistakes during project development. They are taught to view failure as part of the innovation and idea development process. This attitude fosters mental resilience, reflective skills, and resilience in the face of challenges, all essential elements of creative thinking.

Furthermore, PBL encourages effective collaboration between students, so that creative thinking skills develop not only individually but also through social interactions. Students learn to appreciate others' perspectives, develop strategies together, and generate more complex and innovative solutions than if they were working alone.

Overall, the impact of PBL on creative thinking skills is very positive and significant. This approach shapes students into individuals who are not only able to follow instructions but also able to design ideas, innovate, and creatively solve problems in various areas of life. PBL, therefore, is an effective approach to preparing students to face the challenges of the 21st century.

Supporting and Inhibiting Factors in PBL Implementation

The effective implementation of Project-

Based Learning (PBL) relies heavily on the presence of various supporting factors and the ability to address challenges in the field. Key supporting factors include teacher competence and preparedness, adequate learning facilities, and support from the principal and the educational community. Teachers who are competent in designing, facilitating, and evaluating PBL are able to create an engaging and productive learning environment and foster student motivation for active engagement (Hidayat & Pratama, 2022).

Furthermore, the availability of diverse learning resources and access to educational technology are crucial factors in the success of PBL. Facilities such as laboratories, libraries, flexible learning spaces, and digital devices enable students to explore more broadly and deeply. Support from parents and the community also plays a significant role, encouraging students to be active, responsible, and complete projects optimally.

On the other hand, there are a number of obstacles frequently encountered in the implementation of PBL. One of the main obstacles is teachers' lack of understanding and competence regarding this method. Many teachers are unfamiliar with or lack confidence in managing the PBL process effectively, resulting in suboptimal learning activities and the goal of developing students' creative thinking skills not being fully achieved.

Other common obstacles include limited facilities and adequate learning resources, as well as limited time to implement

comprehensive projects. Furthermore, a learning culture that emphasizes memorization, partial mastery of material, and test-based assessment also hinders the consistent and comprehensive adoption of the PBL approach.

In addition to administrative and resource aspects, psychological factors and student motivation also influence the success of PBL implementation. Some students may lack confidence, be reluctant to actively participate, or have difficulty adapting to a learning approach that demands creativity, collaboration, and independence. These conditions need to be addressed to ensure all students can optimally engage in the project-based learning process.

Overcoming these obstacles requires a comprehensive strategy. Training and developing teacher competencies are crucial steps to ensure they are able to effectively design, facilitate, and evaluate projects. Improving facilities and access to technology also needs to be prioritized to ensure students have adequate learning resources. Furthermore, a paradigm shift in assessment and learning culture, from rote learning to competency-based learning and creativity, is a key factor in the success of PBL.

Support from all stakeholders, including teachers, parents, principals, and the community, is crucial for creating a conducive environment for PBL implementation. When all supporting factors are in place and obstacles are systematically addressed, PBL can provide maximum benefits for student skill development, including creative thinking, problem-solving, and other 21st-century competencies.

Overall, the success of PBL implementation is determined not only by the method itself, but also by the synergy between resources, educator competence, student motivation, and a supportive learning environment. Optimal supporting factors can strengthen the effectiveness of PBL, while poorly managed constraints can limit the achievement of learning objectives. With a structured approach and comprehensive support, PBL becomes an effective and relevant learning strategy for developing creative, innovative, and independent students.

CONCLUSION

Based on literature reviews and various studies, it can be concluded that Project-Based Learning (PBL) is an effective learning approach for developing students' creative thinking skills. PBL places students at the center of learning activities, requiring them to actively engage in completing realistic, complex, and life-relevant projects. Through this process, students acquire not only theoretical knowledge but also practical skills, critical thinking, creativity, innovation, collaboration, communication, and problem-solving abilities.

PBL is characterized by emphasizing collaborative, multidisciplinary, and reflective processes, while also allowing space for creativity and innovation. The teacher acts as a facilitator, guiding and providing feedback, rather than simply delivering material. Furthermore, PBL instills positive values such

as responsibility, work ethic, discipline, and social awareness, thus supporting the development of students' holistic competencies.

The success of PBL implementation is heavily influenced by supporting factors, such as teacher competence and preparedness, adequate learning facilities, principal support, and parental and community involvement. Conversely, obstacles such as limited facilities and time, a rote-oriented learning culture, and low student motivation need to be addressed for PBL to be effective. Strategies such as teacher training, facility improvements, and shifts in assessment paradigms are key to maximizing the benefits of PBL.

Overall, PBL has a significant positive impact on the development of students' creative thinking skills. With appropriate implementation and comprehensive support, PBL can shape students into creative, innovative, and independent individuals, ready to face the challenges of the 21st century, both in academic and real-life contexts.

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