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Project Based Learning Evaluation in Developing Student Creative

Meike Imbar
Fakultas Ilmu Sosial dan Hukum, Universitas Negeri Manado
Email: meikeimbar01@gmail.com

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ABSTRACT

This study aims to analyze the evaluation of project-based learning in developing student creativity through a comprehensive literature review. The research method uses a qualitative approach with a type of literature study, involving a systematic analysis of various academic sources relevant to project-based learning and the development of student creativity. Data collection techniques are carried out through documentation studies by reviewing journal articles, reference books, and scientific publications that can be accessed through academic databases. Data analysis uses thematic analysis techniques that include data reduction, data presentation, and drawing conclusions with source triangulation to ensure the validity and reliability of the findings. The results of the study indicate that project-based learning has significant effectiveness in improving student creativity, with an increase of up to 25% compared to conventional learning. This learning successfully develops various dimensions of creativity holistically, including originality, flexibility of thinking, elaboration, and sensitivity to problems. Effective evaluation strategies include the use of a multi-dimensional creativity rubric, portfolio assessment, peer assessment, and self-reflection that provide a comprehensive approach to measuring the development of student creativity. This study contributes to the development of a project-based learning evaluation framework that can optimize the development of student creativity in the context of 21st-century education.

Corresponding Author:
Meike Imbar
Fakultas Ilmu Sosial dan Hukum, Universitas Negeri Manado
Jl. Unima, Tounsaru, Kec. Tondano Sel., Kabupaten Minahasa, Sulawesi Utara
Email: meikeimbar01@gmail.com

1. Introduction

Project-Based Learning (PjBL) has become a pedagogical approach that has received widespread attention in contemporary education. This learning model emphasizes projects or activities as the core of learning, allowing students to explore, evaluate, interpret, and synthesize (Dewi, 2022). This approach provides opportunities for students to actively engage in designing learning objectives to produce tangible products or projects (Sutirman, 2013). In the context of developing creativity, project-based learning holds enormous potential because it provides a space for students to express original and innovative ideas through collaborative problem-solving.

Creativity is a crucial 21st-century skill to develop in modern education systems. Creativity is not only related to artistic aspects but also encompasses critical thinking, problem-solving, and innovation skills needed by students to face future challenges. Mangangantung, Pantudai, and Rawis (2023) explain that implementing the project-based

learning model can improve students' creativity and science learning outcomes. This demonstrates that project-based learning has a significant positive impact on the development of student creativity in various subjects.

The implementation of project-based learning in the Indonesian education system has experienced rapid acceleration, particularly following the implementation of the Independent Curriculum (Curriculum Merdeka), which emphasizes strengthening the Pancasila Student Profile. This learning model is highly aligned with the characteristics of education that prioritizes active, collaborative, and contextual learning. Fahrezi, Taufiq, Akhwani, and Nafia'ah (2020) conducted a meta-analysis of the project-based learning model, which showed that PjBL has a positive effect on student learning outcomes. However, a specific evaluation of the effectiveness of project-based learning in developing student creativity still requires more in-depth and comprehensive study.

Previous studies have shown that project-based learning contributes significantly to the development of various aspects of student learning. Ingtiyasningsih (2022) demonstrated that the project-based learning model is effective in increasing creativity in fifth-grade students' water cycle material at Kepatihan State Elementary School. Furthermore, research conducted by a research team at Sariharjo Elementary School demonstrated that the Project-Based Learning model can be used to increase learning interest and creativity in fifth-grade students (Autentik Jurnal, 2022). The results of this study strongly indicate that project-based learning has significant potential for developing student creativity.

The collaborative process characteristic of project-based learning enables students to develop critical thinking, problem-solving skills, and innovation skills. Azaria (2020) suggests that student creativity can be enhanced through project-based learning models in fourth grade. Collaboration among students in completing authentic projects provides opportunities to exchange ideas, share perspectives, and generate creative solutions that might not be possible individually. This process develops not only cognitive aspects but also affective and psychomotor aspects, contributing to the holistic development of creativity.

The evaluation aspect of project-based learning is a crucial component in ensuring the effectiveness of this learning model in developing student creativity. Evaluation focuses not only on the final project outcome but also on the learning process, collaboration, problem-solving, and innovation undertaken by students. Febriani (2023) in her research on Project-Based Learning in enhancing student creativity at the Al Azhar Syifa Budi Junior High School in Cibinong, Bogor, demonstrated the importance of comprehensive evaluation to measure the level of creativity achieved by students. Appropriate evaluation will provide constructive feedback for the development of more effective project-based learning.

Developing valid and reliable evaluation instruments to measure student creativity in the context of project-based learning presents a unique challenge for educators and researchers. Imania (2021), in her study on project-based learning management in developing creativity, emphasized the importance of a holistic and authentic evaluation approach. Evaluation instruments must be able to measure various dimensions of creativity, from originality of ideas, flexibility of thinking, elaboration of ideas, to synthesis and analysis skills. Furthermore, evaluations should also consider aspects of the creative process The students' work is not just about the final product or project.

The context of project-based learning in developing student creativity also requires consideration of supporting and inhibiting factors for its implementation. Martati (2022), in

a conference on the application of Project-Based Learning in elementary schools, identified various factors influencing the success of Project-Based Learning (PjBL) implementation. These factors include teacher readiness to design and facilitate project-based learning, the availability of resources and infrastructure, school management support, and student readiness to face more complex and challenging learning challenges compared to conventional learning.

Several previous studies have made important contributions to understanding the relationship between project-based learning and the development of student creativity. Nahdiah and Handayani (2021) conducted a study on the effect of the Project-Based Learning model, supported by Google Meet, on students' creative thinking skills. The results showed that implementing Project-Based Learning (PjBL) with the assistance of digital technology can significantly improve students' creative thinking skills. This research emphasizes that the integration of technology in project-based learning not only provides ease of access but also expands students' creativity through various available digital tools. These findings suggest that adapting project-based learning with digital technology can be an effective strategy for developing student creativity, especially in today's era of digitalized education.

Setiawan et al. (2020), in their study on enhancing student creativity in thematic learning using a project-based learning approach, provides another perspective on the implementation of Project-Based Learning (PjBL). This study, conducted using a classroom action research approach, demonstrated that the application of PjBL in thematic learning can enhance student creativity through active engagement in projects integrated across subjects. The results showed significant improvements in creativity indicators such as originality, flexibility, and elaboration. This study also identified that project-based thematic learning provides a more meaningful context for students to develop creativity because they can see the connections between concepts and apply them in real-life projects relevant to everyday life.

Although various studies have demonstrated the effectiveness of project-based learning in developing student creativity, there remains a research gap that needs to be addressed. Most existing research focuses on the implementation of PjBL in general and its impact on learning outcomes, but specific and in-depth evaluations of the dimensions of creativity developed through project-based learning are limited. Previous studies have tended to use creativity evaluation instruments that are still general and not specific to the context of project-based learning. Furthermore, most studies were conducted over a relatively short period of time, thus failing to capture the long-term development of student creativity. This limitation highlights the need to develop more comprehensive evaluation instruments and longitudinal research to understand patterns of student creativity development through project-based learning.

Another gap lies in the lack of research exploring contextual factors that influence the effectiveness of project-based learning in developing student creativity. Previous studies have not examined how student characteristics, teacher teaching styles, school culture, and socioeconomic conditions influence project-based learning outcomes in developing creativity. Furthermore, there is limited research comparing the effectiveness of various evaluation models in measuring student creativity in the context of project-based learning. This research gap highlights the need for more comprehensive studies to develop a project-

based learning evaluation framework that can optimize student creativity development according to diverse contexts and characteristics.

The novelty of this research lies in the development of a comprehensive evaluation framework for project-based learning that specifically focuses on student creativity development. Unlike previous studies that tended to use a general evaluation approach, this study will integrate multiple assessment approaches that include creative process evaluation, creative product evaluation, and long-term impact evaluation on students' creative abilities. This framework will combine various evaluation techniques, such as project-based creativity rubrics, portfolio assessments, peer assessments, self-reflection, and digital documentation, to provide a holistic picture of student creativity development. This innovation is expected to make a significant contribution to the field of learning evaluation and student creativity development.

Another innovative aspect is the integration of digital technology into the project-based learning evaluation process to foster student creativity. This research will explore the use of digital platforms, artificial intelligence, and learning analytics to track and assess student creativity development in real time and continuously. This approach will enable teachers to obtain more accurate and comprehensive data on student creativity progress and provide more targeted and personalized feedback. Furthermore, this research will develop an adaptive evaluation model that can adapt to individual student characteristics and needs, ensuring each student receives an optimal evaluation experience to develop their creative potential through project-based learning.

The reality of implementing project-based learning evaluations to develop student creativity in the field demonstrates various challenges and complexities that must be overcome. Based on observations and field studies, many teachers still experience difficulties in designing and implementing appropriate evaluations to measure student creativity in the context of project-based learning. These limitations are caused by several factors, including teachers' lack of understanding of the dimensions of creativity that need to be evaluated, limited time for comprehensive assessments, and a lack of valid and practical evaluation instruments. Furthermore, differences in student characteristics, the level of school technology readiness, and management support also influence the effectiveness of project-based learning evaluation in developing student creativity.

Real-world conditions also indicate that the implementation of project-based learning to develop student creativity still faces various structural and cultural barriers. Evaluation systems that still focus on cognitive aspects and final learning outcomes tend to lead teachers to overlook the creative process students undertake during project completion. School cultures that still prioritize standardized tests and achievement-oriented learning also pose challenges to implementing more holistic and authentic creativity evaluation. Furthermore, limited resources, both in terms of facilities and teacher competency, prevent the effective implementation of project-based learning evaluation from being optimal. This reality demonstrates the need for a more systematic and sustainable approach to improving the quality of project-based learning evaluation in developing student creativity.

2. Method

This research uses a qualitative approach with a literature review to analyze the evaluation of project-based learning in developing student creativity. A qualitative approach

was chosen because it can provide an in-depth understanding of the phenomenon of project-based learning evaluation through the exploration of various perspectives and previous research findings. As explained by Ummaspul (2020), the qualitative literature review method is an appropriate approach for examining educational phenomena through in-depth analysis of various relevant literature sources. This research relies on primary sources such as research journals, scientific articles, books, and other academic publications related to project-based learning and the development of student creativity.

The data collection technique in this study was conducted through documentation studies, reviewing various literature sources relevant to the topic of project-based learning evaluation in developing student creativity. The data sources used include national and international journal articles, reference books, previous research results, and other scientific publications accessible through academic databases such as Google Scholar, ResearchGate, and e-journal portals. As stated in the research team's study on the development of qualitative research (2024), a qualitative method with a literature review type can address the researcher's problems through various literature reviews such as books, research articles, and other sources. The data collection process was conducted systematically using specific keywords relevant to the research focus.

The data analysis in this study employed thematic analysis techniques, which included data reduction, data presentation, and conclusion drawing. The analysis process began with identifying and categorizing various research findings relevant to project-based learning evaluation and student creativity development. Data reduction techniques were implemented by sorting and selecting the most relevant and significant information to answer the research questions. Maharani (2022), in her book on qualitative research methodology, explains that qualitative data analysis requires a systematic process to organize and interpret data in depth. Following the data reduction process, the data were presented in the form of categorizations of findings based on the main themes emerging from the literature analysis.

The validity and reliability of the data in this literature study were ensured through source triangulation, which involved using multiple sources from various credible, peer-reviewed studies and publications. The validation process involved comparing findings from various literature sources to ensure the consistency and accuracy of the information obtained. As explained in the study on developing critical and creative skills through problem-based education (2023), qualitative research adopts a methodology that utilizes observation, interviews, and document analysis to collect valid and reliable data. In the context of a literature review, validation is carried out by cross-checking information from various sources and ensuring that the sources used have high academic credibility.

Limitations of this literature review include its dependence on the availability of relevant literature and limited access to some data sources, which may not be freely accessible. Furthermore, the analysis is interpretive based on existing literature, thus not involving direct empirical data from the field. Nevertheless, the literature review approach offers advantages in terms of comprehensive analysis and the ability to synthesize various research findings from a broad time period. This study also adopted a systematic review approach to ensure that the literature selection and analysis were conducted objectively and systematically, thus producing valid and reliable conclusions for developing project-based learning evaluations for developing student creativity.

3. Result and Discussion

a. Result

1) The Effectiveness of Project-Based Learning Models in Enhancing Student Creativity

Based on the results of a literature analysis, it was found that project-based learning models are significantly effective in enhancing student creativity. Research conducted by Ingtiyasningsih (2022) showed that the average creativity score in the experimental class using the project-based learning model was 88, while the average score in the control class was 66. These findings indicate that project-based learning can increase student creativity by up to 25% compared to conventional learning. These research findings are supported by the findings of Mangangantung et al. (2023), who showed that the first cycle of research achieved a student creativity score of 50.7%, which increased to 89.4% in the second cycle, indicating a consistent and significant increase in student creativity development.

A more in-depth analysis shows that the effectiveness of project-based learning in enhancing student creativity is manifested in various aspects of creativity. Research conducted by a research team on evaluating the effectiveness of project-based learning methods (2024) revealed that project-based learning methods significantly increased student creativity in various aspects, including originality of ideas, flexibility of thinking, and elaboration of ideas. The collaborative process of completing projects allows students to develop critical thinking, problem-solving, and innovation skills, which are essential components of creativity. These findings indicate that project-based learning not only increases creativity scores quantitatively but also develops the dimensions of creativity holistically.

Literature studies also reveal that the effectiveness of project-based learning in enhancing student creativity varies by educational level and subject matter. Research at the elementary school level has shown very positive results, as reported in a study on improving student creativity and learning outcomes through the project-based learning model (2019), which showed an increase in average student creativity from baseline or pre-cycle levels. Meanwhile, research at the junior high school level on the effect of the project-based learning model on creative thinking skills (2021) showed that this learning model aligns with creativity goals and the independent curriculum, as students accept project-based learning as a learning model that helps them develop their creativity.

Factors contributing to the effectiveness of project-based learning in enhancing student creativity include active student engagement in the learning process, the presence of authentic challenges requiring creative solutions, and opportunities to collaborate with peers. Literature analysis shows that project-based learning provides a meaningful context for students to explore various possible solutions, experiment with new ideas, and develop original products or works. The reflection process that is an integral part of project-based learning also contributes to the development of students' metacognition, which is an important aspect in developing creativity. These findings suggest that the effectiveness of project-based learning in enhancing student creativity depends not only on the implementation of the learning model alone, but also on the quality of the project design, teacher facilitation, and active student engagement in the learning process.

2) Dimensions of Creativity Developed through Project-Based Learning

The results of the literature analysis reveal that project-based learning comprehensively develops various dimensions of student creativity. The first dimension that develops significantly is originality, namely students' ability to generate new and unique ideas. Research conducted by Hartono (2018) on Project-Based Learning (PjBL) to enhance student creativity shows that the project-based learning model plays a crucial role in enhancing creativity by developing the ability to generate original solutions. Students involved in project-based learning tend to develop divergent thinking, enabling them to explore various alternative, unconventional solutions. The brainstorming process and group discussions in project-based learning provide a stimulus for students to generate fresh and innovative ideas.

The second dimension developed through project-based learning is flexibility of thinking, namely students' ability to adapt to changing situations and view problems from multiple perspectives. Research findings indicate that students participating in project-based learning demonstrate significant improvements in their ability to switch cognitive sets and use various problem-solving strategies. Research on the application of project-based learning to enhance creativity in elementary school students (2023) revealed that students involved in authentic projects develop the ability to adapt their approaches when faced with unexpected obstacles or challenges. This flexibility of thinking is also reflected in students' ability to integrate knowledge from various disciplines in completing their projects.

Elaboration is the third dimension of creativity that develops prominently through project-based learning. Elaboration refers to students' ability to develop and expand basic ideas into more detailed and sophisticated concepts. Research results indicate that the iterative process in project-based learning, which involves planning, implementation, evaluation, and revision, provides opportunities for students to continuously develop and refine their ideas. Students learn not only to generate initial ideas but also to develop them into comprehensive and well-thought-out solutions. This elaboration process is reinforced by feedback from teachers and peers, which helps students continuously refine and improve their creative outputs.

The fourth dimension that develops is problem sensitivity, namely the ability to identify problems that need to be solved or areas that need improvement. Project-based learning, which focuses on authentic problem-solving, provides opportunities for students to develop sensitivity to real-world issues and identify gaps or unmet needs. Research shows that students involved in project-based learning demonstrate improvements in problem identification and definition skills. They become more aware of their surroundings and are able to identify opportunities for improvement or innovation. Developing this sensitivity to problems also contributes to the development of students' entrepreneurial mindset and social awareness, which are important aspects of creativity in the 21st-century context.

3) Creativity Evaluation Strategies in Project-Based Learning

A literature analysis reveals various evaluation strategies that can be used to measure student creativity in the context of project-based learning. The first strategy is the use of a comprehensive and multidimensional creativity rubric. Research shows that an effective rubric for evaluating creativity in project-based learning must include clear criteria for

measuring originality, flexibility, elaboration, and fluency. The rubric should not only assess the final project product but also consider the creative process undertaken by students during the project. Ingtiyasningsih (2022) in her research used a combination of observation, testing, and documentation methods to collect data on student creativity, demonstrating the importance of multiple assessment approaches in creativity evaluation.

Portfolio assessment is a second evaluation strategy proven effective in measuring student creativity development through project-based learning. Portfolios provide comprehensive documentation of students' creative journeys, from idea generation to final product implementation. Through portfolios, teachers can observe the evolution of students' thinking and creative development processes. Research shows that portfolio assessments not only provide evidence of creative outcomes but also insight into students' creative processes, reflection, and self-assessment. Digital portfolios integrated with technology can provide richer and more interactive documentation, allowing students to include multimedia elements that more comprehensively document their creative process.

Peer assessment and collaborative evaluation are the third strategy that provides a unique perspective in evaluating creativity. Research shows that students often gain valuable insights into the creativity of their peers, especially in the context of collaborative projects. Peer assessment allows students to develop critical thinking skills and appreciate the creative work of others. Furthermore, the peer evaluation process also provides multiple perspectives on the quality and creativity of project outcomes. Collaborative evaluations involving students, teachers, and even external evaluators can provide a more comprehensive and fair holistic assessment of student creativity in project-based learning.

Self-reflection and metacognitive assessment are the fourth evaluation strategy that is crucial in measuring student creativity. Research shows that students' ability to reflect on their own creative process is an important indicator of creative development. Self-reflection allows students to identify strengths and areas for improvement in their creative processes. Metacognitive assessments, which involve students evaluating their own creative thinking processes, can provide valuable insights into how students approach creative challenges and how they can improve their creative performance. The use of reflection journals, self-assessment rubrics, and guided reflection questions can facilitate the development of metacognitive awareness that contributes to students' long-term creative development in project-based learning.

b. Discussion

1) The Effectiveness of Project-Based Learning Models in Enhancing Student Creativity

Research findings demonstrating the effectiveness of project-based learning in enhancing student creativity can be explained through the perspective of constructivism theory developed by Vygotsky. Vygotsky's constructivism theory emphasizes the importance of social interaction and collaboration in developing student cognition (Detik, 2023). In the context of project-based learning, students actively engage in the process of constructing knowledge through interactions with peers and the learning environment. These constructivist principles are highly relevant to project-based learning because they provide a stimulating, dynamic, and relevant learning environment for students to develop their

creativity (Gramedia Literasi, 2024). This theory explains why project-based learning can lead to up to a 25% increase in creativity compared to conventional learning, as students do not simply passively receive knowledge but actively construct understanding through exploration and experimentation.

The concept of the Zone of Proximal Development (ZPD), part of Vygotsky's theory, provides a strong theoretical foundation for understanding how project-based learning can optimize the development of student creativity. The ZPD refers to the distance between the actual developmental level demonstrated by independent problem-solving ability and the potential developmental level that can be achieved through problem-solving with adult assistance or collaboration with more capable peers (Gramedia Literasi, 2024). In project-based learning, teachers act as facilitators, helping students reach their maximum creative potential through appropriate scaffolding. Vygotsky's theory explains that children's cognitive development is influenced by parenting, education, and the environment in which they grow up. This, in the context of project-based learning, is manifested through the design of authentic and meaningful projects.

Constructivist learning theory, pioneered by Jean Piaget and Lev Vygotsky, provides the understanding that students do not simply receive knowledge from outside sources but actively construct understanding through interactions with their environment (Universitas Medan Area, 2024). The implementation of project-based learning aligns with the principles of constructivism, which emphasize students' active role in constructing their own knowledge. In the context of the Independent Learning Curriculum, constructivism serves as the philosophical foundation supporting the implementation of project-based learning to develop student creativity. This theory explains that students learn something by doing it themselves, asking questions, thinking, and experimenting, which is the essence of project-based learning that encourages students to become active and creative learners.

2) Dimensions of Creativity Developed through Project-Based Learning

The development of creativity through project-based learning can be understood through Guilford's creativity theory, which distinguishes between convergent and divergent thinking. Guilford explains that creativity is an inherent ability or skill, closely related to talent and divergent thinking skills (Psiko21, 2024). Guilford's Intellectual Structure Theory explains that creativity is related to divergent thinking, namely the ability to generate multiple alternative answers or solutions to a problem. In project-based learning, students are faced with authentic problems that require divergent thinking to generate creative and innovative solutions. This theory explains why project-based learning is effective in developing originality, flexibility, and elaboration, the key dimensions of creativity.

Torrance's creativity theory provides an additional perspective in understanding the development of creativity through project-based learning. Torrance discusses the creative process as the ability to understand problems, formulate new hypotheses, test them, and develop original solutions (Scribd, 2024). The Divergence and Convergence Theory, developed by Guilford and E. Paul Torrance, separates creativity into two types of thinking: divergent (the ability to generate many ideas) and convergent (the ability to select the best idea). In the context of project-based learning, students first use divergent thinking to generate various ideas and alternative solutions, then use convergent thinking to evaluate

and select the best solution to implement in their projects. This process explains how project-based learning can develop both aspects of creative thinking in a balanced way.

The reality of learning in schools, which emphasizes "convergent" thinking and a single correct answer to given questions, means that "divergent" and other creative thinking processes are rarely practiced (UPI, 2024). This aligns with Guilford's criticism in his inaugural address as President of the American Psychological Association that college graduates are quite capable of performing routine tasks but lack creative thinking skills. Project-based learning offers a solution to this problem because it provides students with opportunities to develop creative thinking skills through challenging and meaningful projects. Albert Bandura's Social-Cognitive Theory, which argues that creativity can be influenced by social and environmental factors, such as support from others and learning through observation, also supports the effectiveness of project-based learning in developing creativity through collaboration and social interaction.

3) Creativity Evaluation Strategies in Project-Based Learning

The development of creativity evaluation strategies in project-based learning can be understood through authentic evaluation theory, which emphasizes holistic and contextual assessment. Constructivism theory provides the foundation for developing evaluations that focus not only on final results but also on the learning process. From a constructivist perspective, evaluations must be able to measure how students construct knowledge and develop creativity through interactions with the learning environment. The use of multiple assessment approaches, including creativity rubrics, portfolio assessments, peer assessments, and self-reflection, aligns with constructivist principles that emphasize student-centered learning. This theory explains why creativity evaluation requires a comprehensive and multidimensional approach to accurately measure various aspects of creativity.

Vygotsky's social learning theory provides theoretical justification for the use of peer assessment and collaborative evaluation in measuring student creativity. The concept of scaffolding in Vygotsky's theory explains that learning occurs through social interaction and assistance from more competent others. In the context of creativity evaluation, peer assessment allows students to learn from the perspective of their peers and develop critical thinking skills through the process of evaluating the creative work of others. The Zone of Proximal Development theory is also relevant in this context because peer assessment can help students achieve higher levels of creativity through feedback and insights from peers. This collaborative evaluation approach not only measures creativity but also develops students' ability to provide constructive feedback and accept criticism for improvement.

Metacognition theory provides the foundation for the use of self-reflection and metacognitive assessment in creativity assessment. Metacognition refers to an individual's ability to recognize and regulate their own thinking processes, which is a crucial aspect of long-term creativity development. In project-based learning, self-reflection allows students to develop awareness of their creative process and identify effective strategies to enhance creativity. This theory explains why metacognitive assessment is an important evaluation strategy because it not only measures creative output but also develops students' abilities to become independent and reflective learners. Portfolio assessments integrated with reflection journals and self-assessment rubrics provide a platform for developing students'

metacognition in the context of creativity, in line with the principle of lifelong learning, which emphasizes the ability to continuously learn and develop independently.

4. Conclusion

Based on the results of the literature analysis, it can be concluded that project-based learning evaluation is significantly effective in developing student creativity. Key findings indicate that implementing a project-based learning model can increase student creativity by up to 25% compared to conventional learning, with consistent improvement from 50.7% in the first cycle to 89.4% in the second cycle. Project-based learning has proven effective in holistically developing various dimensions of creativity, including originality, flexibility of thinking, elaboration, and sensitivity to problems. A comprehensive evaluation strategy, which includes a multidimensional creativity rubric, portfolio assessment, peer assessment, and self-reflection, provides a holistic approach to measuring student creativity development in the context of project-based learning.

The implications of this research indicate that project-based learning evaluation requires a systematic and sustainable approach to optimize student creativity development. The integration of Vygotsky's constructivism theory, Guilford and Torrance's creativity theory, and metacognition theory in the design of project-based learning evaluations provides a strong theoretical foundation for developing an effective evaluation framework. Recommendations for further research include the development of more specific and adaptive evaluation instruments, longitudinal research to measure the long-term impact of project-based learning on student creativity, and exploring the integration of digital technology into the evaluation process to improve the accuracy and efficiency of creativity measurement. This research contributes to the development of more effective learning evaluation practices in developing student creativity through project-based learning.

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