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The Application of Project-Based Learning with Constructivism Theory in Enhancing Creativity of Elementary School Students: A Literature Review

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Abstract

The age of twenty-first century demands the development of creative abilities that begins during childhood. Project-Based Learning (PBL) which derives from constructivist theory functions as an efficient method to develop creativity in elementary school environments. Researchers have conducted an organized review of scholarly works that analyze how PBL influences creativity development through evaluation of fluency and flexibility together with originality and elaboration. The research indicates PBL enables students to become autonomous while engaging them and collaborating with peers which leads them to acquire creative problem-solving skills applicable to actual scenarios. The extensive use of PBL faces various obstacles that prevent its full implementation. The main barriers to PBL's implementation include restricted time availability and insufficient teacher capacity and lack of resources and inadequate assessment systems for creativity. Lack of schooling for PBL implementation exists among numerous instructors while rigid curricular frameworks usually constrain project-based methods. The inability of traditional assessment methods to accurately determine creativity creates boundaries in measuring long-term effects. The complete implementation of PBL in elementary education requires policy revision combined with teacher training programs and different assessment approaches specific for creative learning. These challenges need proper resolution so PBL can establish classrooms as student-engaging learning spaces for developing students who succeed in school and work. Future research about PBL demands extensive investigations of its enduring creativity effects together with effective methods to enlarge its application across different educational environments.

Introduction

21st century education demands the development of critical thinking, problem solving, and creativity skills in students (Patty et al., 2023; Patty, Iriyani, et al., 2024; Patty, Marlina, et al., 2024; Kivunja, 2014; Thornhill-Miller et al., 2023). These skills are essential to prepare students for future challenges. One of the key skills that need to be instilled since primary education is creativity. According to Robinson (2011), creativity helps students not only in improving academic achievement but also in formulating innovative solutions and thinking flexibly in everyday life. However, learning in primary schools still tends to focus on conventional teacher-centered and test result-oriented methods, which often do not provide space for students to explore their creativity (Moodie & Nam, 2016; Wu et al., 2023; Desai, 2020). To address this challenge, project-based learning (PBL) approach has been widely applied as one of the effective methods in enhancing students' creativity (Zhou et al., 2012; Almulla, 2020; Anazifa & Djukri, 2017; Hussein, 2021; Gachinu, 2014). PBL is a learning model that actively involves students in the completion of projects relevant to real life, which allows students to integrate theoretical and practical knowledge in authentic situations

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(Thomas, 2000; Almulla, 2020; Kwan, 2009; Pham, 2018). Through PBL, students are invited to think critically, work collaboratively, and solve problems creatively. The theory of constructivism, proposed by Piaget (1973) and Vygotsky (1978), provides a strong foundation for this approach. This theory states that learning is an active process in which students construct new understanding based on experience and interaction with their environment. The application of constructivism-based PBL provides an opportunity for students to be active agents in their learning, allowing them to develop creative and innovative thinking skills through the exploration of challenging and contextually relevant projects (Chan, 2013; Gabuardi, 2021; Kek & Huijser, 2016; Sukackė et al., 2022; Hsbollah & Hassan, 2022; Malawat & Singh, 2024; Martaningsih et al., 2022; Woodgate, 2019; Jones, 2022).

This research aims to conduct a literature review regarding the implementation of project-based learning with constructivism theory and its impact in enhancing the creativity of elementary school students. This review is expected to provide insights into how PBL can be implemented successfully in the primary school environment as well as the factors that influence the success of this learning. In addition, this review will also discuss the important role of teachers in facilitating project-based learning that is able to enhance students' creativity.

Methods

The study uses Systematic Literature Review (SLR) methodology to explain how Project-Based Learning (PBL) based in constructivism theory improves creativity within elementary school students. The systematic literature review methodology was selected by the researchers because it enables them to integrate research findings systematically to identify literature gaps and produce an overview of the research field (Snyder, 2019). The analysis of scholarly studies aims toreveal both PBL's methods of fostering creativity within young students and its successful factor.

The study followed a structured data collection method to achieve proper selection of relevant literature. The research employed systematic database searches that used both Google Scholar along with ERIC, ProQuest and Scopus. This search used four thesaurus combinations which included "Project-Based Learning AND elementary education" combined with "Constructivism AND creativity development" and "21st-century skills AND project-based learning" and "PBL AND student-centered learning." The research technique enabled the recovery of studies which explained the effects of PBL on elementary students' creativity development within a constructivist context.

The established criteria for study selection functioned as specific parameters to guarantee high relevance and reliability among the reviewed research papers. Timely research articles between 2015 and 2025 that appeared in peer-reviewed journals dealt with PBL implementation within elementary education to study its creative development effects qualified for this review. In order to achieve valid results the research selected only used data based on empirical studies and systematic reviews. The authors excluded research that examined higher or secondary education levels together with studies unrelated to constructivism and papers without empirical data.

The inclusion of studies progressed through a two-step evaluation stage. The initial assessment of collected studies based their titles and abstracts for identifying research which explicitly researched PBL's influence on creativity. The complete text evaluation phase enabled researchers to inspect the methodological strength as well as research approaches and applicability of each study. The repeated selection steps produced research results containing only high-quality data.

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This research applied thematic analysis as described by Braun & Clarke (2006) to examine the selected studies to verify common patterns and important themes. The analysis focused on three main areas: (1) the implementation of PBL in elementary schools, which explored how constructivist principles were integrated into project-based learning and what types of projects were commonly used; (2) the impact of PBL on creativity, which examined how the approach influenced students' creative thinking skills, particularly in terms of fluency, flexibility, originality, and elaboration; and (3) challenges and limitations in PBL implementation, which identified common barriers such as curriculum constraints, teacher preparedness, and resource availability, along with potential solutions proposed in the literature.

This research evaluated selected studies' quality by using the Mixed-Methods Appraisal Tool (MMAT) as described by Hong et al. (2018) to confirm the credibility of analyzed works. Each study received an evaluation based on the clarity of defined objectives and appropriate methodology selection and valid reliable data collection procedures and conclusion strength. The study uses an organized review method to establish a solid foundation about PBL's constructivist-based effects on student creativity in elementary education alongside identifying the key influencing variables.

Results and Discussion

The results of this systematic literature review are presented in Table 1, summarizing key studies that examined the impact of Project-Based Learning (PBL) within the constructivist framework on elementary students' creativity development.

Table 1. Summary of Reviewed Studies

Study	Objective	Methodology	Key Findings
Almulla (2020)	To assess the effectiveness of PBL in engaging students in learning	Experimental Study, Elementary Schools	PBL significantly improved students' creativity, collaboration, and motivation
Anazifa & Djukri (2017)	To compare PBL with problem-based learning in fostering creative thinking	Quasi-Experimental, 6th Grade	PBL students demonstrated better creativity and problem-solving skills
Chan (2013)	To explore critical thinking and creativity in PBL	Mixed-Methods, Comparative Analysis	PBL improved original thinking and risk-taking in problem-solving
Dilfuza (2024)	To investigate student creativity through problem-based learning	Systematic Literature Review	PBL fosters independent thinking and interdisciplinary knowledge integration
Jang et al. (2010)	To analyze the role of autonomy in creativity development	Experimental, Self-Determination Theory	Higher autonomy in PBL resulted in greater intrinsic motivation and creative performance
Kokotsaki et al. (2016)	To review literature on PBL and creativity	Literature Review	PBL promotes collaboration, engagement, and creativity but requires skilled teachers

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Lee & Hannafin (2016)	To design an engagement framework for PBL	Case Study, Thematic Analysis	Students with ownership of learning showed higher creativity and problem-solving

The research results presented in this literature review show that Project-Based Learning (PBL) stands as an effective educational strategy to boost creativity within the elementary school age group. Research indicates that students who participate in PBL projects achieve better creative thinking performance through higher fluency and flexibility and originality and elaboration than students in traditional classrooms. According to Almulla (2020) and Anazifa & Djukri (2017) students who participate in PBL activities show improved ability to create innovative solutions in combination with flexible problem-solving abilities. Students benefit greatly from PBL because the approach's discovery-oriented approach delivers multiple chances for them to create and communicate creative solutions.

The effectiveness of PBL serves as a direct result of its foundation on constructivism theory. Student involvement in knowledge-building activities where they undertake real-world projects leads to increased engagement along with enhanced conceptual understanding according to Chan (2013) and Jang et al. (2010). Students find freedom to innovate under PBL structures because the system enables idea exploration along with experimental solution development and intellectual challenge experimentation. The findings of Lee & Hannafin (2016) illustrate that students who control their educational projects exhibit improved motivation alongside enhanced persistence along with curiosity which stands vital for creative advancement.

Through PBL students develop creativity more effectively because they must collaborate with each other. The research presented by Kokotsaki et al. (2016) and Hsbollah & Hassan (2022) demonstrates how projects performed by groups enhance student proficiency regarding communication and solution negotiation and creative concept refinement The learning experience through group discussions and cooperative tasks enables students to enhance each other's ideas which models actual collaborative innovative practices. The research indicates that structured collaborative learning spaces which teachers design with flexibility in mind lead students to become more creative with their problem-solving abilities and interdisciplinary thinking skills.

The analysis presents evidence about how student autonomy together with their motivation factors create conditions that enhance creativity. Students gained better intrinsic motivation and engaged more when they decided what to learn per Jang et al. (2010) alongside Lee & Hannafin (2016). When students select their subjects and create designs while reflecting on their projects it enables them to become more committed to their work which drives improved creative thinking. The research data shows that when teachers take the lead in implementing PBL methods creative outcomes decrease confirming that student control in their learning environment produces better creative results.

PBL showed various obstacles during its implementation as an approach to develop creativity in students. Teachers face time restrictions as the main obstacle when trying to incorporate project work into their existing school curriculum according to Kokotsaki et al. (2016). PBL success depends heavily on how prepared teachers are to implement this type of learning approach. Lack of proper PBL methodology training among teachers creates problems when they attempt to create and supervise project-based learning activities properly (Du et al., 2019). The implementation of PBL faces challenges from limited resources such as insufficient materials and services and spaces that do not enable flexibility according to

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Almulla (2020). Elementary education requires organizational backing combined with instructor preparation along with flexible curricular frameworks to establish PBL as a comprehensive creative strategy for teaching.

Table 2. Creativity Indicators Used in the Reviewed Studies

Creativity Indicator	Definition	Studies that Used It
Fluency	Ability to generate multiple ideas	Almulla (2020), Jang et al. (2010)
Flexibility	Capacity to think in diverse ways	Chan (2013), Lee & Hannafin (2016)
Originality	Ability to develop unique and novel ideas	Anazifa & Djukri (2017), Dilfuza (2024)
Elaboration	Extent to which ideas are developed in detail	Kokotsaki et al. (2016), Lee & Hannafin (2016)
Problem-Solving	Ability to find solutions to real-world issues	Jang et al. (2010), Anazifa & Djukri (2017)

The reviewed studies assess creativity through five main evaluation tools which consist of fluency and flexibility and originality and elaboration and problem-solving skills. The ability to generate multiple ideas known as fluency exists as a common assessment tool in experimental studies including Almulla (2020) and Jang et al. (2010) that measure student idea production before and after PBL implementation. Flexible thinking ability receives examination in qualitative research involving student reflections and project outcomes as studied in Chan (2013) and Lee & Hannafin (2016). The uniqueness of student ideas depends heavily on their originality according to Anazifa & Djukri (2017) and Dilfuza (2024). The focus on elaboration through expanded idea explanation appears in both Kokotsaki et al. (2016) and Lee & Hannafin (2016) research while problem-solving ability analyses take place in Jang et al. (2010) and Anazifa & Djukri (2017). These studies demonstrate student strategies for creative application of knowledge when solving problems.

Table 3. Benefits of PBL for Creativity Development

Benefit	Description	Supporting Studies
Enhanced Idea Generation	Students produce more diverse and innovative ideas	Almulla (2020), Anazifa & Djukri (2017)
Improved Collaboration	PBL encourages teamwork and idea-sharing	Kokotsaki et al. (2016), Chan (2013)
Increased Motivation	Students show greater interest and engagement	Jang et al. (2010), Lee & Hannafin (2016)
Better Real-World Application	PBL fosters problem-solving skills in real contexts	Jang et al. (2010), Anazifa & Djukri (2017)
Autonomy and Ownership	Students take control of their learning process	Lee & Hannafin (2016), Dilfuza (2024)

Research evidence shows that PBL leads to critical benefits which advance creativity growth. Idea generation stands out as the most distinct advantage since PBL enrollment leads students to exhibit stronger thinking abilities in fluency and originality (Almulla, 2020; Anazifa & Djukri, 2017). Student teamwork receives major support from PBL which enables students to share thoughts and improve ideas through collaborative learning sessions (Kokotsaki et al., 2016; Chan, 2013). Student motivation increases after implementing PBL since learners

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become more dedicated and show greater involvement according to Jang et al. (2010) and Lee & Hannafin (2016). Student mastery of real-world problems increases through PBL because they use genuine challenges to apply what they have learned (Jang et al., 2010; Anazifa & Djukri, 2017). Through PBL students develop independent learning abilities coupled with ownership of their work because they become responsible for their projects and find solutions without teacher guidance (Lee & Hannafin, 2016; Dilfuza, 2024).

Table 4. Challenges in Implementing PBL for Creativity Development

Challenge	Description	Studies Highlighting This Issue
Time Constraints	Teachers struggle to fit projects within curricula	Kokotsaki et al. (2016), Du et al. (2019)
Teacher Readiness	Lack of training on PBL design and facilitation	Du et al. (2019), Almulla (2020)
Resource Limitations	Limited access to materials and digital tools	Almulla (2020), Lee & Hannafin (2016)
Assessment Issues	Difficulty in measuring creativity in PBL	Anazifa & Djukri (2017), Chan (2013)
Student Motivation	Some students struggle with self-directed learning	Jang et al. (2010), Lee & Hannafin (2016)

The establishment of PBL as an educational method leads to multiple difficulties which affect its ability to generate creativity. Responsibilities related to time are considered a main problem because teaching personnel frequently face obstacles when trying to merge project-related work with normal educational requirements (Kokotsaki et al., 2016; Du et al., 2019). The insufficient preparation of educators stands as the main hurdle since they need better training to plan and guide PBL activities effectively (Du et al., 2019; Almulla, 2020). The complete implementation of PBL faces obstacles because of limited resources which prevent the use of sufficient materials and digital tools (Almulla, 2020; Lee & Hannafin, 2016). The subjective methodology for creativity measurement creates difficulties in student progress assessments (Anazifa & Djukri, 2017; Chan, 2013) along with methodological issues in evaluating student progress. PBL provides improved motivation for most students yet some students need supplemental teacher direction for effective self-learning (Jang et al., 2010; Lee & Hannafin, 2016).

Student-led learning approaches in PBL promote creativity according to Almulla (2020) and Anazifa & Djukri (2017). Active and inquiry-based tasks serve better than passive learning for developing creativity according to existing creativity theories (e.g., Torrance, 1974) because they emphasize fluency, flexibility, originality and elaboration. The constructivist theories of Piaget (1973) and Vygotsky (1978) establish a firm theoretical basis for PBL because students learn through actual constructing knowledge in meaningful real-life scenarios.

The strength of PBL-based creativity enhancement relies on theoretical support and empirical evidence yet studies have shown skepticism about their effects on sustainable measured learning outcomes. The research conducted by Jang et al. (2010) along with Lee & Hannafin (2016) demonstrates that PBL creates meaningful relationships between student autonomy and engagement but there is limited evidence about the lasting impact of creative skills development. An essential issue emerges regarding how well students retain creativity advancements from PBL lessons since they shift into conventional educational structures.

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Future research needs to study students across time to evaluate how PBL shapes permanent creative abilities students can bring to new educational situations.

All studies examined for this analysis show that PBL strategies build self-directed learning and inner drive which serve as essential factors in developing creativity. Students demonstrating enhanced learning autonomy achieve greater levels of curiosity and engagement as well as higher persistence according to Jang et al. (2010) and Lee & Hannafin (2016) research. These elements form important components of creative thinking. Research by Deci & Ryan (1985) known as Self-Determination Theory demonstrates that people pursue deep learning engagement more effectively when they have autonomy control.

The positive aspects of student autonomy in learning face difficulties because youngsters sometimes lack control over their behavior. Every student needs executive functioning competence to manage time effectively and establish objectives and continue concentrating on long-term work. Student motivation appears simultaneously as a positive aspect and challenging force in research studies dealing with motivation (Jang et al., 2010; Lee & Hannafin, 2016). Students with classroom backgrounds prefer structured instruction thus PBL can seem confusing and they might struggle to take control in unguided learning situations. The integration of scaffolding and guided instruction needs to precede PBL models to allow students proper development of self-regulation until they reach autonomous work ability.

The fundamental element of PBL which strengthens creativity emerges from teamwork. Kokotsaki et al. (2016) and Chan (2013) show that team dynamics encourage team members to exchange thoughts and solve problems together and encounter various viewpoints that lead to creative thinking outcomes. The research data provides support for social constructivist theories (Vygotsky, 1978) which demonstrate peer conversation plays an essential role in developing cognitive abilities and creative thinking.

Group dynamics require successful management since ineffective operations will instead reduce creative output instead of enhancing its potential. Many studies did not explore the key issues related to equal student participation nor conflicts in group-based decision-making and the management of teamwork projects. Some learners dominate discussion time leading to unequal educational opportunities as other students provide only limited engagement. Students need proper teacher-guidance to succeed in group-based learning because teachers must help students build essential collaborative competencies like communication skills together with negotiation abilities and conflict resolution expertise. The scientific community should focus future studies on developing instructional methods which help teachers build group dynamics that enhance creativity from every student participant.

Large-scale deployment of PBL faces significant obstacles that impede its general practical application. Time restrictions together with unprepared teachers and limited educational resources pose major practical obstacles according to the examined research examples (Kokotsaki et al., 2016; Du et al., 2019; Almulla, 2020). PBL demands thorough instructional preparation along with adaptable class timings and adequate funding although such requirements can prove difficult to establish in conventional elementary institutions.

The main obstacle stands as teacher readiness. The literature compiled by Du et al. (2019) together with Almulla (2020) demonstrates that teachers show insufficient preparation both educationally and emotionally to execute PBL teaching methods properly. Regular teacher education programs mainly teach conventional classroom instruction methods through lectures but do not teach open-ended inquiry-based learning approaches. Teachers require

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specialized training because current research indicates their insufficient ability to execute PBL effectively.

Time limitations together with structured educational frameworks create severe problems for teachers. The demanding content requirements along with standardized testing pressure force teachers to distribute their time poorly for extended project work especially in schools where these factors dominate. The implementation of PBL results in better advanced thinking skills but it faces difficulties when matching with standardized curricular guidelines together with testing methodologies. Standard educational institutions need policymakers and curriculum developers to develop PBL implementation procedures which expand its availability across different types of schools.

All reviewed research studies have failed to adequately investigate the ways creativity should be evaluated. Standardized assessment tools struggle to measure creativity because it exists across multiple dimensions that change based on each context. The research by Anazifa & Djukri (2017) along with Chan (2013) employs indicators of fluency, flexibility and originality to measure creativity but no consensus exists for evaluating PBL creative results. Current problems with standardized assessment criteria stand as a substantial impediment for PBL to gain wider use in instructional settings.

Future investigations must investigate different creative assessment tools including portfolio assessments and self-assessment systems along with process-oriented rubrics which recognize the development of creative abilities. Standard education systems lack assessment frameworks that validate PBL effectiveness while educators face difficulties in securing its broader spread due to this issue.

Conclusion

The literature review examined the effects of using Project-Based Learning (PBL) with constructivist principles for enhancing creative abilities in elementary schoolchildren. Active learning combined with autonomy and collaboration and real-world problem-solving backs PBL as a method which increases creativity according to consistent research findings. Students who participate in PBL develop better fluency together with flexibility and originality and elaboration skills in creative thinking while also showing enhanced motivation and deeper understanding of concepts. PBL operates through learning by experience and social interaction because of constructivist principles which present both theoretical and practical support for its effectiveness.

Multiple implementation barriers restrict PBL from becoming a standard teaching approach in elementary schools. Major implementation barriers during PBL adoption are problems with available time along with insufficient teacher skills and restricted resources and uncertain methods for measuring creativity. Educators face difficulties in implementing PBL because they lack training and proper resources to ensure effective execution of this teaching method. The open-ended approach of PBL meets resistance within traditional educational frameworks because standard assessment systems fail to match PBL structures and teachers lack appropriate ways to embed creative student-driven assignments into their teaching schedules.

The complete execution of PBL demands several essential recommendations to achieve success. To realize effective PBL teaching teachers need professional development which provides them with essential PBL implementation skills and practices. Teachers need appropriate educational policy modifications that enable them to use project-based learning without compromising essential learning goals. Schools need to create new creativity

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assessment models which combine portfolio analysis and process-focused scoring to properly evaluate learning benefits from PBL.

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