



THE EFFECT OF PROJECT PLAY METHODS ON LEARNING MOTIVATION AND NUMERACY LITERACY SKILLS OF CHILDREN OF KINDERGARDEN NEGERI PEMBINA BENGKAYANG

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ABSTRAK

Penelitian ini bertujuan untuk mengkaji pengaruh metode bermain proyek dan LKA (Lembar Kerja Anak) terhadap motivasi belajar dan kemampuan literasi numerasi anak di TK Negeri Pembina Bengkayang. Penelitian ini menggunakan desain quasi eksperimen dengan bentuk non-equivalent control group design yang melibatkan 90 anak usia 5–6 tahun yang dipilih melalui teknik purposive sampling. Data dikumpulkan melalui wawancara, observasi, dan dokumentasi, kemudian dianalisis menggunakan statistik deskriptif dan inferensial. Uji paired t-test digunakan untuk menguji perbedaan dalam masing-masing kelompok sebelum dan sesudah perlakuan, sedangkan independent t-test digunakan untuk membandingkan perbedaan antar kelompok. Hasil penelitian menunjukkan bahwa metode bermain proyek dan LKA sama-sama memberikan pengaruh positif dan signifikan terhadap motivasi belajar dan kemampuan literasi numerasi anak. Namun, anak yang mengikuti pembelajaran dengan metode bermain proyek menunjukkan motivasi belajar yang secara signifikan lebih tinggi serta kemampuan literasi numerasi yang lebih baik dibandingkan anak yang belajar menggunakan LKA. Temuan ini menunjukkan bahwa meskipun kedua metode memberikan kontribusi positif terhadap hasil belajar anak usia dini, metode bermain proyek lebih efektif dalam meningkatkan perkembangan kognitif dan motivasi anak. Oleh karena itu, pendekatan pembelajaran yang interaktif dan berbasis bermain direkomendasikan sebagai strategi pedagogis yang efektif untuk meningkatkan motivasi dan literasi numerasi pada pendidikan anak usia dini.

Kata Kunci: *Metode Bermain Proyek, Literasi Numerasi, Motivasi Belajar, Pendidikan Anak Usia Dini.*

ABSTRACT

This study examines the effects of project play methods and LKA (student worksheets) on children's learning motivation and numeracy literacy skills at Pembina Bengkayang State Kindergarten. The study employed a quasi-experimental design using a non-equivalent control group design involving 90 children aged 5–6 years selected through purposive sampling. Data were collected through interviews, observations, and documentation, and analyzed using descriptive and inferential statistics. Paired t-tests were used to examine differences within each group before and after treatment, while independent t-tests were applied to compare differences between groups. The findings reveal that both project play and LKA methods have a positive and significant effect on children's learning motivation and numeracy literacy skills. However, children who participated in project play demonstrated significantly higher learning motivation and better numeracy literacy skills than those who learned using LKA. These findings indicate that although both methods contribute positively to early childhood learning outcomes, project play is more effective in enhancing children's cognitive and motivational development. Therefore, play-based and interactive learning approaches are recommended as effective





pedagogical strategies for improving motivation and numeracy literacy in early childhood education.

Keywords: *Project Play Method, Numeracy Literacy, Learning Motivation, Early Childhood Education*

INTRODUCTION

Early childhood education (ECE) plays a vital role in supporting children's cognitive, social, emotional, and physical development. According to the Indonesian National Education System Law No. 20 of 2003, ECE aims to provide educational stimulation for children from birth to six years old to prepare them for further education. Early childhood is often regarded as the "golden age" because brain development occurs rapidly during this period, making appropriate educational experiences essential for optimal growth and future learning success. At the kindergarten level, children learn most effectively through meaningful, engaging, and interactive activities that encourage exploration and active participation (Krajcik et al., 2023; Wardah et al., 2022). Constructivist perspectives, particularly those proposed by Piaget, emphasize that children construct knowledge through direct experiences, while Vygotsky underscores the importance of social interaction and scaffolding in cognitive development. Consequently, learning approaches in ECE should be child-centered and grounded in play-based activities.

Learning motivation is an important factor influencing children's learning outcomes in early childhood education. Motivated children tend to participate actively, maintain attention, and show enthusiasm during learning activities, whereas low motivation may reduce engagement and participation. In early childhood settings, motivation is closely related to the learning experiences provided in the classroom. Interactive and enjoyable activities can enhance children's intrinsic motivation, while overly teacher centered approaches may reduce their interest and curiosity (Efriani et al., 2023; Goodwin, 2024; Soto-Calvo et al., 2021).

In addition to motivation, numeracy literacy is a fundamental competency that supports later academic achievement and problem-solving abilities (Adam, 2024; Chang, 2023). Numeracy literacy refers to the ability to understand and apply basic mathematical concepts such as numbers, counting, and patterns in everyday contexts (Díez-Palomar et al., 2023; Pratiwi et al., 2024). In early childhood education, learning motivation and numeracy literacy are closely interconnected because motivated children are more willing to engage in mathematical activities and explore basic concepts through meaningful experiences. Therefore, the development of numeracy literacy requires engaging and developmentally appropriate learning strategies rather than relying solely on teacher directed instruction and worksheets (Amirova, 2025; Dahal & Bhat, 2023).

Preliminary observations conducted at Pembina Bengkayang State Kindergarten revealed several challenges in the learning process, particularly related to children's learning motivation and numeracy literacy skills. Classroom activities were still predominantly teacher-centered, limiting children's opportunities to actively participate and explore learning experiences. As a result, many children showed low learning motivation, indicated by limited enthusiasm and participation during classroom activities. In addition, children's numeracy literacy skills were relatively low, especially in recognizing numbers, understanding numerical order, and comprehending basic mathematical concepts. These findings indicate the need for more engaging and developmentally appropriate instructional approaches that can effectively improve both children's learning motivation and numeracy literacy.



One promising approach to address these challenges is the project play method, a form of project-based learning adapted to early childhood education. Project play engages children in meaningful, hands-on activities that encourage exploration, creativity, collaboration, and knowledge construction through direct experiences (Amelia et al., 2025; Hsiao et al., 2025). This approach aligns with play-based learning principles that emphasize enjoyable and meaningful learning activities. In early childhood settings, project play can enhance children's active engagement and intrinsic motivation by involving them in activities related to their interests (Stojanović et al., 2023; Nafiu et al., 2025). In addition, it supports the development of numeracy literacy by integrating mathematical concepts into real-life contexts, such as counting and recognizing numbers through role-playing activities (Guohui & Xiujin, 2024; Helm et al., 2023). Furthermore, project play promotes social interaction and collaboration, enabling children to develop communication skills and learn from their peers.

Previous studies have shown that project-based learning can improve children's engagement, intrinsic motivation, and understanding of mathematical concepts, particularly early numeracy skills (Duke et al., 2021). Self-determination theory proposed by Deci and Ryan further emphasizes that autonomy and meaningful engagement are important in fostering children's motivation to learn (Ryan & Deci, 2024). Through active participation and opportunities to make choices, project play can create a more meaningful and motivating learning environment. However, previous studies have primarily examined the general benefits of project-based learning without specifically comparing its effectiveness with worksheet-based learning approaches in early childhood education. Although worksheets (LKA) remain widely used, they often provide limited support for children's active engagement and conceptual understanding. Furthermore, few studies have simultaneously investigated the effects of project play and LKA on both learning motivation and numeracy literacy in kindergarten settings. Therefore, this study addresses this gap by examining the comparative effectiveness of project play and worksheet-based learning on children's learning motivation and numeracy literacy at Pembina Bengkayang State Kindergarten. The novelty of this study lies in comparing these two instructional approaches to identify more effective strategies for supporting children's cognitive and motivational development.

Based on the aforementioned issues, this study aims to investigate the effects of the project play method and the use of worksheets (LKA) on children's learning motivation and numeracy literacy skills. Specifically, the study analyzes the differences in outcomes between children who learn through project play and those who learn through conventional worksheet-based approaches. This research is expected to contribute to the development of more effective and developmentally appropriate learning strategies in early childhood education, particularly in improving children's motivation and numeracy literacy. In summary, improving learning motivation and numeracy literacy in early childhood requires innovative and engaging instructional approaches that are aligned with children's developmental characteristics. Project play is considered a promising alternative because it encourages active participation, exploration, and meaningful learning experiences. Therefore, examining its comparative effectiveness against traditional worksheet-based learning is important to provide empirical evidence and practical implications for enhancing the quality of early childhood education, especially in the context of Pembina Bengkayang State Kindergarten.

METHOD

This study employed a quasi-experimental design using a non-equivalent control group pretest–posttest design to examine the effects of the project play method and worksheet-based





learning (LKA) on children’s learning motivation and numeracy literacy skills. The research was conducted at Pembina Bengkayang State Kindergarten and involved 90 children aged 5–6 years selected using a total sampling technique. The participants were divided into two existing classes, consisting of 45 children in the experimental group and 45 children in the control group. The experimental group received learning through the project play method, which emphasized active engagement, collaboration, and play-based exploration in real-life contexts, while the control group received conventional worksheet-based learning (LKA).

The intervention was conducted over eight instructional meetings during a four-week period. In the experimental group, children participated in structured project-based activities such as collaborative problem-solving, exploration of numeracy concepts through real-life situations, and interactive group tasks. Meanwhile, the control group completed teacher-directed worksheet activities focused on basic numeracy exercises. Data were collected using observation checklists and simple interview guidelines based on indicators of learning motivation, including attention, participation, and persistence, as well as numeracy literacy indicators such as number recognition, counting ability, understanding of simple operations, and pattern recognition. The instruments were validated through expert judgment by early childhood education specialists, while reliability testing was conducted using Cronbach’s Alpha to ensure consistency of the measurements.

Data analysis was conducted using descriptive and inferential statistical techniques. Descriptive statistics were used to summarize the distribution of scores, while inferential analysis included paired sample t-tests and independent sample t-tests. The paired sample t-test was used to examine differences between pretest and posttest scores within each group, whereas the independent sample t-test was used to compare the posttest results between the experimental and control groups. Prior to hypothesis testing, the Shapiro–Wilk test was used to assess data normality and Levene’s test was used to examine homogeneity of variance. All statistical analyses were performed at a significance level of $\alpha = 0.05$ using statistical software. This methodological approach enabled a more rigorous evaluation of the effectiveness of project play compared to worksheet-based learning in improving children’s learning motivation and numeracy literacy skills.

RESULTS AND DISCUSSION

Results

Descriptive Analysis of Learning Motivation

The descriptive analysis of learning motivation was conducted to identify differences in posttest scores between children who participated in project play activities and those who learned using worksheets (LKA). The results showed that the project play group achieved higher learning motivation scores compared to the LKA group. This finding indicates that learning activities involving active participation and hands-on experiences tend to enhance children’s enthusiasm and engagement in the learning process. A summary of the descriptive statistics, including the mean scores and distribution of learning motivation in both groups, is presented in Table 1.

Table 1. Descriptive Statistics of Children’s Learning Motivation Scores

Group	N	Mean	Standard Deviation	Minimum	Maximum
Project Play	45	55.07	2.568	48	60
Worksheet-Based Learning (LKA)	45	50.86	2.629	44	56

Referring to the descriptive statistics presented in Table 1, the posttest results showed differences in learning motivation between children who participated in project play activities and those who learned using worksheets (LKA). Children in the project play group obtained a higher average score compared to the LKA group. The project play group achieved a mean score of 55.07 with a standard deviation of 2.568, while the LKA group obtained a mean score of 50.86 with a standard deviation of 2.629. In the project play group, the highest motivation score reached 60 and the lowest score was 48. Meanwhile, in the LKA group, scores ranged from 44 to 56. These findings indicate that children who were involved in project-oriented play activities tended to show greater enthusiasm, participation, and persistence during classroom learning activities. The distribution of scores in both groups was further examined through normality testing. The Kolmogorov–Smirnov and Shapiro–Wilk tests showed significance values above 0.05, indicating that the data were normally distributed. In the project play group, the Kolmogorov–Smirnov significance value was 0.093, whereas the LKA group obtained a significance value of 0.100. Therefore, the data fulfilled the assumptions required for parametric statistical analysis.

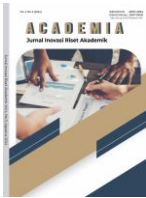
Effect of Project Play on Learning Motivation

To examine the effect of the learning interventions on children’s learning motivation, paired sample t-tests and an independent sample t-test were conducted. The paired sample t-test was used to analyze differences between pretest and posttest scores within each group, while the independent sample t-test was used to compare posttest results between the project play group and the worksheet-based learning (LKA) group. The statistical analysis showed that both learning approaches significantly improved children’s learning motivation after the intervention. However, the project play method demonstrated a greater increase in learning motivation compared to worksheet-based learning. The results of the hypothesis testing are presented in Table 2.

Table 2. Results of Paired Sample t-Test and Independent Sample t-Test on Learning Motivation

Analysis	Group	Mean Difference	t-value	Sig. (p)	Interpretation
Paired Sample t-Test	Project Play	-13.652	-26.818	0.000	Significant improvement
Paired Sample t-Test	Worksheet-Based Learning (LKA)	-11.591	-23.440	0.000	Significant improvement
Independent Sample t-Test	Project Play vs. LKA	—	7.669	0.000	Significant difference between groups

As presented in Table 2, the paired sample t-test demonstrated that the implementation of project play significantly improved children’s learning motivation. The statistical analysis produced a mean difference of -13.652 with $t = -26.818$ and $p = 0.000$ ($p < 0.05$). The results suggest that project play activities successfully encouraged children to become more engaged and motivated throughout the learning process. Children in the LKA group also showed improvement in learning motivation after the intervention. The paired sample t-test yielded a mean difference of -11.591 with $t = -23.440$ and $p = 0.000$ ($p < 0.05$). Although worksheet-based activities contributed positively to children’s motivation, the increase was not as strong



as that observed in the project play group. To determine whether there was a significant difference between the two learning approaches, an independent sample t-test was conducted. The analysis revealed a significant difference in learning motivation between children who learned through project play and those who learned through LKA ($t = 7.669, p = 0.000$). The higher mean score obtained by the project play group confirms that this learning approach was more effective in promoting children’s learning motivation.

Descriptive Analysis of Numeracy Literacy Skills

To examine children’s numeracy literacy skills after the learning intervention, a descriptive statistical analysis was conducted for both the project play group and the worksheet-based learning (LKA) group. The analysis included the mean score, standard deviation, minimum score, and maximum score obtained by children in each group. The descriptive results indicate differences in numeracy literacy achievement between children who participated in project play activities and those who learned through worksheets. In addition, the analysis provides an overview of the distribution of children’s numeracy literacy scores after the intervention. The descriptive statistics of numeracy literacy skills are presented in Table 3.

Table 3. Descriptive Statistics of Children’s Numeracy Literacy Skills

Group	N	Mean	Standard Deviation	Minimum	Maximum
Project Play	45	66.09	2.912	58	71
Worksheet-Based Learning (LKA)	45	60.75	2.974	52	68

The descriptive statistics also showed differences in children’s numeracy literacy skills after the learning intervention. Children who participated in project play activities achieved a mean score of 66.09 with a standard deviation of 2.912, whereas children in the LKA group obtained a mean score of 60.75 with a standard deviation of 2.974. In the project play group, the scores ranged from 58 to 71, while the scores in the LKA group ranged from 52 to 68. These results indicate that children who engaged in project-based learning activities demonstrated better understanding of basic numeracy concepts, including counting, number recognition, sequencing, and simple problem solving. The normality test results also confirmed that the numeracy literacy data were normally distributed, allowing further hypothesis testing to be conducted using parametric statistics.

Effect of Project Play on Numeracy Literacy Skills

To determine the effect of project play and worksheet-based learning (LKA) on children’s numeracy literacy skills, inferential statistical analyses were conducted using paired sample t-tests and an independent sample t-test. The paired sample t-test was used to examine differences between pretest and posttest scores within each group, while the independent sample t-test was conducted to compare posttest results between the two groups. The statistical analysis showed that both learning approaches significantly improved children’s numeracy literacy skills after the intervention. However, the project play method demonstrated a greater improvement compared to worksheet-based learning. The results of the hypothesis testing are presented in Table 4.

Table 4. Results of Paired Sample t-Test and Independent Sample t-Test on Numeracy Literacy Skills

Analysis	Group	Mean Difference	t-value	Sig. (p)	Interpretation
Paired Sample t-Test	Project Play	-18.174	-33.407	0.000	Significant improvement
Paired Sample t-Test	Worksheet-Based Learning (LKA)	-16.341	-29.415	0.000	Significant improvement
Independent Sample t-Test	Project Play vs. LKA	—	8.601	0.000	Significant difference between groups

The paired sample t-test showed that project play had a significant effect on children's numeracy literacy skills. The analysis produced a mean difference of -18.174 with $t = -33.407$ and $p = 0.000$ ($p < 0.05$). This finding indicates that learning activities involving projects, exploration, and hands-on experiences helped children improve their numeracy literacy skills more effectively. Similarly, the children who learned using LKA also experienced significant improvement in numeracy literacy skills. The paired sample t-test yielded a mean difference of -16.341 with $t = -29.415$ and $p = 0.000$ ($p < 0.05$). Despite this improvement, the increase observed in the project play group remained higher. Further analysis using the independent sample t-test revealed a significant difference in numeracy literacy skills between the two groups ($t = 8.601$, $p = 0.000$). The mean score achieved by children in the project play group was substantially higher than that of children in the LKA group. This result suggests that project play provided richer and more meaningful learning experiences for strengthening early numeracy literacy skills. Overall, the findings consistently demonstrate that both learning approaches contributed positively to children's development. However, project play produced stronger effects on both learning motivation and numeracy literacy skills. Activities involving exploration, collaboration, and direct participation appeared to create a more engaging learning environment for early childhood learners.

Discussion

The findings of this study highlight the importance of using interactive and child-centered learning approaches in early childhood education. The significant improvement in learning motivation among children in the project play group can be explained by the nature of project-based activities, which emphasize active participation, autonomy, and meaningful engagement. These findings are consistent with the self-determination theory proposed by Deci and Ryan (2024), which suggests that intrinsic motivation increases when learners are actively involved and feel a sense of autonomy in the learning process. Furthermore, the higher numeracy literacy outcomes observed in the project play group support constructivist learning theory, particularly Piaget's view that children construct knowledge through direct interaction with their environment. In project play activities, children are not merely passive recipients of information but actively explore, experiment, and apply mathematical concepts in real-life contexts (Budhiarti et al., 2025; Putri et al., 2024). This finding is supported by Chen (2025), who emphasizes that early mathematical experiences play a critical role in strengthening children's problem-solving abilities, memory development, and long-term academic achievement. For instance, activities such as role-playing market scenarios or group-based counting tasks allow children to internalize abstract numeracy concepts in a concrete and



meaningful way (Žakelj et al., 2024). Similarly, Wang et al. (2025) reported that meaningful and context-based mathematics learning experiences help young children develop stronger mathematical understanding and engagement.

From the perspective of social constructivism, the effectiveness of project play can also be explained through the social interactions that occur during collaborative activities. Vygotsky emphasized that children's cognitive development is strongly influenced by communication, cooperation, and guided participation within their social environment. During project play, children engage in discussions, negotiate roles, exchange ideas, and receive scaffolding from both teachers and peers. These interactions support learning within the Zone of Proximal Development (ZPD), enabling children to achieve higher levels of understanding than they could independently. Consequently, project play not only promotes individual knowledge construction but also facilitates the co-construction of mathematical understanding through social engagement. Research by Sarkowi et al. (2023) similarly demonstrates that exploration-based learning environments encourage active interaction, collaborative inquiry, and cognitive development among young children. This mechanism may explain why children in the project play group demonstrated higher motivation and numeracy literacy outcomes compared to those who primarily engaged in individual worksheet activities.

The findings also align with previous studies, which emphasize that play-based and project-oriented learning can significantly enhance early mathematical understanding (Miseliūnaitė & Cibulskas, 2024; Sohail et al., 2024). Through project play, children engage in collaborative problem-solving, which not only strengthens their cognitive skills but also enhances social interaction and communication. This holistic learning experience contributes to both cognitive and motivational development. Evidence from Masnia et al. (2025) further indicates that project-based learning supported by digital learning media significantly improves students' literacy and numeracy competencies, suggesting that project-oriented approaches can be effective across different educational contexts. In contrast, although worksheet-based learning (LKA) showed positive effects, its impact was relatively lower. This may be due to its more structured and teacher-directed nature, which limits children's opportunities for exploration and active engagement. Worksheets tend to focus on task completion rather than conceptual understanding, which may reduce children's interest and intrinsic motivation over time.

Another possible mechanism underlying the improvement in learning motivation is the integration of authentic and meaningful learning experiences within project play activities. When children are involved in solving real-world problems and completing projects that are relevant to their daily lives, they are more likely to perceive learning as enjoyable and purposeful. Such experiences can increase curiosity, persistence, and self-confidence, which are important components of learning motivation. In addition, project play provides opportunities for repeated practice of numeracy concepts in diverse contexts, allowing children to strengthen conceptual understanding rather than merely memorizing procedures. Through exploration, manipulation of objects, and collaborative inquiry, children can connect mathematical ideas with concrete experiences, thereby supporting deeper numeracy literacy development. The importance of applying numeracy skills in contextual problem-solving situations is also highlighted by Hidayat et al. (2025), who found that elementary school students' numeracy literacy develops more effectively when mathematical concepts are embedded within meaningful word-problem contexts.

These findings contribute to the growing body of evidence suggesting that motivation and numeracy literacy are closely interconnected. Children who are highly motivated tend to



participate more actively in learning activities, invest greater effort in problem-solving tasks, and demonstrate higher levels of engagement, all of which support the acquisition of foundational numeracy skills. Conversely, successful learning experiences can reinforce children's motivation by fostering a sense of competence and achievement. According to Chen (2025), positive experiences in early mathematics learning contribute not only to academic performance but also to children's confidence in tackling increasingly complex cognitive challenges. Therefore, project play appears to create a positive cycle in which increased motivation supports numeracy development, while improved numeracy skills further strengthen motivation to learn.

Despite the positive findings, several limitations of this study should be acknowledged. First, the study was conducted within a limited educational setting and involved a relatively small sample, which may affect the generalizability of the results to broader populations. Second, the intervention period was relatively short, making it difficult to determine the long-term effects of project play on children's motivation and numeracy literacy development. Third, the study focused primarily on learning outcomes and motivation, while other potentially influential factors, such as parental involvement, socioeconomic background, and prior learning experiences, were not examined in depth. Future studies are therefore encouraged to involve larger and more diverse samples, employ longitudinal designs, and investigate additional variables that may influence the effectiveness of project play interventions. Future research may also examine how contextual factors identified by Wang et al. (2025), including teacher readiness, instructional resources, and learning environments, influence the success of early mathematics interventions.

The practical implications of these findings extend beyond classroom instruction. Educational institutions and policymakers may consider incorporating project-based play approaches into early childhood curricula and teacher professional development programs. Teachers require adequate support and training to design meaningful project play activities that align with developmental goals and learning standards. Furthermore, collaboration between schools and families can help reinforce project-based learning experiences beyond the classroom, thereby creating a more supportive environment for the development of children's motivation and numeracy literacy skills. This recommendation is in line with the findings of Masnia et al. (2025), which underscore the importance of innovative instructional designs and appropriate learning media in fostering literacy and numeracy development.

These findings have important implications for early childhood education practice. Educators are encouraged to integrate project play into classroom activities to create more engaging and meaningful learning experiences. While worksheets can still be used as supplementary tools, they should not dominate the learning process. Instead, a balanced approach that prioritizes play-based and experiential learning is recommended to optimize children's motivation and numeracy development. In summary, this study provides empirical evidence that project play is a more effective instructional approach than worksheet-based learning in enhancing both learning motivation and numeracy literacy skills among kindergarten children. The integration of play, collaboration, and real-world contexts makes learning more meaningful, thereby supporting children's overall development.

CONCLUSION

This study demonstrates that learning approaches emphasizing active participation, exploration, and meaningful experiences are more effective in supporting early childhood learning motivation and numeracy literacy skills. The findings indicate that the project play



method provides broader opportunities for children to engage directly in the learning process, thereby fostering greater enthusiasm, persistence, and understanding of basic numeracy concepts. These results reinforce the view that learning in early childhood education should be aligned with children's developmental characteristics through interactive, child-centered, and play-based activities rather than relying primarily on teacher-centered worksheet instruction.

The study also confirms that meaningful and collaborative learning experiences contribute not only to cognitive development but also to the development of children's intrinsic motivation. Therefore, the implementation of project play can serve as an alternative learning approach for early childhood educators in creating more engaging and developmentally appropriate classroom environments. In practical terms, the findings of this study may be used as a reference for schools and teachers in designing innovative learning activities that integrate play, exploration, and real-life contexts to strengthen early numeracy literacy. Furthermore, this study opens opportunities for further research related to the long-term effectiveness of project play, its application to other developmental domains, and its integration with digital or technology-based learning media in diverse early childhood education settings. Such developments are expected to contribute to the improvement of learning quality and the optimization of children's overall developmental outcomes.

Future studies are encouraged to examine the long-term effects of project play on children's learning outcomes, involve larger and more diverse samples, and explore its implementation across different developmental domains. Further research may also investigate the integration of project play with digital and technology-based learning media to enhance learning effectiveness in diverse early childhood education contexts. In addition, future studies could examine the role of contextual factors, such as teacher competence, parental involvement, and classroom environments, in influencing the effectiveness of project play. Comparative studies across different educational settings and cultural contexts are also recommended to provide a broader understanding of the applicability and effectiveness of project play in early childhood education.

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