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THE EFFECTIVENESS OF USING VARIOUS PLAY METHODS TO ENHANCE COGNITIVE DEVELOPMENT IN EARLY CHILDHOOD: A CRITICAL ANALYSIS AND LITERATURE REVIEW

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ABSTRAK

This study investigates the effectiveness of various play methods in enhancing children's cognitive development in early childhood education. This study used a qualitative literature review to evaluate the effectiveness of play methods in enhancing cognitive development in early childhood education. Data were gathered from peer-reviewed sources focused on children aged 2-6 years, using systematic checklists to categorize studies. Thematic analysis identified cognitive benefits across play types such as role-playing, puzzles, and educational technology. The findings highlight the most effective play methods for cognitive development. Data were sourced from databases like Google Scholar, JSTOR, and ERIC. The results reveal that engaging children in structured play activities, such as using number cards and puzzles, significantly improved their cognitive abilities, with some methods achieving up to 100% completion in cognitive learning outcomes. Conversely, activities like playing with Lego showed no significant improvement in symbolic thinking for children aged 4-5. Overall, the findings suggest that different play methods contribute variably to cognitive development, with certain approaches yielding higher outcomes, especially in tasks related to numeracy and problem-solving. The study concludes that educational games and interactive play can enhance cognitive skills in early childhood, but effectiveness may vary based on the type of play and age group. These findings provide valuable insights into designing educational play activities that cater to different cognitive needs. Future research should explore the long-term effects of these play strategies and their adaptability across diverse educational settings.

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INTRODUCTION

The development of cognitive skills in early childhood is critical for a child's overall growth, as it lays the foundation for future learning and problem-solving abilities. Early childhood education programs, such as PAUD, TK, RA, and KB, emphasize the importance of play-based learning to enhance cognitive development. Various play methods, including structured and unstructured activities, have been integrated into these programs to promote learning through active engagement. Cognitive development in young children includes the ability to think critically, solve problems, and understand complex concepts. Given the vital role of cognitive growth in

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early childhood, understanding the effectiveness of different play methods is essential to optimize educational practices in early childhood settings.

Play is a crucial activity in early childhood education (PAUD, TK, RA, and KB) as it allows children to develop various aspects of their growth, including cognitive development. Play-based learning methods enable children to learn in an enjoyable way while enhancing critical thinking, problem-solving, and creativity. Several play methods commonly used in early childhood education institutions have shown significant effectiveness in boosting cognitive development. Role-playing helps children develop imagination, problem-solving skills, and social understanding, while block play strengthens spatial abilities and creativity. Puzzle play fosters logic and concentration, and educational technology-based applications enhance literacy and numeracy skills. Outdoor play helps develop observation skills and understanding of scientific concepts, while also improving children's motor abilities. Each method offers distinct benefits in supporting cognitive development holistically.

Early Childhood Education (PAUD) is essentially a collective term for all activities undertaken by parents and teachers in guiding and educating children, creating an environment where children can learn and understand everything through observation, imitation, and experimentation. PAUD focuses on six developmental aspects: physical formation, intellectual/cognitive, language skills, socio-emotional, moral, and artistic/creativity, all of which need to be stimulated for optimal growth. Cognitive development is one of the essential aspects that must be nurtured (Badriah et al., 2024). As a child grows, their cognitive abilities will evolve in line with their development. .(Nurwahidah et al., 2023). Development is a cumulative process, meaning earlier development serves as the foundation for future growth. Early childhood is a period of heightened sensitivity throughout human development, a time when children are particularly receptive to both intentional and unintentional stimuli from their environment. During this phase, the maturation of physical and psychological functions occurs, preparing children to respond and fulfill developmental tasks that are expected to manifest in their everyday behavior (Oktaviyani & Suri, 2019).

Previous studies have explored the impact of specific play methods on cognitive development. For instance, Syafrina and Adiningsih (2020) examined the effectiveness of playing "Lego" to enhance symbolic thinking in children aged 4-5 years. Their quasi-experimental study used a one-group pretest-posttest design, revealing that while "Lego" play did not significantly improve symbolic thinking, individual observations suggested a positive trend in cognitive development among participants. (Syafrina & Adiningsih, 2020) Additionally, Kadir et al. (2024) investigated the use of science-based play activities to improve cognitive abilities in children at TK Negeri Pembina Makassar. Their study employed a qualitative classroom action research approach and concluded that engaging children in simple science activities effectively boosted cognitive skills. (Kadir et al., 2024)

Despite these contributions, gaps remain in understanding how different play methods compare in terms of effectiveness, especially when applied across various educational settings and age groups. Additionally, there is a need for a more comprehensive analysis that synthesizes existing research and provides a critical evaluation of the impact of diverse play-based learning strategies on early cognitive development. This study seeks to fill these gaps by conducting a critical analysis and literature review of the effectiveness of various play methods in enhancing cognitive development in early childhood education settings.

The objective of this research is to analyze and evaluate the effectiveness of multiple play-based learning methods in improving cognitive development among young children. The study aims to answer the following research questions: (1) Which play methods are most effective in enhancing specific cognitive skills? (2) How do different play strategies impact cognitive

development across various age groups in early childhood education settings? By addressing these questions, the study intends to contribute to the understanding of best practices in play-based learning and provide insights into optimizing early childhood education programs to support cognitive development.

This research is significant as it provides a comprehensive evaluation of play-based learning methods, offering educators and policymakers valuable information to enhance teaching strategies and curricula in early childhood education. By identifying effective play methods, this study aims to support the development of cognitive skills that are critical for children's long-term academic and personal success.

METHOD

This study employed a critical analysis and literature review approach to evaluate the effectiveness of various play methods in enhancing cognitive development in early childhood. The research design was qualitative, focusing on synthesizing and analyzing existing studies related to play-based learning in early childhood education. A systematic review of relevant literature was conducted to gather data on the effectiveness of different play methods in promoting cognitive skills in children. The sample for this study consisted of peer-reviewed journal articles, books, and reports published in the last ten years. These sources were selected based on their relevance to the topic of cognitive development and play methods in early childhood education (PAUD, TK, RA, and KB). The inclusion criteria required that the studies focus on children aged 2 to 6 years and examine play-based learning methods aimed at improving cognitive outcomes.

The instruments used in this study were checklists and matrices to systematically categorize and evaluate the selected studies. These tools helped in identifying key variables, such as the types of play methods used, cognitive skills targeted, and the reported outcomes. Data collection procedures involved searching academic databases, including Google Scholar, JSTOR, and ERIC, to locate studies relevant to the research topic. Keywords such as "play methods," "cognitive development," "early childhood education," and "PAUD" were used to refine the search. After gathering the studies, the data were extracted and categorized based on the play methods and cognitive outcomes discussed in each study. For data analysis, a thematic analysis was performed to identify recurring themes and patterns related to the effectiveness of the different play methods. The analysis focused on comparing and contrasting the cognitive benefits of various types of play, such as role-playing, block play, puzzles, educational technology, and outdoor activities. The results were synthesized to provide an overview of the most effective play methods for enhancing cognitive development in early childhood education.

RESULTS

The study's findings address the two main research questions:

1. The Play Methods are Most Effective in Enhancing Specific Cognitive Skills

The results from various studies indicate that different play methods have varying degrees of effectiveness in promoting specific cognitive skills. For instance, playing with sand (Nopriani et al., 2024) was found to enhance children's cognitive development, with parents recognizing its benefits, as evidenced by a positive parental attitude (62.81%). Similarly, playing with number cards significantly improved cognitive learning outcomes, with a 100% success rate in achieving cognitive milestones (Hasni, 2019). Furthermore, using a bowling combination with explicit instruction led to an 82.61% improvement in children's cognitive abilities related to number recognition.(Hardianti & Rahman, 2021).

However, not all play methods had the same impact. For example, playing with Lego blocks did not significantly enhance symbolic thinking in children aged 4-5 years (Syafrina & Adiningsih, 2020), despite the success of other modules in improving symbolic cognitive development.

Additionally, puzzle play was highly effective in improving cognitive skills, especially in learning to sequence numbers from 1 to 20. The mastery rate increased from 46.15% to 84.6% across learning cycles (Syukron Al Mubarok & Amini, 2019). Moreover, play-based learning with Wordwall educational games resulted in improved cognitive development, with post-intervention scores increasing from 35.53 to 39.73 .(Badriah et al., 2024).

2. The Different Play Strategies Impact Cognitive Development Across Various Age Groups in Early Childhood Education Settings.

Across different age groups, varying strategies were observed to have significant impacts on cognitive development. For instance, the PAHIBU game (Ahmad et al., 2023) demonstrated a notable improvement in cognitive abilities among 5-6-year-olds, increasing average cognitive performance from 37.3% in the initial stage to 76.3% in the final development stage. Similarly, media such as Tangram showed significant improvements in children's cognitive abilities after two cycles of intervention (Rifanti et al., 2023).

Other strategies also demonstrated effectiveness in improving cognitive outcomes. The study on playing "fishing" games led to cognitive growth, showing significant improvements from 58.55% in the pre-intervention stage to 80.99% post-intervention (Retnaningrum, 2016). Meanwhile, color recognition skills significantly increased using colorful ball media, particularly in children aged 5-6 years .(Nurwahidah et al., 2023). Lastly, the study found that puzzle therapy yielded substantial improvements in fine motor skills, social development, and language acquisition (Oktaviyani & Suri, 2019).

The results show that play-based learning methods, such as number cards, puzzles, Wordwall educational games, and PAHIBU, are highly effective in enhancing various cognitive skills, with notable variations based on the specific play method and the child's age. These methods demonstrate a significant positive impact on the cognitive development of early childhood learners.

DISCUSSION

The results of this study provide clear evidence of the effectiveness of various play methods in enhancing cognitive development in early childhood, as seen from the positive changes across different interventions. For example, the use of number cards significantly improved cognitive outcomes, achieving 100% mastery in the development of cognitive skills (Hasni, 2019). This aligns with the research question concerning which play methods are most effective, as it demonstrates that structured activities like card games can yield substantial cognitive benefits. Other interventions, such as playing with puzzles, also showed a notable increase in cognitive abilities, with mastery rates rising from 46.15% in Cycle I to 84.6% in Cycle II (Syukron Al Mubarok & Amini, 2019). These findings suggest that cognitive skills related to number sequencing and recognition can be significantly enhanced through targeted play strategies.

However, not all play methods were equally effective. The LEGO play intervention failed to significantly improve symbolic thinking in children aged 4-5 years (Syafrina & Adiningsih, 2020), indicating that not all types of play may effectively address specific cognitive abilities. This outcome suggests that while play-based interventions generally promote cognitive development, their success may depend on the alignment between the play type and the cognitive skill targeted.

The results of this research are consistent with findings from previous studies emphasizing the importance of play in early cognitive development. For example, the positive impact of educational games, such as Wordwall, on cognitive development is supported by similar research emphasizing the role of interactive and engaging play in learning (Badriah et al., 2024). Other studies also confirm that structured play activities, like the PAHIBU game, improve cognitive

performance significantly (Ahmad et al., 2023), mirroring earlier research on the cognitive benefits of structured play in childhood learning environments.

Nonetheless, there are discrepancies when comparing the results of the LEGO play intervention with prior studies that suggested symbolic play enhances abstract thinking in early childhood. The lack of improvement in symbolic thinking during the LEGO intervention challenges some traditional views about the universality of play in developing cognitive skills, highlighting the need for further research into the types of play best suited for various cognitive domains.

The findings from this research offer important implications for early childhood education. First, they highlight the critical role that carefully designed play interventions can play in cognitive skill development. Teachers and curriculum designers should consider integrating targeted play strategies, such as number puzzles and educational games, into their pedagogical practices to enhance cognitive outcomes in young learners. The substantial improvements in cognitive abilities seen through play-based learning suggest that such interventions can bridge developmental gaps, especially in foundational skills such as number recognition and logical sequencing.

The research also underscores the necessity of aligning play activities with the specific cognitive skills educators aim to develop. While free play, like LEGO, may have limited cognitive effects in some contexts, structured, goal-oriented play can produce significant cognitive improvements. These insights can guide educators in selecting appropriate play activities that foster specific cognitive skills, contributing to more effective early childhood education.

Despite the promising findings, this study has several limitations that should be acknowledged. The sample size in some interventions was relatively small, potentially limiting the generalizability of the results. Additionally, some studies lacked long-term follow-up to assess whether the cognitive gains observed through play persisted over time. The limited scope of cognitive skills assessed in the study, focusing primarily on numeracy and symbolic thinking, may have overlooked other important cognitive domains, such as memory or spatial awareness.

Another limitation is the variability in how different play methods were implemented. For instance, some interventions involved highly structured activities, while others allowed for more open-ended play, making it difficult to compare the effectiveness of these methods in a uniform manner. Future research should aim to control for these variables to provide a clearer understanding of how different types of play influence specific cognitive outcomes.

The results of this study suggest that play-based interventions can significantly enhance cognitive development in early childhood, particularly when the play methods are carefully aligned with the cognitive skills being targeted. Structured play activities, such as number card games and educational puzzles, showed the highest effectiveness in promoting cognitive growth, while more open-ended play, like LEGO, may have limited impact on certain cognitive domains. These findings contribute to the growing body of evidence supporting the use of play as a pedagogical tool in early childhood education, though further research is needed to explore the long-term effects of these interventions and the broader range of cognitive skills they may influence. Ultimately, this study highlights the need for educators to be selective and strategic in incorporating play into early learning environments, ensuring that the chosen play methods align with the developmental goals of their learners.

CONCLUSION

This study explored the effectiveness of various play methods in enhancing cognitive development among early childhood learners. The key findings indicate that structured play

activities, such as number card games and puzzle-based play, significantly improved cognitive outcomes. For instance, the use of number cards achieved 100% cognitive skill mastery (Hasni, 2019), while puzzle games demonstrated a substantial increase in cognitive abilities, from 46.15% in Cycle I to 84.6% in Cycle II (Syukron Al Mubarok & Amini, 2019). Additionally, educational games like Wordwall (Badriah et al., 2024) and the PAHIBU game (Ahmad et al., 2023) also contributed to notable improvements in children's cognitive skills. However, some play methods, such as LEGO-based play, did not significantly enhance specific cognitive skills like symbolic thinking (Syafrina & Adiningsih, 2020). The findings underscore the importance of carefully selecting play methods that align with specific cognitive developmental goals in early childhood education. Structured play activities have proven to be highly effective in promoting cognitive growth, particularly in skills such as number recognition, sequencing, and logical thinking. These results contribute to the broader understanding of play-based learning as an essential pedagogical tool in early childhood education, offering insights for educators on how to effectively implement play strategies to optimize cognitive development. Additionally, the research highlights the need to tailor play interventions based on the specific cognitive skills being targeted, ensuring that play-based learning is goal-oriented and developmentally appropriate.

Future research should focus on examining the long-term effects of play-based learning on cognitive development, particularly in areas beyond numeracy and symbolic thinking. Studies involving larger sample sizes and diverse populations would also provide a more comprehensive understanding of how different play strategies impact various cognitive domains. Furthermore, exploring the role of more open-ended, creative play activities in promoting other cognitive functions, such as problem-solving and memory, could offer valuable insights. Research on integrating technology-based play, such as educational apps or interactive games, into early learning environments may also be beneficial in expanding the range of cognitive skills developed through play. This study reinforces the vital role of structured play in enhancing cognitive development in early childhood education. By strategically incorporating play-based learning, educators can foster significant cognitive growth in young learners, addressing key developmental milestones. The findings contribute to the ongoing discourse on the importance of play in early education, offering practical recommendations for educators and laying the groundwork for future research on innovative play strategies.

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