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The Impact of Puzzle Games on the Creative Thinking Skills of Kindergarten Students at St. Maria Ratu Rosario Waipaddi Southwest Sumba

Maria Anjelita Intan Nairo[1)], Emanuel Bai Samuel Kase[2)] Emanuel Inocentius D. Je'e Maly[3)]
STIPAS Keuskupan Agung Kupang[1,2,3)]
marianjelanairo@gmail.com[1)], emankase.stipaskak@gmail.com[2)], juvent476@gmail.com[3)]

Abstract

This research investigates the impact of puzzle games on the creative thinking skills of kindergarten students at St. Maria Ratu Rosario Waipaddi in Southwest Sumba, Indonesia. Using a qualitative descriptive method, the study explores how puzzle play influences children's cognitive, social, and emotional development. Data were collected through interviews, observations, and document analysis. The results indicate that puzzle activities significantly enhanced creativity, spatial reasoning, problem-solving, and verbal expression. Children also demonstrated greater engagement, independence, and collaboration. The study identifies both supporting and inhibiting factors, including the role of teachers, parental involvement, classroom environment, and material availability. While implementation faced certain challenges, such as limited resources and uneven developmental readiness among students, educators successfully adapted puzzle-based instruction to the classroom context. The research concludes that puzzle games serve as effective, low-cost tools for fostering holistic development in early childhood. These findings offer valuable insights for educators and policymakers seeking innovative, inclusive, and contextually appropriate approaches to strengthen learning outcomes in rural and underserved educational settings.

Keywords: Creative Thinking Skill, Early Childhood Education, Kindergarten Students, Puzzle Games.

Introduction

Early childhood education plays an essential role in fostering the comprehensive development of young children. It supports growth across various developmental areas, including cognitive, emotional, physical, and social domains (Elkind, 2007; Daly & Beloglovsky, 2018). Within the Indonesian context, kindergartens serve as foundational institutions where structured and engaging learning experiences are introduced. These early learning environments lay the basis for lifelong education by encouraging curiosity, adaptability, and a sense of security in a supportive setting (Cankaya et al., 2023).

Rather than focusing solely on formal academic instruction, kindergarten education prioritizes play based experiences that correspond with natural developmental stages. Through

this approach, children participate in hands on learning activities that promote exploration, self motivation, and discovery (Bruehl, 2011; Nachmanovitch, 1990). Within such pedagogical frameworks, play is not considered a deviation from learning, but is recognized as a purposeful and strategic instructional method (Goodliff et al., 2017). It enables educators to design learning opportunities that align with children's needs, abilities, and preferred learning modalities (Bers, 2008).

Among various instructional tools integrated into play centered environments, puzzle based activities have proven to be particularly effective. These games require children to apply higher order thinking as they assemble individual pieces into meaningful configurations (Phelps, 2012). The activity promotes cognitive adaptability, logical reasoning, and imaginative thought (Aksoy & Aksoy, 2022). Additionally, puzzle games help children confront challenges and experience satisfaction derived from overcoming problems through thoughtful engagement (Chookah et al., 2024).

At St. Maria Ratu Rosario Waipaddi Kindergarten, puzzle activities are a regular part of the learning process. These tasks contribute to the cultivation of essential skills such as early literacy and numeracy. More significantly, they promote creative expression and a mindset oriented toward innovation (Sarama & Clements, 2009). During play, children construct shapes and objects using diverse materials including blocks, illustrations, and symbolic forms (Hariyani & Bintari, 2021). The combination of independent and collaborative play enhances both personal learning and group interaction.

Creativity is viewed as a central element within early childhood educational goals. It enables children to express ideas, manipulate representations, and generate novel perspectives based on existing knowledge (Daly & Beloglovsky, 2018). While some aspects of creativity may be inherent, its development is largely supported by exposure to stimulating learning environments and engaging educational tools (Elkind, 2007; Ungau et al., 2023). For creativity to thrive, educators must intentionally plan and implement activities that ignite curiosity and encourage imaginative experimentation (Bruehl, 2011).

Initial classroom observations indicated that children who had not previously engaged in structured puzzle activities often displayed limited initiative and hesitation in problem solving tasks. These learners tended to be passive when interacting with instructional materials, showing restricted levels of creative expression. Such findings point to the importance of intentional

interventions that can activate internal motivation and encourage independent engagement (Lubis et al., 2023).

Following the introduction of structured puzzle based instruction, a notable change occurred in students' approach to learning. They began to display enthusiasm when facing new challenges, attempted varied strategies, and demonstrated increased social interaction. Teachers observed that learners became more autonomous and confident in navigating tasks. This development not only reflected behavioral adjustments but also indicated enhanced cognitive processing supported by hands on, experiential learning (Aksoy & Aksoy, 2022; Torres et al., 2021).

The use of puzzle games also contributed to the improvement of fine motor control and concentration. As children manipulated puzzle components with attention and care, they engaged in visual spatial reasoning. These coordinated actions supported accuracy, cognitive structure, and the capacity to recognize patterns and relationships among distinct elements (Wedani & Suyanta, 2023). These foundational abilities are essential for complex academic thinking and are particularly valuable in subsequent stages of formal education (Sarama & Clements, 2009).

In addition to these cognitive and physical benefits, the implementation of puzzle play also facilitated the development of cooperative learning. Teachers noted that children communicated with one another, negotiated responsibilities, and celebrated their collective success during group activities. These moments of interaction encouraged the emergence of empathy, mutual respect, and shared accountability, which are fundamental components of social emotional learning (Trawick-Smith et al., 2016).

Engagement in puzzle based learning was also associated with improvements in task persistence and attentional control. Completing puzzles required learners to remain focused over extended periods, demonstrate patience, and overcome difficulties with determination. These attributes, although non academic in nature, are vital learning dispositions that influence long term academic achievement (Schmitt et al., 2018). Their early development supports the formation of learners who are both self directed and resilient (Aksoy & Aksoy, 2022).

One of the most significant benefits of puzzle based instruction lies in its capacity to support differentiated learning. Children with diverse developmental profiles were able to participate according to their own abilities and progress at a comfortable pace. While some learners concentrated on identifying colors and shapes, others were challenged to construct more

complex patterns (Wina et al., 2019). This flexibility promotes inclusive education by addressing varied learning needs and capacities (Cankaya et al., 2025).

Beyond its instructional function, puzzle play also allowed teachers to conduct formative assessments in a naturalistic setting. By observing children during puzzle sessions, educators could identify problem solving approaches, creative tendencies, and social behaviors. These insights provided critical information that supported personalized instruction without relying on formal testing procedures (Torres et al., 2021).

The present study aims to investigate the role of puzzle games in enhancing the creative thinking abilities of kindergarten students at St. Maria Ratu Rosario Waipaddi. In addition, it seeks to identify contextual elements that either facilitate or hinder the effective integration of puzzle based instruction in early childhood education. This research responds to a growing demand for innovative, inclusive, and developmentally appropriate educational practices that nurture twenty first century competencies from an early age.

Methodology

This study adopted a qualitative descriptive approach to explore and document the lived experiences and perspectives of participants. The research was conducted at St. Maria Ratu Rosario Waipaddi Kindergarten in Southwest Sumba, East Nusa Tenggara Province. Data collection involved semi-structured interviews with teachers, the principal, and selected students, complemented by direct classroom observations and document analysis. The principle of triangulation was applied to enhance the reliability and validity of the findings by incorporating multiple sources of evidence.

To further ensure methodological rigor, the researchers engaged in prolonged field interaction and employed member checking to verify the accuracy of interpretations. Interview transcripts were systematically coded and categorized using NVivo software to identify patterns and recurring themes related to the development of students' creative thinking through puzzle-based learning. In addition, detailed field notes from classroom observations enriched the data by providing contextual insights. Artifacts such as student work and lesson plans were also analyzed to support the interview data and to gain a more comprehensive understanding of the pedagogical strategies used by educators.

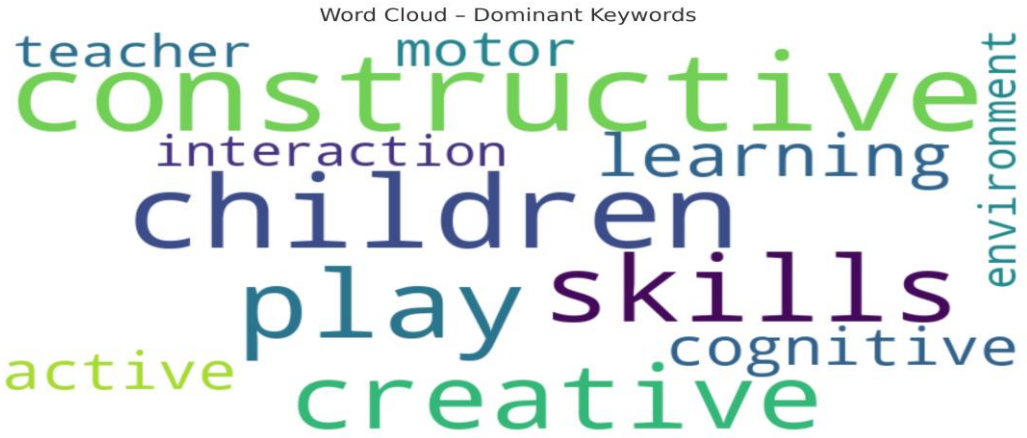
Ethical protocols were strictly followed throughout the research process. These included obtaining informed consent, protecting participant anonymity, and respecting the right of all

participants to withdraw at any stage of the study. By employing a comprehensive and ethically sound methodology, the study was able to generate a nuanced understanding of the role that manipulative play materials played in supporting the cognitive and creative development of young learners within a Catholic early childhood education setting

Research Findings

The data were analyzed using a thematic approach supported by NVivo software. Interviews were conducted with eight participants, including a school principal, several teachers, and students. These interviews were examined to identify patterns and major themes related to the use of constructive play in enhancing the creative thinking abilities of early childhood learners. The thematic analysis yielded four primary themes: (1) the benefits of constructive play, (2) its implementation in school settings, (3) supporting and inhibiting factors, and (4) the roles of teachers and school principals.

1. Word Cloud: Dominant Keywords



The word frequency analysis generated a word cloud in which terms such as *creative, children, play,* and *constructive play* appeared most frequently. These keywords reflect the informants' consistent focus on the role of play in fostering creativity, independence, and enthusiasm for learning among young children.

2. Thematic Findings Based on Coding

From the coding process, the four key themes were developed as follows:

a. Benefits of Constructive Play

Constructive play was perceived to provide direct benefits to children's development. Three sub-themes emerged in relation to this theme:

- Enhancing creativity (N = 9): Children were encouraged to use their imagination when assembling various forms.
- Increasing enthusiasm for play (N = 7): The activity helped children become more active and engaged in their learning.
- Promoting social interaction (N = 5): Children collaborated and communicated with their peers during play.

b. Implementation of Constructive Play in School

Although constructive play had already been introduced in schools, the level of implementation varied:

- Already implemented (N = 6): The activity was integrated into classroom learning and made available to the children.
- Not yet fully optimized (N = 4): Several constraints, such as limited resources and time allocation, affected consistent implementation.

c. Supporting and Inhibiting Factors

Multiple factors were identified as influencing the effectiveness of constructive play:

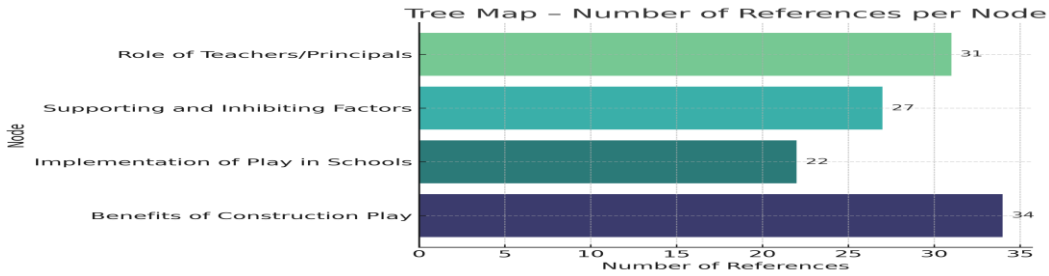
- Learning environment (N = 4): The availability of physical space and the classroom atmosphere contributed to successful play experiences.
- Support from teachers and parents (N = 6): Guidance and encouragement from adults were considered essential.
- Level of game difficulty (N = 3): The complexity of the play needed to align with the children's age and cognitive abilities.

d. Roles of Teachers and Principals

Both teachers and school principals played key roles in ensuring that constructive play supports children's creative development:

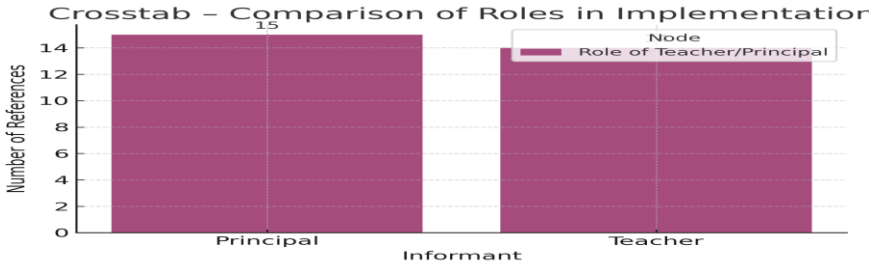
- Encouraging creative activities (N = 6)
- Fostering a positive learning environment (N = 5)
- Providing diverse learning materials and play media (N = 4)

3. Tree Map: Distribution of References by Theme



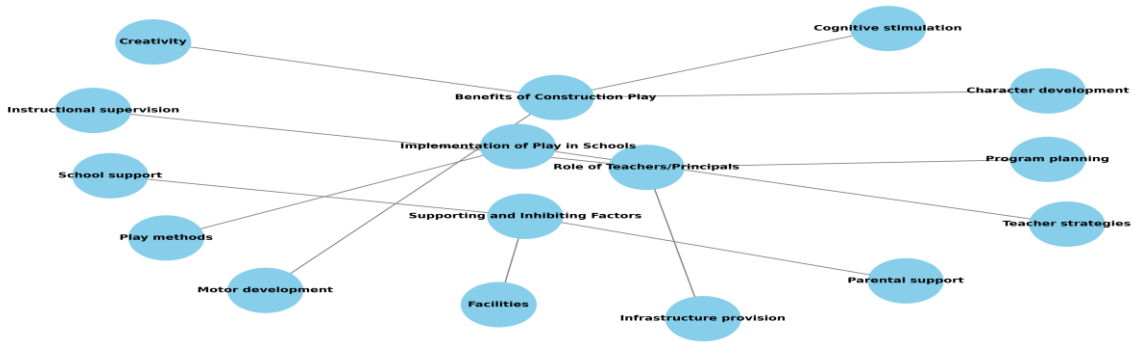
A visual representation of reference frequency using a Tree Map revealed that the theme *benefits of constructive play* had the highest number of coded references (N = 34), followed by *roles of teachers and principals* (N = 31), *supporting and inhibiting factors* (N = 28), and *implementation in school* (N = 22). This suggests that participants most frequently discussed the developmental impact of constructive play.

4. Crosstab: Comparison of Roles in Implementor



The crosstab analysis for the theme *roles of teachers and principals* indicated a relatively balanced contribution between school principals (N = 15) and teachers (N = 16). This finding reflects a shared commitment from both parties in promoting constructive play as a means to develop students' creative thinking skills.

5. Sub-Theme Diagram: Hierarchical Structure of Nodes



The sub-theme diagram illustrated the number of child nodes identified under each major theme. The themes *benefits of constructive play* and *roles of teachers and principals* each

consisted of three sub-themes, indicating the depth and richness of responses associated with these two thematic areas.

Summary of Findings

The analysis confirmed that constructive play has a significant impact on the development of students' creative thinking skills. Through engaging in structured yet flexible activities, children were able to strengthen their imagination, logical reasoning, social collaboration, and fine motor skills. The effectiveness of constructive play in educational settings depends greatly on the availability of a supportive learning environment and the active involvement of both teachers and school leadership in facilitating meaningful play experiences

Discussion

The findings of this study indicate that puzzle games play a vital role in enhancing the creative thinking skills of kindergarten students. Classroom implementation of constructive play allowed children to manipulate shapes, explore visual forms, and interact with various materials in ways that supported imaginative engagement. These experiences contributed to the development of spatial perception and cognitive flexibility. In line with Sarama and Clements (2009), learning through play enables children to engage in complex thinking processes that promote early conceptual understanding.

Consistent exposure to puzzle-based tasks motivated learners to explore multiple configurations and generate original solutions. As children attempted to complete arrangements, they refined their problem-solving strategies and displayed signs of metacognitive thinking. This capacity to generate diverse ideas is widely acknowledged as central to creative development. Aksoy and Aksoy (2022) highlight that block-based activities cultivate such cognitive growth by encouraging independent discovery and mental flexibility.

Students' involvement in puzzle activities was marked by increased motivation and initiative. Learners approached each challenge with energy and sustained effort, even when confronted by difficulties. This shift in behavior reflected heightened autonomy and an eagerness to explore learning materials. As Aksoy and Aksoy (2022) have noted, prolonged emotional engagement in play can improve attention span and foster deeper learning outcomes in early childhood contexts.

The interpersonal dimension of puzzle games emerged as another key aspect of their instructional value. In classroom settings, children frequently collaborated in small groups,

exchanged materials, and worked through challenges together. These cooperative interactions cultivated empathy, teamwork, and mutual respect. According to Iriyanto et al. (2019), peer collaboration in educational play fosters both social and communication competencies critical for early development.

In addition to promoting cognitive and social growth, puzzle activities enhanced fine motor coordination. Children demonstrated improved precision and hand-eye coordination as they manipulated puzzle pieces into place. These physical skills are essential for academic tasks such as handwriting and drawing. Karimah and Padilah (2020) identified similar patterns, noting that the development of motor control contributes significantly to learning readiness in young children.

The study also highlighted the emergence of executive functioning skills through puzzle-based learning. Activities requiring prolonged attention and perseverance supported the development of self-regulation. Children gradually demonstrated increased patience, persistence, and the ability to manage frustration during tasks. These findings align with Ramadani and Pusari (2018), who reported that structured play strengthens children's capacity for discipline and emotional control in educational environments.

Despite being embedded in daily classroom routines, puzzle-based instruction at Waipaddi Kindergarten faced implementation challenges. These included limited supplies of puzzle materials, space constraints, and differences in children's developmental readiness. Nevertheless, teachers responded by adjusting instructional strategies and using available resources creatively, allowing meaningful learning experiences to continue under constrained conditions.

A supportive learning environment played a critical role in the effective use of puzzle games. Teachers and administrators facilitated exploration by arranging learning spaces, offering a variety of materials, and fostering an open classroom culture. Egan (2005) suggests that such imaginative approaches succeed when educators create environments that encourage inquiry and allow children to experiment freely.

Although some students had limited familiarity with puzzles prior to classroom engagement, many adapted quickly through repeated opportunities for practice. Initial hesitation was often associated with a lack of exposure at home. Over time, however, classroom-based interventions reduced this gap. Bers (2008) points out that early education programs are uniquely

positioned to bridge developmental disparities through accessible and structured learning experiences.

Puzzle activities were frequently integrated with curriculum themes across subject areas. Educators linked these tasks to lessons in literacy, numeracy, and science, enabling children to apply abstract concepts through concrete experiences. Phelps (2012) supports this pedagogical approach, stating that integrated play with physical materials reinforces content understanding and supports holistic development in early learners.

Language development was another area of growth associated with puzzle play. While describing their creations, children expanded their vocabulary and improved their expressive language. Spatial and directional terms such as above, between, and near emerged naturally during these sessions. Cankaya, Yildiz, and Cankaya (2023) argue that manipulative play environments support both verbal and non-verbal communication skills in preschool education.

Teachers also used puzzle-based activities as a means of formative assessment. Observing children during these tasks provided insight into their problem-solving methods, creative thinking, and social behaviors. These observations enabled more personalized instruction. Torres et al. (2021) emphasize that observation during physical play offers valuable data for tracking early childhood development.

The successful implementation of puzzle play was supported by the joint efforts of teachers and school leadership. Both groups contributed to lesson planning, material preparation, and the promotion of a collaborative classroom environment. Goodliff et al. (2017) maintain that shared leadership in early education enhances pedagogical innovation and fosters sustainable program development.

Despite positive outcomes, several barriers remained. Challenges included insufficient resources, inconsistent learner participation, and difficulties maintaining engagement. These findings underscore the importance of equitable material distribution and strategic instructional planning. Indah and Yusma (2021) recommend that early education settings prioritize resource accessibility and instructional flexibility to meet diverse developmental needs.

In summary, the use of puzzle games in early childhood education was found to support creative thinking, problem-solving, and social emotional learning. The findings reinforce the value of constructive play as an inclusive and adaptable teaching strategy. Even in settings with

limited resources, well-planned play activities can significantly enrich the learning experience and equip children with essential skills for the twenty first century.

Limitations and Implications for Future Research

This study was conducted in a single rural kindergarten, which may limit the generalizability of its findings to other educational contexts. The use of a qualitative descriptive approach provided rich insights but did not allow for statistical analysis or measurement of effect size. Data collection relied heavily on interviews and observations, which, while valuable, carry the potential for subjectivity. Future research should involve larger and more diverse samples across different regions to examine the broader applicability of puzzle-based learning. Incorporating mixed methods or quasi-experimental designs may help provide measurable outcomes and strengthen the evidence base. Longitudinal studies are also recommended to explore the lasting impact of constructive play on children's cognitive and creative development.

Conclusion

This study demonstrates that puzzle games play a significant role in enhancing the creative thinking abilities of kindergarten students, particularly in educational settings with limited resources. Through constructive play, children developed cognitive flexibility, spatial reasoning, and problem solving skills. The activities also fostered growth in social and emotional domains, including collaboration, empathy, and resilience. Teachers and school leaders contributed meaningfully to the success of implementation by creating supportive learning environments and integrating puzzle activities into thematic instruction. Despite challenges such as limited materials and varied student readiness, the consistent use of puzzle games proved to be an effective and adaptable strategy. The findings support the integration of affordable and practical learning tools into early childhood education as a means to promote creativity and holistic development. These insights are especially relevant for schools in underserved regions that seek to cultivate essential skills for the twenty first century through innovative pedagogical practices. Continued support from educators and policymakers is essential for sustaining and expanding the impact of learning through play in early education.

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