



IMPLEMENTATION OF LOOSE PARTS-BASED MANIPULATIVE MEDIA IN LEARNING ACTIVITIES AT TK NEGERI PEMBINA KUPANG

Article Information

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Abstract

Background: Loose parts-based manipulative media offer flexible and creative learning resources that encourage children to explore, construct, and express ideas through hands-on experiences in early childhood education. Although these media have been widely introduced to stimulate children's development, their implementation still faces challenges related to learning organization, children's active involvement, and the ability of teachers to facilitate meaningful play experiences. **Objective:** This study aimed to examine the implementation of loose parts-based manipulative media in learning activities by identifying teachers' preparation, learning processes, and children's responses at TK Negeri Pembina Kupang. **Method:** This study used a qualitative descriptive research design. Data were obtained through observation of learning activities, semi-structured interviews with teachers, and analysis of learning documentation. The participants involved one early childhood education teacher and children aged 4–5 years. Data analysis followed the Miles and Huberman interactive model, including data condensation, data presentation, and conclusion formulation. Data validity was strengthened through triangulation of sources and methods. **Results:** The study showed that teachers implemented loose parts-based manipulative media by preparing various natural and recycled materials, designing exploration-based activities, and creating opportunities for children to engage in independent discovery. The use of loose parts encouraged children to participate actively, demonstrate creativity, communicate with peers, and develop problem-solving abilities during learning activities. However, several children still experienced difficulties in organizing materials, completing tasks independently, and maintaining focus without teacher assistance. Continuous guidance and structured learning instructions were needed to optimize children's involvement. **Novelty:** This study emphasizes the role of learning design and teacher facilitation as determining factors in maximizing the educational value of loose parts-based manipulative media in kindergarten settings. **Conclusion:** Loose parts-based manipulative media provide valuable opportunities for active, creative, and contextual learning. Effective implementation requires well-prepared teachers, appropriate activity designs, and consistent support to strengthen children's independence and developmental progress.

Keywords: Loose Parts, Manipulative Media, Early Childhood Education, Children's Independence.

INTRODUCTION

Early childhood education (ECE) represents a critical stage in human development because children experience rapid changes in physical, cognitive, social-emotional, language, and creative abilities during the first years of life. This developmental period requires appropriate educational stimulation through learning experiences that are meaningful, contextual, and aligned with children's characteristics. Learning in early childhood should not emphasize academic achievement alone but should provide opportunities for children to explore, interact, communicate, and construct knowledge through active experiences (Nicolopoulou, 2022; Yogman et al., 2018). Therefore, kindergarten learning environments need to be designed to encourage children's curiosity, creativity, independence, and active involvement.

Children aged 4–5 years are still developing their ability to understand concepts through symbolic representation; therefore, concrete and experiential learning activities remain essential. Play-based learning is considered an appropriate pedagogical approach because play allows children to learn naturally through investigation, manipulation, imagination, and social interaction. Through play activities, children develop cognitive flexibility, problem-solving abilities, communication skills, and self-regulation while experiencing meaningful learning processes (Pyle & Danniels, 2017). Consequently, kindergarten teachers are required to provide learning environments that facilitate exploration rather than relying on teacher-centered instruction.

One strategy that supports play-based learning is the utilization of manipulative learning media. Manipulative media provide children with opportunities to interact directly with objects by touching, arranging, modifying, and transforming materials according to their ideas. Such experiences strengthen children's understanding because knowledge is constructed through direct interaction between children and their physical environment. Previous studies have indicated that hands-on learning activities contribute to children's fine motor development, cognitive skills, creativity, and engagement during classroom activities (Carbonneau et al., 2013). Therefore, the selection of appropriate manipulative materials becomes an important consideration in early childhood classroom practices.

Among various manipulative learning resources, loose parts-based media have received increasing attention because they provide open-ended learning experiences. Loose parts refer to materials that can be moved, combined, redesigned, and transformed in various ways according to children's imagination. These materials may include natural objects and recycled resources such as stones, leaves, wood pieces, bottle caps, cardboard, and other environmentally available materials. Unlike conventional instructional materials with fixed functions, loose parts encourage children to create multiple solutions, make decisions, and express individual ideas during play activities (Nicholson, 1971; Daly & Beloglovsky, 2015).

The implementation of loose parts-based learning has been associated with various developmental benefits for young children. Previous research has shown that loose parts activities can stimulate creativity, increase children's exploration behavior, and encourage collaborative interaction among peers. Children are provided with opportunities to experiment, negotiate ideas, and develop problem-solving strategies through flexible play experiences (Houser et al., 2019). In addition, the use of loose parts supports sustainable educational practices because teachers can utilize affordable materials from the surrounding environment while creating innovative learning experiences.

However, previous studies related to loose parts-based media have predominantly focused on measuring its effects on specific developmental outcomes, such as creativity, cognitive development, and fine motor skills. Limited research has examined how loose parts-based manipulative media are implemented in authentic classroom contexts, particularly concerning teachers' preparation, instructional strategies, classroom management, and children's engagement during learning activities. Understanding the implementation process is important because the success of loose parts learning depends not only on the availability of materials but also on teachers' ability to design meaningful activities and provide appropriate guidance.

At TK Negeri Pembina Kupang, loose parts-based manipulative media have been introduced as part of classroom learning activities by utilizing various natural and recycled materials available in the school environment. Initial observations showed that children demonstrated different levels of participation when engaging with loose parts activities. Some children actively explored materials, generated creative ideas, and completed tasks independently, while other children still required teacher assistance to select materials, organize objects, and continue activities until completion. These differences indicate that children's learning experiences are influenced by several factors, including teacher scaffolding, classroom interaction patterns, and children's developmental readiness.

This condition highlights the need for an in-depth investigation of the implementation process of loose parts-based manipulative media in early childhood classrooms. A qualitative approach is considered appropriate because it enables researchers to understand classroom phenomena naturally by examining teacher practices, children's responses, and learning interactions. Through direct observation and exploration of classroom experiences, researchers can identify how loose parts media function as learning resources and how teachers facilitate children's gradual development of independence.

The novelty of this study lies in its emphasis on the implementation dimension of loose parts-based manipulative media rather than merely evaluating learning outcomes. This study examines the relationship between teacher preparation, classroom implementation strategies, and

children's engagement during learning activities. Furthermore, children's independence is positioned as an important aspect because meaningful play experiences should gradually encourage children to make choices, solve problems, and complete learning tasks with reduced dependence on adults.

Therefore, this study aimed to analyze the implementation of loose parts-based manipulative media in learning activities for children aged 4–5 years at TK Negeri Pembina Kupang. Specifically, this study examined teachers' readiness in preparing learning activities, the process of implementing loose parts-based media in classroom practices, and children's engagement and independence during learning activities. The findings are expected to provide practical implications for early childhood educators in designing creative, contextual, and child-centered learning environments.

METHODS

This study employed a qualitative descriptive research design to investigate the implementation of loose parts-based manipulative media in learning activities for children aged 4–5 years at TK Negeri Pembina Kupang. A qualitative approach was selected because this study aimed to understand teacher practices, classroom interactions, and children's learning experiences within a natural educational context. The descriptive design enabled researchers to describe systematically how loose parts media were prepared, implemented, and experienced by children during classroom learning activities (Creswell & Poth, 2023).

The researcher acted as the primary instrument who was directly involved in determining the research focus, collecting data, analyzing information, and interpreting findings. To ensure systematic observation, research instruments were developed based on three main aspects: teacher readiness in preparing activities and materials, implementation of loose parts-based manipulative learning including teacher guidance and children's exploration, and children's engagement reflected through participation, creativity, interaction, problem-solving, and independence during learning activities.

The research was conducted at TK Negeri Pembina Kupang involving children aged 4–5 years and one classroom teacher as participants. Participants were selected through purposive sampling because they were considered capable of providing relevant information related to the implementation of loose parts-based manipulative media. The study involved primary and secondary data sources obtained from classroom observations, interviews, and documentation to provide comprehensive information about the learning process.

Primary data were collected through classroom observations and semi-structured interviews. Observations were conducted during learning activities to identify teacher preparation, classroom implementation strategies, children's responses, and interaction patterns during loose parts activities. Interviews with the classroom teacher were conducted to explore

information regarding lesson planning, material selection, implementation challenges, and teacher strategies in supporting children's participation and independence during learning experiences.

Secondary data were obtained through documentation analysis, including daily learning plans, classroom activity records, children's learning products, and photographs of learning activities. Documentation functioned as supporting evidence to strengthen the interpretation of observational and interview findings. The combination of multiple data sources allowed researchers to obtain a more comprehensive understanding of the implementation process of loose parts-based manipulative media in early childhood learning environments (Sugiyono, 2022).

Data collection techniques consisted of observation, interviews, and documentation. Observation was conducted directly in the classroom to capture authentic interactions between teachers, children, and learning materials. Through observation, researchers documented children's exploration behaviors, communication, participation levels, and independence when engaging with loose parts materials. This technique provided important information regarding the actual implementation of manipulative media during daily learning activities.

Semi-structured interviews were conducted with the classroom teacher to obtain deeper information regarding the preparation, implementation, evaluation, and challenges of using loose parts-based manipulative media. This technique provided flexibility for researchers to explore participants' experiences while maintaining the focus of the research objectives. Documentation analysis was also conducted to examine learning records and activity evidence that supported findings from observations and interviews (Creswell & Creswell, 2023).

The collected data were analyzed using the interactive qualitative data analysis model developed by Miles, Huberman, and Saldaña (2020). The analysis process involved three interconnected stages: data condensation, data display, and conclusion drawing or verification. Data condensation was conducted by selecting, simplifying, organizing, and categorizing relevant information from observations, interviews, and documentation related to teacher practices and children's learning engagement.

After condensation, the data were presented systematically through descriptive narratives and thematic categories to identify patterns in the implementation of loose parts-based manipulative media. The final stage involved drawing conclusions and verifying findings continuously by comparing interpretations with collected evidence. This process ensured that the research findings accurately represented classroom realities and answered the research objectives.

The credibility of the findings was maintained through triangulation techniques involving both source and method comparisons. Source triangulation was conducted by comparing information from teachers, children's activities, and classroom documentation. Meanwhile, technique triangulation was performed by comparing data obtained from observations,

interviews, and document analysis. These procedures increased the consistency, reliability, and trustworthiness of qualitative interpretations (Moleong, 2021; Sugiyono, 2022).

RESULTS AND DISCUSSION

RESULTS

1. Observation Results

Based on classroom observations conducted during learning activities using loose parts-based manipulative media at TK Negeri Pembina Kupang, the researcher found that teachers demonstrated adequate preparation before implementing learning activities. The teacher prepared various loose parts materials obtained from natural and recycled resources and organized them according to the planned learning objectives. The learning environment was arranged attractively to encourage children's curiosity and exploration. At the beginning of the activity, the teacher introduced the materials, explained their possible uses, and provided instructions regarding classroom rules and learning procedures.

The children aged 4–5 years showed positive responses toward the implementation of loose parts-based manipulative media. Most children demonstrated enthusiasm, curiosity, and active involvement when interacting with the available materials. They explored different objects, combined materials according to their ideas, and communicated with teachers and peers during the learning process. The use of loose parts encouraged children to participate more actively because the materials provided opportunities for direct manipulation, creativity, and imaginative play.

However, observations also revealed differences in children's levels of independence during learning activities. Some children were able to select materials, arrange objects, and complete tasks with limited assistance, while others still depended on teacher instructions and demonstrations. Several children required repeated explanations and continuous guidance when exploring the materials. This condition indicates that although loose parts-based manipulative media successfully increased children's engagement, the development of independent learning behaviors required gradual stimulation and consistent teacher support.

The observation findings showed that teacher scaffolding played an important role in supporting children's successful involvement in loose parts activities. Teachers provided assistance through demonstrations, open-ended questions, and encouragement rather than directly completing children's tasks. This approach allowed children to explore materials while gradually developing confidence and problem-solving abilities. Therefore, the effectiveness of loose parts-based manipulative media was strongly influenced by the quality of teacher facilitation during classroom implementation.

2. Teachers' Readiness in Planning Learning Activities

Interview results indicated that teachers at TK Negeri Pembina Kupang demonstrated good readiness in preparing loose parts-based learning activities. Teachers collected various materials from the surrounding environment, including natural objects and recycled materials such as leaves, stones, wooden pieces, cardboard, and other reusable resources. Before classroom implementation, materials were selected, cleaned, and arranged to ensure safety and suitability for children aged 4–5 years. This preparation reflected teachers' awareness of the importance of providing learning media that were attractive, safe, and developmentally appropriate.

Teachers also prepared the learning environment by arranging materials in an invitation-to-play format that encouraged children to explore independently. The arrangement of materials was designed to stimulate children's curiosity and motivate them to create various forms according to their imagination. In addition, teachers prepared learning objectives, activity procedures, and assessment strategies to monitor children's participation, creativity, and developmental progress during the activities.

Nevertheless, teachers reported several challenges during the preparation process. These challenges included limited time for collecting suitable materials, maintaining consistency in preparing various loose parts resources, and organizing materials based on children's developmental needs. Despite these challenges, teachers attempted to overcome these limitations by utilizing materials available in the school environment and adapting activities according to classroom conditions.

These findings demonstrate that teacher readiness is an important factor in successful loose parts implementation. The availability of materials alone is insufficient without careful planning and meaningful learning design. Teachers functioned not only as providers of learning resources but also as facilitators who created conditions that allowed children to explore, experiment, and construct knowledge through play experiences.

3. The Use of Manipulative Media in Learning Activities

The implementation of loose parts-based manipulative media began with the teacher introducing learning materials and explaining how children could use them during activities. Teachers established classroom agreements and provided simple demonstrations to ensure that children understood the learning process. To maintain children's attention and motivation, teachers integrated songs, questions, and interactive conversations before beginning the main activity.

During the core learning activities, children actively engaged in manipulating materials through activities such as arranging, assembling, grouping, creating patterns, and constructing objects based on their own ideas. The activities encouraged children to develop creativity, fine

motor coordination, communication skills, and problem-solving abilities. The flexible characteristics of loose parts allowed children to produce different creations and express their imagination without being limited to a single expected outcome.

Although children showed high enthusiasm during the activities, some children still required additional guidance when selecting materials, organizing their ideas, and completing tasks. Teachers responded by providing repeated demonstrations, asking guiding questions, and offering encouragement. These strategies helped children remain involved while gradually increasing their confidence in exploring materials independently.

The findings indicate that loose parts-based manipulative media created meaningful learning experiences because children learned through direct interaction with concrete objects. The learning process reflected a child-centered approach in which children actively constructed understanding through exploration and experimentation. However, teacher support remained essential to ensure that learning activities were structured, purposeful, and appropriate for children's developmental levels.

4. Children's Engagement in Learning Activities

The implementation of loose parts-based manipulative media significantly influenced children's engagement during classroom activities. Children demonstrated increased interest when interacting with materials because they could directly touch, move, combine, and transform objects according to their ideas. The availability of diverse materials encouraged children to participate actively, communicate with peers, and express creativity during play-based learning activities.

Observation and interview findings revealed variations in children's engagement levels. Some children showed confidence in selecting materials, creating unique structures, and collaborating with classmates. They were able to follow classroom procedures and complete activities with minimal teacher assistance. However, other children remained dependent on teacher direction, experienced difficulties in initiating activities, and required encouragement to participate consistently.

Teachers explained that maintaining children's engagement required continuous innovation in providing learning materials and designing activities. The introduction of new materials and varied activity settings was considered important to sustain children's curiosity and prevent boredom. Teachers also emphasized that children's independence developed gradually through repeated experiences and supportive learning environments.

Overall, the findings indicate that loose parts-based manipulative media effectively stimulated children's participation, creativity, and interaction. However, children's independence was not immediately achieved through the availability of materials alone. Continuous teacher

scaffolding, repeated opportunities for exploration, and supportive classroom interactions were necessary to help children gradually develop confidence and independent learning behaviors.

DISCUSSION

1. Teachers' Readiness in Planning Learning Activities

The findings of this study indicate that teachers at TK Negeri Pembina Kupang demonstrated good readiness in planning learning activities using loose parts-based manipulative media. Teachers prepared various natural and recycled materials, selected materials according to children's developmental characteristics, and organized the classroom environment to encourage exploration. The preparation process included cleaning, arranging, and presenting materials through an invitation-to-play approach. This finding shows that the effectiveness of loose parts implementation is strongly influenced by teachers' ability to design meaningful learning experiences rather than merely providing materials.

The teacher's readiness observed in this study reflects the importance of professional planning in early childhood education. Loose parts materials have flexible characteristics that require teachers to design activities creatively while maintaining alignment with learning objectives. The teacher's role is not only as a provider of materials but also as a facilitator who creates opportunities for children to investigate, experiment, and construct knowledge through play. This finding is consistent with Hanif and Pramudyani (2023), who explained that teacher scaffolding and preparation are essential in optimizing children's experiences when using loose parts materials.

Furthermore, the preparation of loose parts activities in this study demonstrates the relevance of child-centered learning principles. Teachers created learning environments that allowed children to make choices and explore materials based on their own ideas. This finding supports Tabi'in et al. (2024), who emphasized that the integration of loose parts supports the implementation of 21st-century learning in early childhood education by promoting creativity, flexibility, and active participation. Therefore, teacher readiness becomes an important foundation for implementing loose parts-based learning effectively.

2. Implementation of Loose Parts-Based Manipulative Media in Learning Activities

The findings reveal that loose parts-based manipulative media provided meaningful learning experiences for children at TK Negeri Pembina Kupang. During classroom activities, children were encouraged to touch, arrange, combine, and transform materials into various forms. These activities supported hands-on learning experiences because children gained knowledge through direct interaction with concrete objects. The open-ended characteristics of loose parts allowed children to explore different possibilities and develop creative solutions based on their imagination.

The implementation process showed that loose parts media supported children's cognitive development through exploration and problem-solving activities. Children engaged in activities such as grouping, arranging, constructing, and counting materials, which stimulated logical thinking and early mathematical understanding. This finding is supported by Nasution et al. (2024), who reported that loose parts media contributed positively to children's cognitive development, particularly through play-based mathematical activities that encourage exploration and reasoning.

In addition, the teacher's instructional strategies played an important role in maximizing the benefits of loose parts activities. Teachers provided explanations, demonstrations, and guiding questions when children experienced difficulties. These strategies helped children understand the possibilities of materials without limiting their creativity. This finding aligns with Zeng and Ng (2025), who found that teacher questioning strategies during loose parts play can enhance children's learning processes by encouraging observation, reasoning, and scientific thinking.

The results also support Gull et al. (2022), who emphasized that loose parts environments provide opportunities for children to engage in creative and STEM-related exploration. The flexible nature of loose parts enables children to investigate relationships between objects, test ideas, and modify their creations. Therefore, the implementation of loose parts-based manipulative media in this study not only improved children's participation but also created meaningful opportunities for cognitive and creative development.

3. Children's Engagement, Creativity, and Interaction

The findings demonstrate that children showed high levels of engagement when participating in learning activities using loose parts-based manipulative media. Children appeared enthusiastic when introduced to various materials because they could directly observe, touch, and manipulate objects according to their interests. The availability of diverse materials encouraged children to participate actively, communicate ideas, and interact with their peers during play activities.

Children's engagement was also reflected in their creativity when producing different forms and structures from loose parts materials. Because the activities did not have a single correct answer, children were able to express imagination and develop unique creations. This finding is consistent with Wahyuningsih et al. (2023), who stated that loose parts learning environments support creativity development by allowing children to explore materials freely and construct ideas through play.

The findings also indicate that loose parts activities supported children's social interaction. During activities, children shared materials, discussed ideas, and observed their peers' creations. These interactions contributed to the development of communication and cooperation

skills. Mulyani et al. (2022) explained that appropriate learning media can increase children's engagement because attractive and meaningful materials encourage active participation in classroom activities.

Furthermore, the implementation of loose parts media encouraged teachers to continuously modify learning activities according to children's interests and developmental needs. This adaptive approach is consistent with Rachmah et al. (2024), who emphasized that innovation in early childhood learning requires teachers to provide flexible learning experiences that stimulate children's curiosity and active involvement. Therefore, loose parts media function not only as learning tools but also as environments that support children's creativity and interaction.

4. Children's Independence and Teacher Scaffolding

Although children demonstrated strong engagement during loose parts activities, the findings revealed that children's independence was still developing. Some children were able to select materials and complete activities with minimal assistance, while others required teacher guidance, demonstrations, and repeated explanations. This condition indicates that active participation does not automatically mean children have achieved independent learning behaviors.

The findings highlight the important role of teacher scaffolding in supporting children's transition toward independence. Teachers assisted children by providing encouragement, asking open-ended questions, and guiding them to find solutions rather than directly completing tasks. Through this process, children gradually developed confidence and willingness to explore materials independently. This finding supports Hanif and Pramudyani (2023), who emphasized that scaffolding helps young children move from teacher-supported activities toward more independent exploration.

The development of independence through play-based activities requires repeated experiences and supportive environments. Fadhilah and Kurnia (2023) explained that play activities provide important opportunities for children to practice decision-making, responsibility, and self-confidence. In this study, children's dependence on teacher support reflected their developmental stage rather than a limitation of loose parts media.

Overall, the findings indicate that loose parts-based manipulative media effectively promote meaningful learning experiences, creativity, and children's engagement. However, the successful implementation of loose parts activities depends on the balance between providing freedom for exploration and offering appropriate teacher guidance. Continuous scaffolding, adaptive teaching strategies, and varied learning experiences are necessary to gradually develop children's independence in early childhood education.

CONCLUSION

Main Findings: This study revealed that the implementation of loose parts-based manipulative media at TK Negeri Pembina Kupang provided meaningful learning experiences for children aged 4–5 years. The findings showed that teachers demonstrated good readiness in preparing learning activities, selecting appropriate materials, and organizing classroom environments that encouraged children's exploration. The use of loose parts-based manipulative media increased children's engagement, enthusiasm, creativity, and interaction during learning activities. However, children's independence in utilizing learning materials was still developing, as most children required continuous teacher assistance, demonstrations, and scaffolding to complete learning tasks. **Research Contribution:** This study contributes qualitative insights into the implementation process of loose parts-based manipulative media in early childhood education by highlighting the relationship between teacher readiness, learning implementation, children's engagement, and the development of independence. Unlike studies that mainly examine the effectiveness of loose parts media based on learning outcomes, this study emphasizes the importance of classroom processes and teacher scaffolding as essential factors that determine the success of loose parts-based learning activities. **Theoretical and Practical Implications:** The findings strengthen constructivist learning perspectives, which emphasize that children construct knowledge through direct interaction, exploration, and manipulation of concrete learning materials. Practically, this study suggests that early childhood teachers should design flexible play-based activities, provide open-ended learning opportunities, and apply appropriate scaffolding strategies to support children's gradual transition toward independent learning. Schools are also encouraged to utilize environmentally available materials as creative and meaningful learning resources. **Research Limitations and Future Directions:** This study was limited to one kindergarten setting with a small number of participants, which may restrict the generalizability of the findings. Future research is recommended to involve multiple early childhood education institutions with diverse characteristics and examine longitudinally how teacher scaffolding strategies influence children's independence, creativity, problem-solving skills, and sustained engagement in loose parts-based learning environments.

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