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Implementing Project-Based Learning with Loose Parts in Early Childhood Education: A Qualitative Descriptive Study

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Abstract
This study explores the implementation of Project-Based Learning (PjBL) using loose-part media in early childhood education at RA Umi Sundari, a private ECE institution in Indonesia. PjBL is recognized for promoting active, meaningful learning by engaging children in real-world projects that integrate exploration, problem-solving, and collaboration. Despite its growing adoption, the integration of PjBL with loose-part media—flexible, open-ended materials such as stones, bottle caps, or sticks—remains under-researched, especially in the context of private early childhood settings. Employing a qualitative descriptive method and an intrinsic case study design, this research investigates how PjBL with loose parts supports the cognitive, motor, and social development of young children. Data were collected through in-depth interviews, participant observation, and document analysis, and analyzed using thematic analysis. Findings reveal that loose-part-based PjBL fosters creativity, independence, and critical thinking while enhancing children's enthusiasm for learning. Teachers played a crucial role as facilitators, guiding exploration through open-ended questions, emotional support, and structured reflection. The study also identifies several challenges, including uneven teacher preparedness, limited material availability, and time constraints for project planning. While the learning outcomes were positive, the research was limited to a single institution and a short timeframe. Therefore, future studies should explore broader applications, long-term impacts, and potential integration with digital tools. This study contributes to the growing body of knowledge on early childhood pedagogical innovation by offering a contextually relevant model for enhancing child development through PjBL and loose-part integration.

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Introduction

Early childhood education (ECE) plays a crucial role in building the foundation of children's cognitive, social, and motor skills. UNESCO (2021) emphasizes that the quality of ECE significantly determines children's readiness for further education. In Indonesia, a report from the Ministry of Education and Culture (Kemendikbud) reveals that disparities still exist in the quality of ECE services, particularly regarding learning innovations that encourage active participation and the holistic development of children's potential (Adriany, 2024; Darmawan et al., 2024). These disparities can be attributed to various factors, including regional differences, teacher training, and the availability of educational resources. Addressing these gaps is essential for improving educational outcomes and ensuring that all children have equal opportunities to thrive.

One approach receiving increasing attention globally is Project-Based Learning (PJBL), which has been proven effective in enhancing children's engagement and critical thinking skills through exploratory and collaborative activities (Baran et al., 2021). This method emphasizes learning through real-world projects, where children engage in hands-on tasks that require problem-solving and teamwork. However, studies on the implementation of PJBL combined with loose parts media—free and flexible materials that stimulate children's creativity—are still

very limited, especially in the context of private ECEs such as RA Umi Sundari Kraksaan Probolinggo. Therefore, this study is innovative in filling this gap by exploring how the synergy between PJBL and loose parts can create meaningful learning that aligns with the characteristics of early childhood development. It aims to demonstrate how this integration can not only enhance children's learning experiences but also make education more relevant to the challenges of the 21st century.

The novelty of this study lies in addressing the limitations of previous research, which has not extensively examined the implementation of PJBL strategies using loose parts media in early childhood education, particularly in private institutions like RA Umi Sundari Kraksaan Probolinggo. While PJBL is known to enhance children's critical thinking skills and creativity, the use of loose parts media as an integral part of this strategy has rarely been explored in depth. The gap in research becomes particularly evident in the Indonesian context, where private institutions may face different challenges compared to public ones. This study seeks to explore how combining PJBL and loose parts media can support the development of children's cognitive, motor, and social skills in an RA environment. By focusing on local characteristics and a unique learning approach, this research aims to fill an important gap in the literature.

Early childhood education plays a key role in building the foundation for children's cognitive, social, and motor skills (McClelland & Cameron, 2019). One approach gaining widespread attention is Project-Based Learning (PJBL), which fosters active learning experiences through projects involving exploration, problem-solving, and collaboration (Almulla, 2020). This approach encourages children to take responsibility for their own learning, which in turn helps build confidence and independence. However, the application of PJBL in early childhood contexts faces various challenges. Katz et al., (2018) indicate that a major obstacle is the lack of active involvement from children in the learning process, particularly when projects do not align with the child's interests or experiences, making it difficult for them to engage fully.

Additionally, Aisyah & Novita (2025) highlight that limited access to flexible and engaging learning resources that match children's developmental needs is a significant barrier to the effectiveness of PJBL in ECE institutions. Without appropriate materials, children may not be able to explore and learn as effectively as they could. To overcome this, the use of loose parts media has emerged as an effective alternative. Loose parts—such as pieces of wood, stones, bottle caps, cloth, and other natural materials—are open-ended items that children can manipulate, combine, and alter according to their imagination and play goals (Smith-Gilman, 2018). Integrating loose parts with PJBL allows children to engage more deeply, both sensorially and cognitively, and fosters creative, exploratory, and meaningful learning experiences.

This integration not only addresses existing challenges but also represents a pedagogical innovation that supports a child-centered learning approach. The outcome is a dynamic learning environment that promotes holistic child development (Stodden et al., 2023). By using loose parts such as wood, stones, used bottles, and other natural materials, children can explore and create without limits. This dynamic learning environment encourages exploration, experimentation, and creativity, providing opportunities for children to learn by doing. It also allows children to work at their own pace, offering a more personalized and engaging learning experience.

Teachers report that children are more enthusiastic about participating in class activities and are increasingly proactive in group projects. Various empirical findings demonstrate the positive impact of PJBL with loose parts media on early childhood education. Recent studies (Gonzalez et al., 2024; Işik Arslanoğlu et al., 2023) show that this approach fosters greater active participation, initiative in group activities, and deeper involvement in the learning process. Additionally, evaluations of children's development reveal significant improvements in cognitive and social skills, particularly in problem-solving, collaboration, and communication (Almulla, 2020; McIntosh, 2022). As children engage in these collaborative activities, they also develop important social skills such as empathy, negotiation, and teamwork.

Reports from teachers and parents also confirm positive changes in children's learning behaviors, including increased creativity, self-confidence, and an eagerness to share learning experiences at home (Affuso et al., 2023; Cremin & Chappell, 2021; Henriksen et al., 2022). Project documentation from children shows a wide range of ideas, illustrating that loose parts media allows for high levels of exploration and creative expression (Bell et al., 2023; Bender, 2023; Ehsan et al., 2021; Karwowski, 2023; Nambisan & Luo, 2021). These creative outputs demonstrate the ability of loose parts to inspire children to think outside the box and approach problems from different perspectives. However, despite the growing evidence of this approach's effectiveness, its implementation remains uneven. Many ECE institutions, especially in Indonesia, have not fully integrated loose parts-based PJBL due to limited pedagogical understanding, teacher readiness, and support facilities.

This highlights the need for deeper exploration of how to effectively apply PJBL with loose parts media in local contexts. Such research could contribute to improving the quality of early childhood education and provide a valuable model for institutions to follow. While several studies have proven the effectiveness of using loose parts media to support various aspects of early childhood development, research that integrates the PJBL approach specifically with this media remains rare. Chookah et al., (2023) highlighted the role of loose parts media, such as simple musical instruments, in stimulating six aspects of child development, while Iis Novianti & Sri Watini (2022) and Ridwan et al. (2022) demonstrated how this media improves children's communication skills, creativity, and imaginative expression. However, these studies generally focus on using loose parts as a medium for play or independent learning, without linking them explicitly to PJBL strategies that emphasize structured exploration, collaboration, and problem-solving.

This gap in the literature is important because few studies explore how the integration of PJBL and loose parts media can create a holistic and contextual learning experience in ECE institutions. This research aims to fill this gap by examining the implementation of this approach at RA Umi Sundari Kraksaan Probolinggo, contributing to the innovation of learning models that address the developmental needs of children in the 21st century. By focusing on the local context, this study aims to offer practical insights for educators and policymakers interested in improving the quality of early childhood education. Moreover, it will help bridge the gap between educational theory and practice, offering a model that can be adapted in other regions with similar challenges.

This study aims to thoroughly examine the implementation of a holistic approach that integrates PJBL with the use of loose parts media in early childhood learning. The focus will be on developing children's cognitive, social, emotional, and creative skills at RA Umi Sundari Sidomukti Probolinggo. Through a comprehensive analysis, the study will assess how the combination of PJBL and loose parts media contributes to the overall development of children in a private ECE context. It will also explore how this approach can be adapted and scaled to other early childhood education settings in Indonesia. Ultimately, the study seeks to contribute to the improvement of early childhood education models that are responsive to the needs of children in the 21st century..

Methods

This research adopts a qualitative descriptive approach within an interpretive-constructivist paradigm, aiming to understand the meaning from the perspective of the research subjects in their natural context (Alam, 2021; Priya, 2021). A case study design is employed, with RA Umi Sundari as the selected case because of its unique approach to developing children's creativity. The study explores and analyzes Project-Based Learning (PjBL) strategies using loose-parts media in early childhood education at RA Umi Sundari Sidomukti Kraksaan Probolinggo. This research applies an intrinsic case study design, focusing on deeply understanding the specifics of a single case (Stake, 2005), namely RA Umi Sundari.

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RA Umi Sundari was chosen for its unique and contextual approach to fostering early childhood creativity, integrating local values, exploration-based learning strategies, and a learning environment that supports children's autonomy and self-expression. The contextual significance of this institution makes it an exemplary case for exploring how children's creativity can be developed holistically in a non-conventional educational setting. The selection of this case study has potential theoretical implications for early childhood education research, particularly in linking local practices with Vygotsky's social constructivism theory. The findings from this case are expected to offer valuable insights for transferring to similar contexts, where children's creativity is a developmental focus, albeit with varying cultural and institutional characteristics.

Research Subjects

The subjects of this study are outlined in Table 1:

Table 1. Research Subjects

Element	Gender	Final Education	Total
Founder	Female and Male	S-2	2
Headmaster	Female	S-1	1
Representative Headmaster	Female	S-1	1
Teacher	Female	S-1	6
Educational Staff	Female	S-1	1
Student	Female and Male		20
Total			**16**

In this study, key informants were purposively selected using a criteria-based selection approach. This means the informants were chosen because they met specific criteria relevant and significant to the study's focus, which is the development of early childhood creativity. Informants included representatives from the foundation, principal, vice principal, educators, and educational staff at RA Umi Sundari. Each informant played a different but complementary role in developing the educational programs at this institution. The foundation was selected for its strategic role in shaping the direction and philosophy of the institution, including designing educational approaches that support children's creativity. The principal and vice principal were selected due to their operational decision-making roles and direct responsibility for implementing learning programs. Educators were selected as they are the primary implementers of the learning process in the classroom and key facilitators of children's creativity. Educational staff were included because they contribute to creating a conducive physical and social environment for children's exploration and expression.

Data Collection

Data collection employed three main instruments. First, in-depth interviews were conducted with all key informants to explore their views, experiences, and practices regarding the development of children's creativity. Second, participant observation was conducted in the classroom and play areas to directly observe the activities, interactions, and learning strategies used by teachers to encourage creativity. Third, document analysis was carried out on the curriculum, lesson implementation plans (RPP), and other school policy and program documents to systematically examine the educational approaches and values promoted by the institution. This triangulation of data—through interviews, observations, and documentation—aimed to produce a comprehensive, contextual understanding of how children's creativity is developed at RA Umi Sundari.

Data Analysis

The data from this study were analyzed using thematic analysis based on the six steps outlined by Braun and Clarke (2021). The first step involved familiarization with the data, which entailed rereading interview transcripts, observation notes, and documents to grasp the overall context. Initial coding was then conducted, labeling relevant portions of the data. These codes were

grouped during the theme-search process to identify emerging patterns of meaning. The themes were then reviewed for consistency with the overall data and the focus of the study. Final themes were defined and named to clearly represent their meanings. A report was prepared in which the themes were presented narratively, supported by data quotations, to explain teacher practices and strategies in implementing Project-Based Learning using loose-parts media.

Validity and Credibility

The validity of the data was ensured through the application of several qualitative verification strategies. The researcher employed source triangulation, comparing information from various informants (foundation, principal, teachers, educational staff) to check for consistency between perspectives. Method triangulation was also applied by integrating data from in-depth interviews, participant observation, and document analysis. The use of multiple sources and methods aimed to provide a more complete, in-depth, and reliable understanding.

To ensure credibility, member checking was conducted, where initial findings were reconfirmed with several key informants to verify that the researcher's interpretation aligned with the informants' intentions. Additionally, peer debriefing was carried out, involving discussions of the analysis process and findings with colleagues or supervisors to obtain objective feedback.

The dependability of the research was maintained through the systematic documentation of the research process, including data collection and analysis steps, key decisions, and the researcher's reflections, forming an audit trail that ensures transparency. To support transferability, a rich contextual description (thick description) was provided, detailing the institutional background, programs, and informant characteristics. This allows readers to assess how the findings of this study may be applied to similar contexts. The research flow follows these steps: formulation of the problem, selection of location and informants, data collection via interviews, observations, and documentation, followed by data analysis using thematic analysis techniques, and validation of findings through data verification strategies as described.

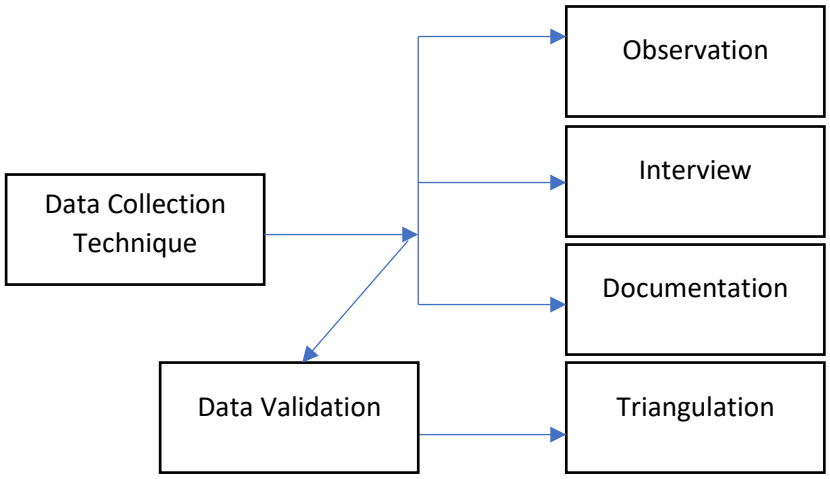

Figure 1. Data collection techniques

Result

The results of the study were obtained through observations, interviews, and documentation of learning activities at RA Umi Sundari. Based on data analysis, several key findings were identified that describe the implementation of Project-Based Learning (PjBL) using loose parts media. These findings include:

Project-Based Learning (PjBL) from the Educators' Perspective

Project-Based Learning (PBL) is an educational approach that places projects at the center of the learning process. In this model, children are not passive recipients of information; instead, they

actively design, implement, and evaluate projects that are relevant to their lives. Through thematic analysis, five key themes emerged that highlight the effectiveness of this approach.

First, children's active involvement is evident as they engage in each stage of the project, showing enthusiasm and a sense of responsibility. Second, contextual and meaningful learning is observed as children relate the material to real-life experiences, which makes learning more relevant. Third, collaboration and social skills develop through group work, where children learn to communicate, share ideas, and appreciate differences. Fourth, independence and creativity flourish when children are given the freedom to make decisions and solve problems on their own. Finally, reflection and self-evaluation allow children to understand their learning process and assess their achievements objectively. Overall, the application of PBL not only enriches cognitive aspects but also supports the social and emotional development of children. This approach has proven effective in creating more meaningful, enjoyable, and real-experience-oriented learning environments.

This was confirmed by the following sources:

> "Project-Based Learning (PjBL) is a teaching method where children learn by engaging in challenging and relevant projects. These projects are usually interdisciplinary, allowing children to explore various concepts and skills through practical and exploratory activities" (Headmaster).
>
> During the implementation of PBL, children seemed enthusiastic and immediately divided tasks amongst themselves. They chose materials independently, some bringing items from home or searching for them at school. When constructing a village model, one child remarked, "This is like my house," indicating a personal connection to the project. Cooperation was evident as children discussed and helped one another. Children who were usually quiet began actively contributing ideas. After completing the project, the children could explain the steps involved and mention parts they liked or found challenging. Some even expressed a desire to continue the project, as they felt there was more to explore. (Teacher 1).

This statement illustrates the importance of PjBL in the context of early childhood education. PBL is not merely a conventional teaching method but an approach that centers the project in the learning process (Nayak et al., 2024; Sukackė et al., 2022). These interdisciplinary projects are designed to provide challenging, relevant learning experiences for children. Through PjBL, children not only engage with academic content but also develop critical thinking, collaboration, and problem-solving skills. Thus, PjBL not only enhances children's learning motivation but also prepares them with essential skills for future challenges.

These two statements underscore that PBL is more than a learning method—it's an educational philosophy that prioritizes comprehensive and meaningful learning experiences for young children. By encouraging active participation in relevant projects, PjBL supports not only intellectual development but also strengthens important social, emotional, and life skills.

The evidence from learning activities conducted at RA Umi Sundari can be seen in Table 2:

Table 2. Observation of PjBL Learning Using Loose Parts Media

Material	Planning	Method	Description
Preparation	Provide pre-activity triggers, such as watching a video about military transportation in war. Show examples of submarine models created by the teacher.	Questions and answers, demonstrations	Select and determine learning modules based on children's developmental achievements and the loose parts media to be used.
Action	Children create a submarine using loose parts from school and home environments.	Projects, hands-on practice	Apply project-based methods to develop creativity, motor skills, and understanding of the studied concepts using loose parts and recycled materials.
Reflection	Children share their experiences and reflect on the	Stories and Q&A	Evaluate the learning process, identify challenges, and plan

Material	Planning	Method	Description
	activity. Conduct a Q&A session about the project.		improvements for future activities.

The table outlines the steps for implementing PjBL using loose parts, divided into three main stages: Preparation, Action, and Reflection, all designed to support children's exploration of transportation concepts, particularly submarines.

In the Preparation stage, the teacher triggers interest by showing a video about military transportation equipment and demonstrating examples of submarine models. The use of question-and-answer and demonstration methods ensures that children actively engage with and understand the project. The teacher also selects learning modules based on the children's developmental levels and the appropriate loose parts media for the project.

In the Action stage, children create submarines from loose parts found at school and in their home environments. The use of project-based methods helps children develop creativity, motor skills, and an understanding of the concepts being studied. This hands-on practice also introduces them to the idea of sustainability through the use of recycled materials.

After completing the project, the Reflection stage allows children to share their experiences. They retell the process of making the submarine and answer questions from their peers and teachers. This reflection enables them to evaluate their understanding and recognize any challenges faced during the project. The reflection also serves as feedback for teachers to improve future lesson planning. Overall, this activity provides a fun, engaging, and meaningful learning experience through an explorative and project-based approach.

Utilization of Loose-Part Media in Early Childhood Education (ECE) Project-Based Learning (PjBL)

The use of loose-part media in Early Childhood Education (ECE) is increasingly recognized as an effective method for encouraging children's creativity, exploration, and independence (Dewi et al., 2024). Loose parts are materials that can be manipulated, combined, moved, and used in various ways to support children's development (Utamimah et al., 2024).

The findings were confirmed by Mrs. Eva PS (Headmaster), who stated that learning at RA Umi Sundari consistently integrates loose-part media in its activities, to foster exploration, independent creativity, and enjoyment for the children. Learning with loose parts provides children with greater freedom to explore numerous possibilities in creating unique shapes and concepts. These findings are further illustrated in the following image:

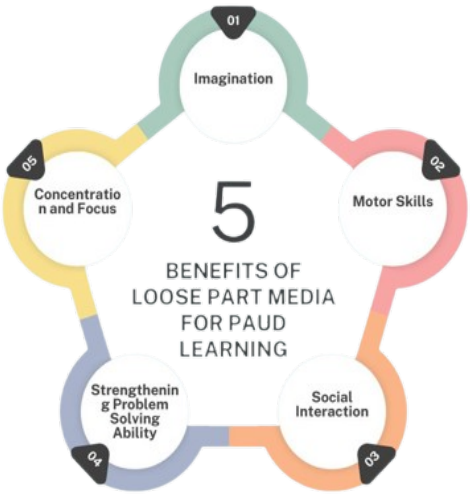

Figure 2. Benefits of Loose-Part Media for ECE Learning

Figure 1 outlines five benefits of learning with loose parts. First, it fosters unlimited imagination, allowing children to use various materials to create different works each time they play, which helps their creativity flourish. Additionally, the development of motor skills is

promoted as children manipulate and arrange materials, improving their hand-eye coordination and enhancing both fine and gross motor skills. Loose-part play also increases social interaction by encouraging children to collaborate with their peers, share ideas, and work together to create objects, all of which contribute to developing better communication skills. Furthermore, this type of play strengthens critical thinking by offering children the opportunity to think creatively and find various solutions as they arrange objects to match their conceptual vision, thereby honing their problem-solving abilities. Lastly, loose-part play improves concentration and focus, as children learn to concentrate on arranging and designing objects to meet their goals, ultimately enhancing their ability to focus and complete tasks effectively.

Loose-part play activities were conducted in the morning in a classroom that had been set up with various materials, such as stones, ice cream sticks, buttons, bottle caps, and dry leaves. The children were given the freedom to choose and use these materials according to their imagination. Without specific instructions, they began arranging, combining, and creating unique and different shapes. During the activity, it was evident that children actively used hand movements to arrange and move small objects, which helped develop their fine motor skills. Several children worked in small groups, discussing what they wanted to create and exchanging ideas, indicating positive social interactions.

At the same time, some children encountered challenges when trying to arrange loose parts to form the desired shape. They experimented with various arrangements, rearranged the pieces, and looked for solutions, demonstrating the development of problem-solving skills. The children's concentration was also notable; they appeared serious and diligent in their efforts, ensuring that the final result matched their imagination. Through this activity, the benefits of learning with loose parts were clearly observed—children exhibited creativity without limits, collaborated with peers, thought critically, and remained fully engaged in the process.

A practical approach in schools, which emphasizes diversity in children's creative expression, is essential. By providing time and space for play with a variety of materials and integrating art, music, and drama into the curriculum, schools can stimulate children's imaginations and expand their methods of expressing ideas. This not only develops their creativity but also strengthens social skills such as communication, cooperation, and problem-solving. This approach is supported by the evidence from the learning activities conducted at RA Umi Sundari, as shown in Figure 3.

Figure 3. Learning Activities to Make a Submarine from Bottles

The image above shows an activity where children create a submarine from used bottles, rubber bands, ice cream sticks, and water. The children assemble the materials to form a toy submarine, which is then placed into a tub filled with water. These learning activities directly stimulate and enhance cognitive development, language skills, social interactions, and problem-solving abilities, such as when the ice cream sticks fail to stick to the bottles

Teacher Involvement in Guiding the Learning Process Using Loose-Part Media

Loose-part media provides children with the freedom to explore, but the teacher's role as a facilitator remains crucial. The teacher does not directly dictate the learning process; instead,

they play a pivotal role by asking questions that encourage children to think critically. For example, questions like "What do you want to make with this material?" or "How do you arrange it so that it stays stable?" guide children's exploration. Additionally, the teacher creates a safe and supportive environment, helping children collaborate with their peers. The presence of the teacher ensures that while children engage in independent learning, their exploration is supported with appropriate guidance. Teachers also provide challenges, guide discussions, and offer constructive feedback to direct children's exploration in a meaningful way (Clarke & Braun, V., 2021; Reed et al., 2021).

The teacher's involvement is essential not only in facilitating the learning process but also in stimulating children's use of loose parts to their fullest potential. Teachers can direct children's exploration by introducing interesting challenges, such as arranging simple structures, creating specific patterns, or crafting stories based on their creations. Teachers can also ask open-ended questions that stimulate critical thinking, such as "What if we arranged this object in a different way?" or "What can we make with this material?"

Furthermore, teacher involvement includes providing emotional support, ensuring that children feel confident as they explore. Teachers can praise children for their efforts and offer assistance if they encounter difficulties during the learning process. With the right approach, teachers can create an environment that is both enjoyable and conducive to exploration, fostering optimal development in children.

As Teacher 2, Ibu Umil, explained:

> "The approach I apply is to give children the freedom to explore and be creative. By using loose-part materials, they can freely imagine, but my role as a teacher is to create a safe and supportive space. I want children to feel happy and confident in exploring, because it is important for their development. I also make sure that every child feels appreciated, both when they succeed and when they face challenges in the learning process."

Teachers can create a fun and supportive learning environment by integrating elements that encourage active exploration. One such approach is to provide a variety of loose-part materials, which allow children to be creative and imaginative without limitations. This provides children with the opportunity to select materials, design, and build according to their interests, making the learning process more enjoyable and meaningful.

Additionally, teachers contribute to a positive and supportive atmosphere by praising children's efforts, appreciating their ideas, and fostering an environment where children feel safe to explore without fear of failure. Teachers facilitate learning through direct experience, where children engage actively with materials, rather than simply receiving verbal instructions.

By offering freedom to explore, while accompanying children with questions that stimulate curiosity, teachers help develop critical skills such as problem-solving, creativity, and communication. All of these elements contribute to optimal child development in cognitive, social, and emotional domains.

Discussion

This study highlights the crucial role of teachers in the implementation of Project-Based Learning (PjBL) and the use of loose-part media in early childhood learning at RA Umi Sundari. This finding is significant because it demonstrates how the PjBL method not only provides space for children to learn theory but also to apply it in real life through practical activities that align with their natural learning styles. With an interdisciplinary approach, PjBL allows children to explore various relevant concepts and skills, combining knowledge from various fields into one challenging and fun project.

The implementation of this method at RA Umi Sundari occurs in three primary stages: preparation, action, and reflection. Each stage is strategically designed to optimize the children's learning experience. The preparation stage involves preparing materials and setting the context for the project. The action stage engages children actively in creating the project, while the reflection stage provides children the opportunity to assess what they have learned. A concrete

example of PjBL implementation is the submarine project, where children use loose-part materials such as used bottles and ice cream sticks. This project encourages creative thinking and problem-solving while contributing to children's cognitive, social, and emotional development.

These findings contribute to existing knowledge by demonstrating how the use of loose-part media within PjBL enriches children's learning experiences. Loose parts allow children to imagine without limits, develop motor skills, and improve social and problem-solving abilities, all of which support children's optimal development. Overall, the results suggest that the teacher's role in facilitating children's exploration and reflection is essential for ensuring effective learning. With the right support, children not only learn from the projects they create but also develop valuable life skills, such as creativity, collaboration, and problem-solving—skills that are highly relevant in the real world. PjBL is a project-based learning method that allows children not only to acquire theory but also to apply it in real life (Baran et al., 2021). With an interdisciplinary approach, this method helps children explore concepts and skills through practical activities that suit their natural learning patterns (Nasir et al., 2021).

The PjBL process at RA Umi Sundari is conducted in three stages: preparation, action, and reflection. Each stage is designed to improve the child's learning experience. During the action phase, children are invited to create submarine projects using loose-part materials like used bottles and ice cream sticks. This encourages them to think creatively and solve challenges, enhancing their problem-solving skills and creativity.

The results of this study support and extend previous studies on the use of loose-part media as an approach to encourage children's creativity, exploration, and independence. It was found that using loose-part media, such as used bottles and ice cream sticks in the PjBL project, provides children with opportunities to imagine, think creatively, and solve problems. Children are not only free to choose and arrange materials but are also given the freedom to develop motor skills, social skills, and problem-solving abilities through independent exploration. Additionally, these findings expand the understanding of the teacher's role in the learning process with loose parts. Teachers act as facilitators, offering support and encouragement when children face challenges. They ensure that the freedom of exploration remains in a context that supports optimal child development. This emphasizes that, while loose-part media supports children's independence, it also requires proper guidance to optimize learning outcomes.

This study does not contradict previous research but rather enriches the argument that loose-part media has significant potential in fostering creativity, social, and cognitive development in children. Thus, this finding confirms the importance of continuing the use of loose-part media in learning, with the teacher's active role in guiding children throughout the exploration process. The use of loose-part media is increasingly recognized as an approach that encourages children's creativity, exploration, and independence (Spencer et al., 2021). Loose parts give children the freedom to create unique shapes and concepts, while enhancing motor skills, social interaction, and problem-solving abilities.

In learning activities with loose-part media at RA Umi Sundari, it was observed that motor skill development was more dominant than social skill development. This can be explained by the nature of the activity, which involves a lot of manipulating objects. When children participate in a submarine-making project using materials such as used bottles and ice cream sticks, they focus more on the physical process—such as carefully assembling and arranging materials to ensure that the objects they create are stable or resemble their imagined designs. This activity improves both fine motor skills (such as hand-eye coordination when assembling small objects) and gross motor skills (e.g., moving and arranging larger objects). The development of motor skills is more visible and tangible during these activities, as children refine their body movements, hand coordination, and precision.

On the other hand, while the social aspect is involved in activities like group work and peer discussions, it tends to develop more slowly for some children. Some children appear more comfortable working independently, focusing on their own tasks without much interaction with

their peers. Children who are more introverted or independent may prefer designing shapes or patterns on their own rather than collaborating in groups. Although opportunities for interaction are present, the teacher's role in facilitating social interaction is critical. Without active facilitation, children may focus more on material exploration and less on discussions or sharing ideas with peers.

Creativity in children also develops in a non-uniform manner. Some children show a faster and more explorative increase in creativity, producing more complex and innovative designs with loose-part media. However, there are also children who take a more careful approach and follow simpler patterns. Individual factors, such as personality and interests, play a significant role in how quickly and intensely creativity develops. Children who are more open and like to explore tend to produce more creative results, while those who are quieter or prefer more structured approaches may not show the same level of creativity. Overall, although activities with loose parts promote creativity and social interaction, the motor aspect is more dominant due to the hands-on nature of the activities. Improvements in creativity and social skills are highly dependent on individual factors, how the teacher facilitates the activity, and the extent to which the child feels comfortable and engaged in collaborating with their peers.

Even though loose parts provide freedom for exploration, the teacher's role remains crucial as a facilitator and companion (Xavier, 2021). Teachers mediate conflicts during group work by inviting children to discuss solutions together, helping them listen to their friends' opinions, and encouraging them to work together despite their differences. Teachers also face a dilemma between allowing freedom to explore and providing a clear structure. They must provide enough guidance to ensure learning objectives are achieved while still allowing space for children's creativity.

In addition, teachers provide emotional support, such as praising children's efforts and helping them overcome difficulties, which boosts their self-confidence and motivation. In this way, teachers create a pleasant learning environment that supports children's optimal development, both cognitively, socially, and emotionally. Everything that teachers do in the PjBL learning process through loose-part media is part of the implementation of the teacher's role as a facilitator. Bridging children's curiosity and answering their informational needs will significantly aid the learning process (Hardika et al., 2018).

Not all teachers have the same understanding and skills in facilitating loose-part-based PjBL, and this is influenced by various factors. One key factor is the teacher's experience and education. Teachers experienced with Project-Based Learning (PjBL) and the use of loose-part media tend to be more confident in facilitating learning. However, teachers who are less experienced or have not received adequate training may find it challenging to implement this method effectively. PjBL requires a flexible and creative approach, which demands teachers act as facilitators who guide children in exploration without fully controlling the process. Furthermore, teachers need to be skilled in encouraging children to think creatively and independently when solving problems.

However, challenges remain in the implementation, especially in managing resources. Not all schools have access to a sufficient variety of loose-part materials that are safe for children. These material limitations can hinder the execution of creative, exploration-based projects. Additionally, the time required to plan and implement PjBL projects is significant, which can be burdensome for teachers, especially in education systems with limited time for each lesson. Group dynamics can also present challenges. When children work in groups, differences in character and working styles can cause conflict or difficulties in collaboration. Teachers must wisely facilitate these interactions, helping children learn to work together, share ideas, and solve problems collectively.

The role of teachers as facilitators in bridging children's curiosity is crucial. Teachers must be able to direct children when they encounter difficulties, provide additional information, and ask open-ended questions to encourage deeper thinking. By providing opportunities for children to think critically and explore their ideas, teachers ensure that learning is not just about

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imparting information but also about developing creativity, social skills, and problem-solving abilities. Through constructive support and thoughtful management, teachers create a fun and engaging learning environment that fosters children's maximum development. Thus, although there are challenges in implementing loose-parts-based PjBL, the role of teachers as facilitators—who can balance freedom and structure in learning—is vital to ensuring children have meaningful and beneficial learning experiences.

Conclusion

This study underscores the significance of using Project-Based Learning (PjBL) with loose-part media in early childhood education at RA Umi Sundari. The findings demonstrate that PjBL offers an interactive and meaningful learning experience, allowing children to not only acquire theoretical knowledge but also apply it through exploration and project-based activities. This approach helps children develop essential skills, such as critical thinking, collaboration, problem-solving, and creativity. The use of loose parts as a learning medium has been shown to effectively promote children's independence and imagination while enhancing their cognitive, social, and motor skills, particularly through hands-on projects like creating a submarine from recycled materials.

However, this study also has limitations that should be acknowledged, including the fact that the sample was limited to a single institution and the research period was relatively short. These limitations may affect the generalization of the results to broader contexts. Therefore, future research should address these shortcomings by involving multiple schools or diverse regions and extending the research period. Additionally, while this study highlights the benefits of PjBL and loose-part media, it has not fully explored the long-term impact of this approach on child development.

Looking ahead, further research can focus on developing a more systematic and integrated loose-part-based PjBL learning model. It could also explore the role of technology in supporting the implementation of this method. The integration of technology could serve as a significant innovation to enhance the appeal and effectiveness of learning for young children. Thus, it is vital for all stakeholders to continue supporting the development of PjBL and the use of loose parts in early childhood education to create a richer, more comprehensive learning experience.

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