



Beyond the final product: exploring young children's creativity through nature-based loose parts play

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ABSTRACT

Purpose: to explore the use of nature-based loose parts in supporting young children's creativity through material exploration, independent choice, experimentation, and open-ended play at PAUD Kiddy Kid Center, Banda Aceh.

Method: this study employed a qualitative descriptive approach at PAUD Kiddy Kid Center, Banda Aceh. Participants included four young children and their teacher, selected purposively. Data were collected through observation, semi-structured interviews, and documentation, then analyzed using the interactive model of Miles, comprising data reduction, data display, and conclusion drawing.

Findings: nature-based loose parts provided opportunities for children to express creativity through material exploration, independent selection, experimentation, material combination, imagination, and the development of diverse creations. All four observed children demonstrated the identified creative behaviors, although their participation pace varied. Teachers facilitated these processes through careful material preparation, safety supervision, and open-ended guidance. Despite challenges in material storage and hygiene, nature-based loose parts offered an accessible and flexible learning resource that supported creative engagement beyond the final product.

Implications: PAUD educators can use accessible natural materials to create open-ended learning activities that encourage children's creativity, independence, and exploration.

Originality: lies in its process-oriented examination of how children explore, select, combine, and transform nature-based loose parts, emphasizing creative processes rather than finished products.



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Introduction

Early childhood education plays a fundamental role in fostering children's holistic development, including their cognitive, social-emotional, physical, and creative

abilities (Hikmawati & Winnuly, 2025). Among these developmental domains, creativity is particularly important because it enables children to generate ideas, explore multiple possibilities, express their imagination, solve simple problems, and develop original responses to their experiences (Fountoulakis & Simos, 2026). In early childhood, creativity should not be understood solely in terms of the quality or attractiveness of a finished product, but also as a process involving curiosity, experimentation, decision-making, and the exploration of alternative solutions (Ayuni et al., 2025). Children's creative potential can be nurtured when learning environments provide opportunities for autonomy, meaningful exploration, and self-expression (McGillicuddy, 2026). Munar & Maemonah (2022) emphasize that early childhood creativity is influenced by both internal factors and environmental conditions that facilitate the development of imagination and ideas. Consequently, early childhood learning experiences need to move beyond predetermined outcomes and provide opportunities for children to participate actively in constructing their own meanings and creative expressions.

Despite the importance of creativity in early childhood education, the opportunities available for children to engage in open-ended creative experiences depend partly on how learning activities and instructional materials are designed. Activities that emphasize standardized procedures, predetermined models, or a single expected outcome may restrict children's opportunities to experiment, make independent decisions, and develop alternative ideas (Orangi et al., 2025). This issue highlights the need for learning environments that encourage children to investigate materials, formulate their own intentions, and transform initial ideas through play. One approach that offers such opportunities is the use of loose parts, which refers to movable and adaptable materials that children can manipulate, combine, rearrange, dismantle, and reuse in multiple ways. Unlike materials designed for a single function, loose parts allow children to determine how objects will be used and what they might represent. Yanti (2022) identifies loose parts as a flexible resource in early childhood education, while Lestari & Halim (2022) demonstrate their relevance to learning activities intended to develop children's creativity. Nevertheless, the pedagogical value of loose parts cannot be fully understood by examining the availability of materials or the products children create alone; attention must also be given to how children interact with these materials and develop ideas throughout the play process.

Nature-based loose parts offer particular opportunities for creative exploration because natural materials, such as leaves, twigs, stones, seeds, sand, shells, and fruit peels, possess diverse textures, shapes, sizes, colors, and physical characteristics. Their relatively open-ended functions allow children to reinterpret familiar objects, discover relationships among materials, and create representations based on their own experiences and imagination. Moreover, natural materials connect play with children's immediate environments, making learning more contextual and providing opportunities for direct sensory engagement with the surrounding world. Previous studies have reported positive associations between loose parts play and children's creativity. Maghfiroh et al. (2023) found that nature-based loose parts can support the development of early childhood creativity, although implementation may be influenced by children's individual characteristics, classroom conditions, and tendencies to imitate their peers. Similarly, Astuti & Suryani (2024) examined the use of loose parts in relation to creativity and fine motor development, while Yuliani et al. (2024) described the use of natural materials through educational, expansion, and developmental stages that provide opportunities for children to become familiar with materials, explore their potential uses, and produce work based on their own ideas. These findings suggest that

nature-based loose parts can create a meaningful context for creative learning, although the ways in which creativity emerges during children's actual interactions with materials warrant further investigation.

More recent research has continued to examine the potential of loose parts to stimulate creativity through flexible and exploratory play. Triyawati et al. (2025) highlighted the opportunities provided by loose parts for children to express ideas and creativity according to their imagination. Febriyanti et al. (2026) investigated the effectiveness of nature-based loose parts in stimulating early childhood creativity, while Rahmadanti & Sitorus (2026) examined their effectiveness in developing creativity among children aged five to six, including dimensions such as fluency, flexibility, originality, and elaboration. These studies, together with the findings of Lestari & Halim (2022); Maghfiroh et al. (2023); Astuti & Suryani (2024); and Yuliani et al. (2024), establish a relevant empirical foundation for understanding the educational potential of loose parts. However, evidence concerning their potential to support creativity does not automatically explain the processes through which creative behaviors emerge during play. In particular, understanding how children select materials, respond to their physical properties, combine different objects, revise initial ideas, and develop alternative uses requires attention to the interaction between children, materials, and the learning environment. This process-oriented perspective is important for interpreting creativity as an evolving activity rather than merely an outcome measured through completed products.

Although existing studies provide valuable evidence regarding the contribution of loose parts to early childhood creativity, a research gap remains in understanding how children's creative processes unfold during nature-based loose parts play in everyday learning contexts. Much of the existing literature has focused on the effectiveness of loose parts, improvements in creativity, or the developmental outcomes associated with their implementation (Astuti & Suryani, 2024; Febriyanti et al., 2026; Lestari & Halim, 2022; Maghfiroh et al., 2023; Rahmadanti & Sitorus, 2026). While these perspectives are important, they may not fully capture the moment-to-moment processes through which children develop and transform their ideas. More specifically, further attention is needed to the ways children exercise choice, explore material possibilities, combine and rearrange natural objects, respond to challenges, and assign new meanings to materials during play. The present study addresses this gap by shifting the analytical focus from the finished creative product to the processes and behaviors through which creativity becomes visible. Its novelty lies in examining nature-based loose parts play as an open-ended, child-centered experience and exploring creativity through children's material selection, experimentation, combination of resources, idea development, and modification of emerging creations. Rather than treating creativity solely as a measurable outcome, this study considers the creative process itself as a central unit of inquiry.

The theoretical foundation of this study rests on the understanding of creativity as a dynamic process that develops through exploration, experimentation, imagination, and the generation of multiple possibilities. Within this perspective, loose parts function not merely as instructional tools but as open-ended materials whose meanings and uses can be constructed and reconstructed through children's interactions with them. Creativity can be examined through several complementary dimensions, including fluency, or the ability to generate ideas; flexibility, or the ability to consider different approaches and uses; originality, or the production of distinctive ideas; and elaboration, or the development and refinement of ideas into more detailed forms. These dimensions

provide an analytical perspective for understanding creative behaviors during play, consistent with the focus on creativity discussed by Munar & Maemonah (2022) and the dimensions examined by Rahmadanti & Sitorus (2026). From this perspective, the educational value of nature-based loose parts lies not in requiring children to produce a particular artifact, but in creating conditions in which they can make choices, test possibilities, encounter challenges, and revise their ideas. The materials' diverse and adaptable characteristics can support these processes by enabling children to discover multiple potential uses and construct meanings according to their individual interests and experiences.

Based on this background, the present study aims to describe and analyze how nature-based loose parts are utilized to support young children's creativity, with particular attention to the processes of material selection, exploration, combination, experimentation, and the development and modification of ideas during play. Rather than evaluating creativity exclusively through the appearance or quality of finished products, the study seeks to understand the creative behaviors and decision-making processes that become visible as children interact with natural materials. This focus is significant because a process-oriented understanding of creativity can provide educators with a more comprehensive basis for recognizing and supporting children's creative potential, including ideas and exploratory attempts that may not result in a clearly defined final product. It can also inform the design of learning experiences that provide sufficient freedom for children to pursue individual ideas while allowing educators to facilitate exploration without imposing uniform outcomes. By examining the relationship between the characteristics of natural materials, children's interactions, and the emergence of creative behaviors, this study aims to contribute to a more nuanced understanding of how open-ended play can be incorporated into developmentally appropriate early childhood learning.

The expected contribution of this study is threefold. Theoretically, it seeks to enrich the literature on early childhood creativity by foregrounding the processes through which creative ideas emerge and develop during nature-based loose parts play, thereby complementing studies that primarily emphasize effectiveness and developmental outcomes. Empirically, it is expected to provide a contextualized account of how children select, manipulate, combine, and reinterpret natural materials, as well as how fluency, flexibility, originality, and elaboration may become observable during these activities. Practically, the findings are expected to inform early childhood educators in designing flexible, contextual, and child-centered learning environments that use accessible natural materials to encourage exploration, independent decision-making, experimentation, and creative expression. The study may also offer a useful reference for future research investigating the relationship between open-ended play, environmental resources, and creative development in early childhood education. Ultimately, by emphasizing the processes beyond the final product, this research seeks to strengthen the understanding that children's creativity is not simply demonstrated by what they make, but also by how they think, explore, experiment, and construct possibilities throughout the act of creating.

Method

This study employed a qualitative descriptive research design to explore how nature-based loose parts are used to support young children's creativity during play-based learning activities. A qualitative approach was selected because the study focused on understanding children's behaviors, interactions, exploration processes, and creative

expressions within their natural learning environment, rather than measuring creativity solely through predetermined indicators or finished products. This design enabled the researcher to describe how children selected, manipulated, combined, and reinterpreted natural materials, as well as how creative ideas emerged and developed throughout play. Qualitative descriptive research is appropriate for examining educational practices in early childhood settings because it allows researchers to document learning processes and interpret participants' experiences through direct observation, interviews, and supporting documentation (Muttaqin et al., 2023).

The study was conducted at PAUD Kiddy Kid Center in Banda Aceh, Indonesia. The research site was selected because its learning activities provided opportunities for children to interact directly with materials and engage in play-based experiences relevant to the use of nature-based loose parts. The participants consisted of young children who participated in learning activities involving natural materials and teachers who were directly involved in planning, implementing, and observing these activities. Participants were selected purposively based on their direct involvement in the learning experiences under investigation. The children served as the primary focus of observation, particularly regarding their exploratory behaviors and creative processes, while teachers served as supporting informants who provided information about instructional objectives, learning procedures, children's responses, and observed manifestations of creativity. Data collection was scheduled in coordination with the institution's learning activities. The research period should be stated using the actual starting and ending dates to ensure methodological clarity. Data were collected through observation, semi-structured interviews, and documentation. These techniques were used complementarily to obtain a comprehensive understanding of children's creative processes and the educational context in which nature-based loose parts play occurred. The use of multiple data collection techniques is consistent with qualitative research practices in early childhood education, where classroom activities, teacher perspectives, and documentary evidence can provide complementary insights into learning processes (Putri & Murhayati, 2025).

Observation was conducted directly during children's engagement with natural materials. The researcher focused on observable behaviors associated with creative exploration, including children's selection of materials, investigation of material characteristics, combination of different objects, generation of ideas, experimentation with alternative uses, modification of emerging creations, and expression of imagination and originality. Particular attention was given to the processes through which children developed and transformed their ideas, rather than exclusively evaluating the appearance or quality of their final products. Observational records were used to document children's actions, interactions, responses to materials, and relevant classroom situations as they occurred.

Semi-structured interviews were conducted with teachers to obtain contextual information about the planning and implementation of nature-based loose parts activities. The interviews explored the objectives of the activities, the selection and preparation of natural materials, the teacher's role in facilitating children's exploration, children's responses and creative behaviors, and challenges encountered during implementation. The semi-structured format allowed the researcher to address the main research topics while providing opportunities for teachers to elaborate on their experiences and observations. Documentation complemented the observational and interview data through relevant photographs, records of children's activities, examples

of children's creations, classroom notes, and learning plans. These materials were used to contextualize observed behaviors and support the interpretation of the data.

The researcher served as the primary research instrument, taking responsibility for establishing the research focus, collecting and interpreting data, and developing conclusions. Supporting instruments included an observation guide, a semi-structured interview guide, and a documentation checklist. The observation guide was designed to organize records of children's interactions with natural materials and identify behaviors relevant to creative exploration. The interview guide provided a framework for eliciting teachers' perspectives while allowing flexibility to explore issues emerging during data collection. The documentation checklist helped ensure that relevant visual and written records were collected systematically. These instruments were developed in accordance with the research objectives and could be refined in response to conditions encountered in the field. Throughout the process, the researcher sought to describe children's behaviors as accurately as possible and distinguish direct observations from subsequent interpretations.

Data were analyzed using the interactive model of qualitative data analysis proposed by Miles et al. (2014), which comprises data condensation, data display, and conclusion drawing and verification. Analysis was conducted iteratively throughout data collection, allowing emerging insights to inform subsequent observations and interpretations. During data condensation, observational notes, interview transcripts or records, and documentary evidence were selected, organized, coded, and categorized according to their relevance to the research objectives. The initial categories focused on children's material selection, exploration, combination of objects, experimentation, idea generation, modification of creations, and other observable manifestations of creativity. During data display, the organized information was presented in descriptive narratives and, where appropriate, thematic matrices to identify patterns and relationships among children's behaviors, teacher perspectives, and documented learning activities. The final stage involved drawing and verifying conclusions by examining recurring patterns, comparing evidence across data sources, and considering whether the interpretations were adequately supported by the collected data. This iterative and predominantly inductive process enabled the findings to emerge from the empirical evidence rather than from predetermined assumptions about children's creativity (Qomaruddin & Sa'diyah, 2024).

The trustworthiness of the findings was supported through source triangulation and method triangulation. Source triangulation involved comparing observations of children's activities with teachers' accounts of the learning process and children's creative behaviors. Method triangulation involved comparing evidence obtained through observation, interviews, and documentation to identify converging information, clarify differences, and strengthen the interpretation of the findings. Repeated and focused observations were also used to develop a more comprehensive understanding of children's interactions with natural materials across the observed activities. In addition, the researcher examined the consistency between descriptive records and emerging interpretations to reduce the risk of drawing conclusions from isolated behaviors or individual data sources. Together, these procedures were intended to enhance the credibility and dependability of the qualitative findings.

Ethical considerations were addressed throughout the research process because the study involved young children. Permission to conduct the research was obtained from PAUD Kiddy Kid Center before data collection, and the purpose and procedures of the study were communicated to the institution. Appropriate informed consent was to

be obtained from parents or legal guardians, together with the relevant institutional permissions, before collecting research data involving children. Children's comfort, dignity, privacy, and well-being were prioritized during observations and documentation. Data collection took place within ordinary learning activities and was conducted in ways intended to minimize disruption and avoid physical or psychological harm. Children's identities were protected through the use of pseudonyms or codes in research records and reporting. Photographs and other identifiable documentation were collected and used only with appropriate authorization and in accordance with applicable privacy requirements. The researcher also respected children's willingness to participate and their behavioral or verbal indications of discomfort, ensuring that research activities did not take precedence over their safety and well-being.

Results and discussion

Planning and preparation of nature-based loose parts activities

The findings were obtained through classroom observations, semi-structured interviews with teachers, and documentation of learning activities at PAUD Kiddy Kid Center, Banda Aceh, Indonesia. The data revealed that loose parts activities were implemented through a planned process involving thematic preparation, material collection, safety assessment, environmental arrangement, guided introduction, open-ended exploration, and post-activity reflection. The materials used included twigs, sand, seeds, shells, bottle caps, and other readily available loose materials. Although not all materials were natural, their combination provided children with opportunities to explore different textures, shapes, sizes, colors, and potential uses. The activities were not exclusively directed toward producing predetermined artifacts; instead, they emphasized children's active engagement with materials and the development of ideas through play.

Teacher interviews indicated that preparation began with collaborative planning among teachers before the development of teaching modules. The teachers agreed on a monthly theme, including themes related to the environment and care for nature, which were subsequently translated into loose parts activities. Material collection was also organized collaboratively. Every Saturday, teachers divided responsibilities for gathering resources, including twigs, shells, bottle caps, and other reusable objects. This practice demonstrates that the implementation of loose parts activities involved institutional coordination rather than spontaneous material provision. It also illustrates how teachers incorporated locally available resources into the learning environment while aligning activities with curricular themes.

These findings suggest that the availability of inexpensive materials is only one aspect of implementing loose parts play; the deliberate organization of resources is equally important. Yuliani et al. (2024) describe the potential of locally available materials to support creative learning by allowing children to interact directly with objects from their immediate environment. Similarly, Febriyanti et al. (2026) highlight the exploratory opportunities offered by nature-based loose parts, which enable children to develop imaginative ideas and produce diverse creations. The present findings extend this discussion by illustrating the organizational practices through which such opportunities were made available, particularly collaborative collection, thematic planning, and the preparation of reusable materials. These practices indicate that an open-ended learning environment requires intentional preparation even when the materials themselves are simple and inexpensive.

Material safety constituted another important component of preparation. According to the teachers, materials were selected according to their suitability for young children, with particular attention to sharp edges, potentially hazardous small objects, and general cleanliness. Collected materials were washed and dried before being introduced into learning activities. This procedure was important because natural materials vary in their physical characteristics and may require different handling and storage arrangements. As illustrated in Figure 1, children engaged with the prepared materials during the learning activities.



Figure 1 children engaging with materials during nature-based loose parts play

The preparation procedures demonstrate that children's freedom to explore was supported by deliberate adult supervision. Open-ended play does not eliminate the teacher's responsibility to establish safe and developmentally appropriate conditions. Rather, the findings suggest that safety management and child autonomy can operate together: teachers determine whether materials are suitable for use, while children retain opportunities to decide how those materials might be used. This interpretation is consistent with Mutohirin & Azizah (2026), who discuss the importance of material safety, teacher readiness, resource availability, and activity management in implementing nature-based loose parts. In this setting, preparation functioned not merely as a logistical requirement but as a pedagogical condition that enabled children to explore materials with greater freedom.

Implementation and open-ended exploration

Following preparation, teachers arranged the play area before the children arrived. The learning session began with familiar classroom routines, including prayer, before children moved to the prepared activities. Teachers introduced the materials and demonstrated possible ways of using them. However, these demonstrations were not intended to establish a single model that every child had to reproduce. Instead, they served as initial stimuli that helped children understand the materials while leaving room for independent exploration and alternative uses.

For example, bottle caps were introduced as resources for counting, number recognition, color classification, and comparisons of shape and size. Twigs could be grouped according to length, while sand could be used for drawing or forming shapes based on children's own ideas. These examples illustrate how a single material could

serve different learning purposes depending on the activity and the child's intention. More importantly, the educational possibilities of the materials were not limited to their original functions. Their value emerged partly from the opportunities children had to manipulate, rearrange, classify, and reinterpret them.

This finding is consistent with Lestari & Halim (2022), who examined loose parts as a medium for developing early childhood creativity, and Fauziah (2022), who discussed the integration of loose parts into learning activities involving multiple developmental dimensions. The findings from Kiddy Kid Center add a contextual perspective by showing how teachers used familiar objects for different purposes without requiring children to follow a single prescribed outcome. The pedagogical significance of this practice lies in the relationship between material flexibility and children's decision-making: the same object can become the basis for different activities when children are encouraged to consider alternative uses.

The observations and teacher interviews further indicated that children were allowed to touch, move, arrange, classify, and combine materials before deciding what they wanted to create. Teachers explained that sand, for instance, did not have to be shaped into a particular form prescribed in advance. Children could draw or construct forms according to their own ideas. This arrangement created opportunities for children to participate in determining both the direction of their activities and the forms their creations would take.

The distinction between demonstrating possibilities and prescribing outcomes is particularly important. When a demonstration becomes a fixed template, children may concentrate on reproducing the teacher's example rather than exploring alternative ideas. In contrast, a demonstration used as an initial stimulus can provide orientation without removing children's ownership of the creative process. Fariyah & Muzaqi (2023) emphasize the opportunities loose parts provide for expression, imagination, and flexible creative activity. Similarly, Sari et al. (2025) discuss the role of loose parts in allowing children to express their ideas more freely. The findings of the present study illustrate how this principle was enacted through teachers' decisions to introduce materials while permitting children to determine their subsequent uses.

Creative behaviors observed during play

A central finding was that children were given opportunities to develop different ideas using the same materials. According to the teachers, children could create forms according to their individual interests rather than being required to produce identical results. In activities involving sand, for example, children could represent houses, vehicles, or other forms based on their imagination. The resulting diversity was therefore understood in relation to children's choices and the possibilities offered by the materials, rather than conformity to a predetermined product.

This finding is relevant to a process-oriented understanding of creativity. Differences between children's creations can indicate that they are approaching the same materials from different perspectives, although the appearance of a product alone does not establish the full nature of the thinking behind it. To understand children's creativity more comprehensively, attention must also be given to how they select materials, develop ideas, experiment with alternatives, and revise their constructions. Jubaedah & Sadiyah (2024) associate nature-based loose parts with opportunities to develop children's creativity and imagination. Lismayani et al. (2023) and Wulandari et al. (2026) also examine loose parts in relation to creative development and open-ended play. The present findings complement this literature by documenting how teachers'

provision of flexible materials and non-prescriptive guidance created opportunities for varied forms of expression.

The observations also identified opportunities for children to combine different materials. A child could use one material as the main component of a creation and another as an additional element. Combining materials potentially required children to consider relationships among shape, size, texture, position, and function. Children could also rearrange objects when their initial arrangements did not correspond to their intentions. Such activities provided opportunities to test possibilities and make adjustments rather than simply complete a predetermined sequence of steps.

Experimentation was another relevant feature of the observed play. Children could try different ways of arranging and using objects, while teachers remained available to provide assistance when difficulties arose. From a process-oriented perspective, these attempts are important because creative activity does not always proceed directly from an initial idea to a finished creation. It can involve uncertainty, trial and error, and revision. Astuti & Suryani (2024) discuss loose parts in relation to creative development and fine motor skills, while Febriyanti et al. (2026) highlight the exploratory possibilities of nature-based materials. The present findings provide contextual support for the importance of examining experimentation and modification as part of creative activity, rather than focusing exclusively on completed artifacts.



Figure 2 children creating different forms through the flexible use of loose parts materials

Figure 2 should be used to illustrate the variation in children's approaches to materials, provided that the photograph accurately represents the observed activity. The analytical value of this visual evidence lies in demonstrating the openness of the activity and the range of possible material arrangements, rather than treating visual differences alone as proof of increased creativity.

Observation of creative behaviors among four children

To document children's engagement more systematically, observations were conducted with four children, identified by the pseudonyms S, D, M, and N. The observation guide covered 16 indicators relating to children's participation, exploration, imagination, idea development, experimentation, independence, communication, and social interaction. The recorded observations are summarized in Table 1.

Table 1 observed creative and play-related behaviors among the four children

Nu.	Observed indicator	S	D	M	N
1	Demonstrated interest in the materials	✓	✓	✓	✓
2	Selected materials independently	✓	✓	✓	✓
3	Explored materials directly	✓	✓	✓	✓
4	Expressed ideas or intentions	✓	✓	✓	✓
5	Used imagination during play	✓	✓	✓	✓
6	Demonstrated flexibility in using materials	✓	✓	✓	✓
7	Produced different forms or uses	✓	✓	✓	✓
8	Developed or added elements to creations	✓	✓	✓	✓
9	Combined multiple materials	✓	✓	✓	✓
10	Tried different ways of using materials	✓	✓	✓	✓
11	Sought solutions when encountering difficulties	✓	✓	✓	✓
12	Participated independently in activities	✓	✓	✓	✓
13	Continued participating until the activity ended	✓	✓	✓	✓
14	Communicated about the activity or creation	✓	✓	✓	✓
15	Interacted with peers during the activity	✓	✓	✓	✓
16	Displayed observable expressions during play	✓	✓	✓	✓

Source: primary data, processed

As shown in Table 1, all four children demonstrated behaviors corresponding to the 16 observed indicators. These included selecting and exploring materials, expressing ideas, using imagination, combining objects, experimenting with alternative arrangements, and communicating about their activities. The findings indicate that all four children participated in the range of behaviors documented during the observed sessions. They also suggest that the learning environment provided opportunities for children to engage in multiple aspects of creative play.

The observations further indicated differences in the pace at which children participated. Child S appeared somewhat slower than D, M, and N in completing certain activities but nevertheless demonstrated all the recorded indicators. This difference should not be interpreted as evidence that S had lower creativity. The observation records indicate variation in participation pace, not a demonstrated difference in creative ability. In open-ended play, children may need different amounts of time to inspect materials, select objects, test arrangements, and decide how to proceed. Consequently, the duration of an activity or the speed of producing an artifact should not be used as the sole basis for judging creativity.

The observation findings were also broadly consistent with the teachers' accounts of children's freedom to select and use materials. The teachers described opportunities for children to explore different materials and develop creations according to their own ideas, while the observation records documented corresponding behaviors across the four children. This convergence strengthens the descriptive account of how the activities were implemented. However, because the observations involved only four children and the indicators were recorded as present or absent, the results should not be interpreted as evidence that every child demonstrated the same level of creativity or that loose parts caused a measurable improvement in creative ability.

The findings are broadly consistent with Sari et al. (2025), who examined the use of loose parts to support creativity among children aged five to six, and Lutara et al. (2026), who investigated nature-based loose parts in relation to creativity among children in the same age range. Nevertheless, the present study differs in emphasis:

rather than establishing an effect through quantitative comparisons, it documents the range of behaviors observed during activities at a particular early childhood education setting. Its contribution lies in showing how participation, material exploration, experimentation, and communication can be examined together when investigating creativity in everyday play.

Teacher facilitation, reflection, and children's engagement

The teachers played an important role in establishing the conditions under which children could explore materials independently. Their responsibilities included preparing resources, organizing the play area, explaining possible uses, monitoring safety, observing children's actions, and providing assistance when necessary. At the same time, teachers generally left decisions about the intended creations to the children. This balance between preparation and autonomy was a defining feature of the activities documented in the study.

The findings suggest that the teacher's role in open-ended play is not simply to withdraw from children's activities. Instead, effective facilitation involves deciding when to introduce a stimulus, when to allow independent exploration, and when to offer assistance without taking over the child's task. This interpretation is consistent with the implementation of loose parts described by Yuliani et al. (2024), in which the teacher prepares the learning environment and accompanies children while allowing them to use materials creatively. It also reinforces the importance of teacher readiness identified by Mutohirin & Azizah (2026). The present study demonstrates that children's freedom to create depends partly on the teacher's ability to establish clear safety boundaries while avoiding unnecessary restrictions on the creative process.

Teacher interviews also indicated that children were particularly enthusiastic when activities took place outdoors. The teachers associated this response with the opportunity to engage with materials in a way that differed from more familiar classroom activities involving writing boards or markers. Outdoor activities also provided opportunities for direct sensory engagement, including touching materials, observing colors, and experiencing different textures. These observations suggest that the setting and sensory characteristics of materials formed part of the children's experience of loose parts play. However, the study did not measure engagement quantitatively or compare indoor and outdoor activities systematically; therefore, the findings are best interpreted as teachers' reported observations of children's responses.

Reflection was incorporated into the learning process after the activities ended. Children were invited to come forward and describe what they had done, while teachers observed their explanations and recorded relevant behaviors. This procedure allowed children to revisit their experiences and communicate the intentions behind their creations. It also provided teachers with information that might not have been apparent from examining the final products alone. A child's explanation may reveal why a particular material was selected, what the child intended to represent, or how an idea changed during the activity.

This reflective component is particularly relevant to the title of the present study, *Beyond the Final Product*. A completed creation cannot necessarily reveal the full process through which it emerged. Children's explanations, observed decisions, and interactions with materials can provide additional information about their creative intentions. At the same time, the findings do not establish the quality or depth of children's explanations, because no detailed language analysis was reported. The evidence supports the value of including children's accounts in the evaluation process,

while further research could investigate more closely how children's verbal explanations relate to their observed creative actions.

Practical challenges and material management

Despite the opportunities provided by loose parts activities, the study identified practical challenges associated with maintaining the materials. One issue reported by teachers was that the sand could become contaminated because cats frequently accessed the area where it was kept. This situation required additional attention to cleanliness, storage, and the suitability of materials for subsequent use. The teachers reported coordinating with the foundation and school principal to address storage arrangements and improve the management of loose parts.

This finding highlights a practical distinction between collecting natural materials and maintaining them for repeated educational use. Although locally available materials can reduce dependence on commercially produced learning resources, their continued use requires appropriate storage and cleaning procedures. Material management is therefore part of the pedagogical infrastructure supporting open-ended play, rather than merely an administrative concern. Mutohirin & Azizah (2026) similarly identify resource management and implementation conditions as relevant considerations in developing nature-based loose parts activities.

Teachers also reported that loose parts could be reused and obtained at relatively low cost. This was particularly relevant in the context of a private early childhood education institution with limitations in providing a wide range of purchased learning materials. Although conventional materials such as origami paper and HVS paper were available, loose parts provided additional resources that could be collected from the surrounding environment and used in multiple activities. Their practical value lay in the combination of accessibility, reusability, and flexibility.

Nevertheless, the findings should not be interpreted to mean that nature-based loose parts are always cost-free or require little institutional support. Collection, cleaning, sorting, storage, supervision, and replacement can all require time and resources. The experience at Kiddy Kid Center suggests that sustainable implementation depends on coordinated management and appropriate facilities. This contextual evidence complements research on the educational potential of nature-based materials by showing that their practical advantages must be considered alongside the work required to maintain safe and usable resources.

Integrating the findings with previous research

Taken together, the findings indicate that nature-based loose parts activities at PAUD Kiddy Kid Center were characterized by planned material preparation, open-ended exploration, opportunities for children to generate and modify ideas, and teacher facilitation that supported rather than prescribed creative outcomes. The evidence also shows that the learning process involved sensory experiences, independence, social interaction, and communication. These features suggest that loose parts play can provide a learning context in which creativity is expressed through multiple related behaviors rather than through the production of a single type of artifact.

The findings correspond with previous studies that have examined loose parts as a resource for supporting early childhood creativity. Lestari & Halim (2022) investigated loose parts in relation to creative development, while Fariyah & Muzaqi (2023) discussed their potential to encourage children's expression and imagination. Jubaedah & Sadiyah (2024) examined nature-based loose parts in relation to creativity and

imagination, and Yuliani et al. (2024) described their implementation in early childhood learning. More recent studies by Febriyanti et al. (2026) and Lutara et al. (2026) have also investigated nature-based loose parts and creative development. Collectively, these studies provide a relevant context for interpreting the present findings, although their specific research designs and outcome measures should be considered before making direct comparisons.

The distinctive contribution of the present study is its contextual description of the practices and interactions through which children engaged with loose parts in a particular educational setting. Rather than focusing exclusively on effectiveness or developmental outcomes, the study documents how materials were collected, prepared, introduced, explored, combined, and managed, and how children participated in activities involving them. It also brings together teacher accounts and observations of four children to describe the relationship between the learning environment and the creative behaviors recorded during play. This perspective complements outcome-oriented studies by foregrounding the processes that can be observed in everyday educational practice.

The findings also clarify why the final product should not be treated as the sole indicator of children's creativity. Material selection, experimentation, changes in arrangement, the development of ideas, and communication about a creation all provide relevant information about children's participation in the creative process. However, these behaviors must be interpreted in context. Combining several materials, for example, may indicate exploration, but the number of materials used does not independently determine the originality or quality of a child's ideas. Similarly, variation between products can suggest different approaches without necessarily establishing the extent of creative thinking involved. A process-oriented approach therefore requires researchers and educators to interpret observable actions alongside contextual information and, where possible, children's own explanations.

An important limitation is that the present study was descriptive and involved four observed children in one educational institution. The observation table records the presence of specified behaviors but does not provide baseline measurements, standardized creativity scores, or a comparison group. Consequently, the findings do not establish a causal relationship between loose parts activities and increased creativity, nor can they be generalized to all early childhood education settings. Instead, they provide a contextualized account of how the activities were implemented and how creative behaviors appeared during the observed sessions. Future research could build on this account through longitudinal observations, more detailed analyses of children's explanations and material choices, or comparative studies across different learning environments.

Summary of implementation findings

For clarity, Table 2 consolidates the principal implementation findings from the teacher interviews, classroom observations, and supporting documentation. It summarizes the key processes and practical considerations without treating every activity as an independent measure of creativity.

Table 2 summary of Nature-Based Loose Parts Implementation at PAUD Kiddy Kid Center

Aspect	Principal finding	Educational significance
Planning	Teachers coordinated activities around monthly themes.	Connected loose parts play with the learning program.

Aspect	Principal finding	Educational significance
Material collection	Teachers shared responsibilities for collecting materials, including on Saturdays.	Supported collaborative and resource-conscious preparation.
Materials	Twigs, sand, shells, seeds, bottle caps, and other loose materials were used.	Offered varied physical characteristics and possible uses.
Safety and preparation	Materials were selected for suitability, cleaned, and dried before use.	Supported safe and appropriate exploration.
Play-area arrangement	Teachers prepared the activity area before children arrived.	Established the conditions for organized, open-ended play.
Introduction	Teachers demonstrated possible uses without requiring identical products.	Provided initial guidance while preserving children's choices.
Exploration	Children touched, moved, arranged, classified, and experimented with materials.	Created opportunities for active engagement and discovery.
Idea development	Children could create different forms and modify their arrangements.	Supported the observation of flexible and imaginative behaviors.
Material combination	Children could combine two or more materials.	Allowed exploration of relationships among materials and their functions.
Problem-solving	Children could seek help from peers or teachers when difficulties arose.	Illustrated how social support could accompany independent activity.
Independence	Children handled tools and materials and participated in sorting and cleaning.	Involved children in practical responsibilities during play.
Teacher facilitation	Teachers prepared resources, monitored safety, and provided support.	Balanced autonomy with appropriate supervision.
Children's engagement	Teachers reported enthusiasm, particularly during outdoor activities.	Suggested that the setting and sensory experiences were relevant to participation.
Reflection and evaluation	Children were invited to describe their activities, and teachers recorded selected behaviors.	Provided information beyond the finished product.
Practical constraints	Sand could become contaminated by cats, creating storage and hygiene concerns.	Highlighted the need for appropriate material management.
Institutional support	Teachers coordinated with school leadership regarding storage.	Demonstrated the importance of institutional involvement.
Resource efficiency	Materials were accessible and could be reused when properly maintained.	Offered a practical alternative to reliance on purchased resources.
Sensory experience	Children encountered different textures, colors, shapes, and physical characteristics.	Connected creative play with direct sensory exploration.

Source: primary data, processed

The findings indicate that nature-based loose parts play at PAUD Kiddy Kid Center created opportunities for children to select, explore, combine, and reinterpret materials within a learning environment prepared by teachers. The observations of S, D, M, and N documented a range of behaviors relevant to creative participation, while teacher interviews clarified how planning, safety procedures, facilitation, reflection, and material management supported the activities. The study therefore contributes a descriptive account of creativity as a process situated in children's interactions with materials and their learning environment. Rather than demonstrating a quantified increase in creativity, the findings show how open-ended play can provide conditions in which creative behaviors become observable and can be examined beyond the appearance of the final product.

Conclusions

This study found that the use of nature-based loose parts at PAUD Kiddy Kid Center, Banda Aceh, provided opportunities for young children to engage in creative exploration through open-ended play. The implementation involved collaborative planning, material collection and preparation, safety management, teacher facilitation, and post-activity reflection. Observations of four children (S, D, M, and N) documented behaviors associated with creative engagement, including selecting and exploring materials, expressing ideas, using imagination, combining objects, experimenting with alternative arrangements, modifying creations, and communicating about their activities. Although all four children demonstrated the observed indicators, differences in their participation pace highlighted the importance of recognizing individual learning processes rather than evaluating creativity solely through the speed or appearance of a finished product. These findings suggest that the educational value of loose parts lies not only in the materials themselves but also in the opportunities they provide for children to make choices, explore possibilities, and develop ideas according to their interests and imagination.

The study contributes to early childhood education by providing a process-oriented understanding of how nature-based loose parts can support opportunities for creative expression in everyday learning contexts. It extends the discussion beyond finished products by highlighting the roles of material exploration, experimentation, teacher facilitation, sensory engagement, and children's decision-making in creative play. Practically, the findings may inform early childhood educators in designing flexible, child-centered learning experiences using accessible and reusable materials while maintaining appropriate safety and hygiene standards. However, the findings should be interpreted in light of several limitations. The study was conducted in a single early childhood education institution, involved observations of only four children, and relied on qualitative descriptions rather than standardized creativity assessments or pre- and post-intervention comparisons. Consequently, the findings do not establish a causal relationship between loose parts activities and improvements in creativity, nor can they be generalized to all early childhood settings.

Future research should address these limitations by involving children from multiple early childhood education institutions and diverse educational contexts to explore how environmental conditions, material availability, and teaching practices shape creative engagement. Longitudinal studies could examine how children's exploration, idea generation, experimentation, and modification of creations develop over time, while mixed-methods or comparative designs could combine detailed observations with appropriate measures of creative development. Further studies could also investigate how children's verbal explanations relate to their observed creative behaviors and how teachers balance guidance with children's autonomy during open-ended play. In addition, research on material storage, hygiene, accessibility, and institutional support could provide practical insights into the sustainable implementation of nature-based loose parts activities. Such investigations would help deepen understanding of the processes through which creative behaviors emerge and provide a stronger evidence base for designing developmentally appropriate, exploratory, and child-centered learning environments in early childhood education.

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