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Investigating the Types and Use of Loose Parts in Early Childhood Classroom

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ABSTRACT

Although loose parts are increasingly recognized in early childhood education (ECE) for fostering open-ended exploration, empirical descriptions of how educators categorize and systematically arrange these materials within classroom settings remain limited. This study investigated the types of loose parts utilized and the pedagogical patterns of classroom arrangement supporting play-based learning in ECE. Employing a qualitative case study design, the research involved 12 purposively selected participants comprising three school principals, six ECE teachers, and three curriculum experts across three ECE institutions in the Special Region of Yogyakarta that had integrated loose parts into daily instruction. Data were collected through in-depth online interviews, limited participatory classroom observations, and photographic documentation, and were analyzed using the Miles and Huberman interactive model alongside cross-case analysis and methodological triangulation. The findings revealed two primary results: first, educators utilized diverse natural and recycled materials encompassing natural objects, wood and bamboo, plastic, metal, fabric, glass, and discarded packaging selected for safety, durability, and multifunctionality; second, classroom organization followed three structured stages (preparation, implementation through learning invitations, and evaluation) across two instructional models, namely center-based and project-based learning, which facilitated children's idea generation, exploration, and reflection. As a small-scale qualitative case study within three specific institutional contexts, the findings are context-bound and offer transferable pedagogical insights rather than statistical generalizability.

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1. Introduction

Early Childhood Education (ECE) is a fundamental phase in human resource development because, in this period, children experience very rapid development in cognitive, language, social-emotional, motor, and creativity aspects (Almalki et al., 2024; Effane & Feriana, 2024). Learning at the ECE level places play as the main approach, because through play children gain a learning experience that is meaningful, contextual, and in accordance with their developmental stage (Zosh et al., 2022). Therefore, the early childhood learning environment needs to be designed in a flexible way, rich in stimulation, and provide space for children to explore, imagine, and build knowledge through direct interaction with the surrounding materials.

One of the approaches that is developing in early childhood education is the use of loose parts. The concept of loose parts was first introduced by Nicholson, who stated that children's creativity and thinking skills will increase when the environment provides materials that are open, flexible, and can be manipulated in a variety of ways (Cankaya et al., 2023). Loose parts refer to removable materials that can be moved, combined, separated, and reused by children according to their ideas and needs (Beloglovsky, 2015; Cankaya et al., 2023b; Dyah et al., 2021). These materials can come from a variety of sources, such as natural materials, wood and bamboo, plastic, metal, fabric, used packaging, and glass (Beloglovsky & Daly, 2015; Maryatun, 2022). The loose parts characteristic of not having a single function makes them relevant to play-based learning and project-based learning.

Various studies show that the use of loose parts makes a positive contribution to the development of children. The results of previous research confirm that loose parts can stimulate creativity, imagination, critical thinking skills, and problem-solving skills (Beloglovsky & Daly, 2015; Cankaya et al., 2023a; Maryatun, 2022; Sukardjo et al., 2023). Another study also reported that the use of loose parts supports children's motor, language, social-emotional, and collaborative development through open and meaningful play activities (Dyah et al., 2021). In the context of early childhood education, loose parts are seen as a medium that allows children to move from free play activities to a more directed learning process without losing the essence of play itself.

In Indonesia, the use of loose parts has begun to be widely applied in Early Childhood Education institutions, especially in line with the implementation of the Independent Curriculum, which emphasizes project-based learning and strengthening 21st-century competencies from an early age. This curriculum provides a wider space for teachers and children to determine themes, activities, and learning materials that are relevant to the environmental context.

However, the implementation of loose parts in ECE still faces several pedagogical and operational challenges. Daly and Beloglovsky (2015) note that many early childhood educators lack a comprehensive understanding of loose parts principles, particularly regarding material selection, alignment with learning objectives, and play environment management. Similarly, prior research in Central Java kindergartens indicates that many teachers still experience difficulties systematically integrating loose parts activities into their Daily Learning Implementation Plans (Rencana Pelaksanaan Pembelajaran Harian) (Rahmawati, 2023). Another challenge in implementing loose parts is the absence of specific standard operating procedures (SOPs) for safety assessment in early childhood settings (Haryanto & Twiningsih, 2024).

Some studies show that loose parts are often used as an additional medium and combined with manufactured materials, and have not been arranged and used systematically (Haryanto & Twiningsih, 2024) As part of a complete learning strategy, there is even minimal study on this topic (Cheng et al., 2025).

Analysis of previous research reveals not only descriptive gaps but also important conceptual gaps that need to be addressed. This description is necessary to clarify the theoretical framework for how loose parts are selected, organized, and integrated in learning practice as an aspect that has not been explained in depth in existing impact studies. Most studies focus more on the impact of loose parts on certain aspects of development (Cankaya et al., 2023; Dyah et al., 2021; Priyanti & Jhoni Warmansyah, 2021; Sukardjo et al., 2023), while studies that specifically investigate the types of loose parts used in Early Childhood Education and their significance in supporting the transition from play to learning are still limited. In addition, there has not been much research that describes how loose parts are interpreted and utilized by ECE educators as part of a learning environment that is consciously and pedagogically designed (Cheng et al., 2025). This gap shows the need for research that not only highlights the benefits of loose parts, but also examines the types of materials used and their strategic role in early childhood learning practices.

In this study, loose parts are defined as loose materials that are open, flexible, and can be used repeatedly by children in various play and learning activities to support the learning process in early childhood education. Loose parts are play materials that can be moved, manipulated, assembled, and changed according to children's imagination (Askar & Durmusoglu, 2023; Daly & Beloglovsky, 2015; Cankaya et al., 2023a; Siantayani, 2020). This material is open-ended, so it does not have a single function and allows children to create various forms of play freely (Rahardjo, 2019; Theresa Casey et al., 2016). Loose parts can be used repeatedly, are easy to carry, redesign, and disassemble and reassemble according to the child's idea.

The use of loose parts has been proven to improve the quality of children's play and learning because it provides space for active exploration, creativity, and problem-solving (Rawanti et al., 2023; Utami et al., 2023). In the context of early childhood education, loose parts create a flexible, imaginative, and meaningful learning environment because children can experiment directly with various materials from their environment (Cankaya et al., 2023; Dyah et al., 2021; Sardi & Mayar, 2023).

Loose part materials are generally derived from natural materials and recycled materials. Indonesia has great potential for natural materials such as wood, stones, leaves, grains, sand, and water that are easy to use as loose parts. In addition, recycled materials such as bottles, cardboard, cans, and simple household appliances can also be used. These materials need to meet the criteria of being safe, easy for children to use, cheap, and easy to care for and store so that they can be used sustainably (Daly & Beloglovsky, 2015; Theresa Casey et al., 2016). Loose parts need to be arranged in the early childhood study room to attract children's interest so that they want to do activities.

The arrangement of the ECE classroom is an effort by teachers to arrange spaces, tools, and learning materials to create a conducive, safe, and attractive learning atmosphere for children (Fadila et al., 2025) that is adaptive to the development of the times (Budiarti & Shintarahayu, 2024). Good classroom arrangement allows children to move freely, play independently or in groups, and makes it easier for teachers to assist.

Classroom arrangement is closely related to the learning model applied. In Indonesia, ECE commonly used classroom arrangement models include center, area, and corner models (Chaiyarak, V. & Phanthong, 2021; Peraturan Menteri Pendidikan Dan Kebudayaan Republik Indonesia Nomor 146 Tahun 2014 Tentang Kurikulum

2013 Pendidikan Anak Usia Dini, 2014; Yuniatari, 2020). The center model places children as active subjects with a choice of play activities in each center that the teacher has prepared (Juwita, 2025). The area model divides the class into several play areas such as blocks, art, science, and role-playing, allowing children to learn according to their interests. Meanwhile, the angular model rooted in the Montessori approach emphasizes the child's independence through the arrangement of tools that are easily accessible and organized. Loose parts are very relevant to be applied in various models of ECE class arrangement because they are flexible and can be adjusted to the needs of each center, area, or corner.

ECE is an educational service for children aged 0–6 years old that aims to support the growth and development of children as a whole (Bassok et al., 2016; Brewer, 2014; Krogh & Slentz, 2001; Wiltshire, 2024). Early childhood is a fundamental period that determines the development of children in the next stage, so it requires appropriate, active, and appropriate stimulation in accordance with the characteristics of the child (Brewer, 2014; Essa, 2016). ECE focuses on the development of all aspects of child development, including religious and moral values, physical-motor, cognitive, language, social-emotional, and art. Learning in ECE is carried out through the principles of play, child-centered, fun, contextual, and inspirational (Fadlillah, 2020).

ECE learning environment, including classroom arrangement and the provision of play media such as loose parts, has an important role in supporting children's exploration, creativity, and learning experiences. Therefore, the implementation of loose parts that are integrated with the arrangement of early childhood classes is an important strategy in creating meaningful learning, according to the stage of development and the needs of early childhood.

Based on the description of the problem and the theoretical study, this research is important to enrich the understanding of the use of loose parts in the context of ECE. The novelty of this research lies in its focus on investigating the types of loose parts used and their use in supporting the early childhood learning process, especially in bridging play activities with meaningful learning. Thus, this research not only contributes to the development of play-based learning theory, but also provides an empirical picture of the practice of using loose parts in ECE.

The problems in this study are formulated as follows: (1) what are the types of loose parts used in learning in Early Childhood Education, and (2) how to use loose parts in supporting the early childhood learning process from the planning stage, their use in learning, and its evaluation. In line with these problems, this study aims to identify the types of loose parts used in Early Childhood Education and their use in supporting play-based learning.

Theoretically, the results of this study are expected to enrich the study of loose parts and play-based learning in Early Childhood Education (ECE). Practically, the findings of this study are expected to be a reference for ECE educators in selecting, arranging, and utilizing loose parts in a more systematic and meaningful way as part of the early childhood learning environment.

2. Method

2.1 Design and Research Approach

This study uses a qualitative approach with a case study design, which aims to obtain an in-depth picture of the arrangement of ECE classes that utilize loose parts as learning media. The qualitative approach was chosen because it was able to produce descriptive data in the form of words, actions, and behaviors that were observed directly in the natural setting. Case studies are used to examine contemporary phenomena in depth in a real-life context, especially to answer research questions related to what, why, and how to arrange ECE classes with main loose parts materials (Yin, 2018).

2.2 Location and Research Subject

This research was carried out in three ECE institutions that have implemented loose parts in learning activities, namely KB Annajmu Saqib in Bantul Regency and TK Aisyiyah Nuraini and KB/TK Az Zahra in Yogyakarta City, Special Region of Yogyakarta Province. The three schools have received training related to the use and arrangement of loose parts and applied them continuously in learning.

The research data sources consisted of teachers, principals, and/or curriculum staff selected using purposive sampling techniques. The selection of informants was carried out consciously based on certain criteria, namely (1) they have experience in loose parts-based classroom arrangement training, and (2) they have applied loose parts in learning for at least one semester. The distribution of Research Informants can be seen in the following table :

Tabel. 1. Distribution of Research Informants

Informant category	KB Annajmu Saqib	TK Aisyiyah Nuraini	TK Az Zahra	Total
School principals	1	1	1	3
ECE teachers	2	2	2	6
Curriculum experts	1	1	1	3
Total	**4**	**4**	**4**	**12**

2.3 **Data Collection Techniques**

Data collection was conducted during odd semester of the 2024-2025 academic year using interviews, classroom observations, and document analysis; exact fieldwork calendar dates were not logged separately in the research archive.

In-Depth Interviews. Individual, semi-structured interviews were conducted online via Zoom with 12 participants: 3 school principals (1 per school), 6 classroom teachers (2 per school), and 3 curriculum coordinators (1 per school). Each informant participated in one main interview session (with follow-up clarifications via text/voice notes where needed), guided by a flexible interview protocol; individual session durations were not timed systematically in the field log. All Zoom sessions were recorded with participants' consent and transcribed verbatim prior to coding.

Classroom Observations and Ethical Safeguards. Direct, non-participant and limited-participatory observations were conducted across three consecutive school days per institution in specific age-grouped classrooms: 2 classes at TK Aisyiyah Nuraini (Group A and B, ages 4–6 years), 2 classes at KB/TK Az Zahra (Playgroup and Kindergarten units, ages 3–6 years), and 1 class at KB Annajmu Saqib (Playgroup class, ages 2–4 years). To ensure analytical rigor, observations were structured into two distinct phases each day:

Physical Environment Observation (07:00–07:45 a.m.): Conducted prior to children's arrival, focusing on teachers' material selection, sanitation checks, spatial zoning, accessibility of storage shelves, and aesthetic arrangement of learning invitations.

Child-Material Interaction Observation (60–90 minutes during core learning sessions): Conducted during active play and circle-time transitions to document how children selected, combined, and manipulated loose parts, as well as how teachers scaffolded inquiry through open-ended questioning.

All observational data were recorded systematically using a pre-validated structured observation checklist (covering material categories, safety compliance, and pedagogical stages), accompanied by time-stamped descriptive field notes and spatial layout sketches. Because classroom observations and visual documentation involved young children, strict ethical and child privacy protocols were enforced. Institutional permission from principals and written informed consent from parents/guardians were obtained prior to fieldwork. Children's verbal assent was respected during classroom visits, all field notes used anonymized institutional and participant codes, and visual documentation was framed to focus on children's hands and material constructions, with any visible faces obscured or blurred in publications to protect children's identities.

Document Analysis. Supporting institutional documents and archival photographs, including lesson plans, teacher training certificates/modules, and assessment records, were collected to triangulate findings related to classroom layout and loose parts utilization.

Institutional artifacts were collected to triangulate interview and observational findings, comprising daily and weekly lesson plans (RPPH/RPPM), loose parts training modules, safety checklists, teachers' narrative assessments, and school-owned archival photographs of classroom layouts and play activities. Ethical clearance and consent procedures were documented according to the scope of data collection: all 12 adult informants (principals, teachers, and curriculum coordinators) provided informed consent for interviews, while formal institutional authorization was obtained from each school principal for classroom observations and access to school documentation. Because separate written parental consent for public dissemination of identifiable child images was not obtained, all photographic documentation included in this manuscript has been anonymized by blurring children's faces and omitting personal identifiers to ensure strict protection of child privacy.

2.4 **Data Analysis Techniques**

Data analysis was carried out using the Miles and Huberman interactive analysis model (Miles et al., 1994), which takes place continuously and simultaneously throughout the research process until credible data is obtained, with the stages as described below.

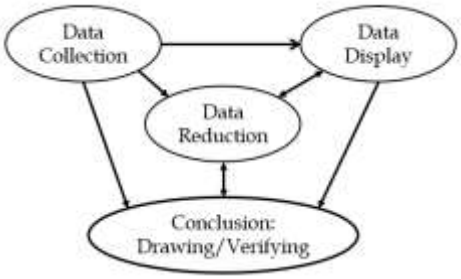


Figure 1. Qualitative Data Analysis Stages
(Miles & Huberman, 1994)

The stages of analysis include first data collection, which involved gathering information through individual interviews, classroom observations, and documentation. The units of analysis consisted of meaningful statements from interview transcripts, recorded activities from classroom observations, and relevant written and visual

evidence, particularly photographs of loose parts materials and classroom arrangements. The collected data focused on two research questions: (1) What types of materials are used as the main loose parts materials in ECE? and (2) How are ECE classrooms arranged to utilize loose parts as learning media?

Second, data reduction involved selecting, focusing, simplifying, and organizing the collected information according to the research objectives. Initial coding was conducted by assigning descriptive codes to relevant data segments. For example, references to leaves, stones, branches, and seeds were coded as natural materials, while bottle caps, cardboard, and plastic containers were coded as recycled materials. Information concerning teachers' preparation of materials before children's arrival was coded as pre-class material preparation, while descriptions of material placement and accessibility were coded as material accessibility. Related codes were subsequently grouped into broader categories, such as natural loose parts materials, recycled and manufactured materials, and classroom material organization. These categories were further examined to identify patterns and themes relevant to the research questions.

Third, data display involved organizing the reduced data into descriptive narratives, tables, and analytical matrices to facilitate interpretation. Findings from each institution were initially examined separately and subsequently compared across the three ECE institutions. The cross-case comparison focused on the types of loose parts materials available, teachers' preparation practices, material accessibility, storage arrangements, and classroom organization. This process enabled the identification of similarities, differences, and institution-specific practices.

Fourth, conclusion drawing and verification involved interpreting the patterns and relationships identified in the displayed data. Data triangulation was conducted by comparing information obtained from interviews, observations, and documentation. For example, teachers' statements regarding the availability and arrangement of loose parts materials were examined against direct classroom observations and supporting photographs. When differences or inconsistencies emerged among data sources, the researchers revisited the relevant transcripts, observation records, and documentation to examine their context. Divergent findings were retained and interpreted rather than automatically excluded, while conclusions unsupported by sufficient evidence were treated cautiously.

To ensure analytical rigor, findings were synthesized from anonymized interview transcripts (comprising 3 principals, 6 classroom teachers, and 3 curriculum coordinators), classroom observation checklists and field notes, and institutional documents (lesson plans, safety guidelines, and archival classroom photographs). Rather than presenting isolated individual statements, interview responses, observational records, and documentary evidence were cross-checked and aggregated into cross-case thematic matrices to reflect corroborated institutional practices across the three schools. All emerging interpretations were continuously verified against the raw dataset to ensure accuracy and consistency.

3. Result And Discussion

3.1 Result

This research produces answers from two predetermined problem formulations. A formulation of what types of materials are used as the main loose part material and how to arrange the classroom using loose parts for ECE to obtain the results as described below.

3.2 **Types of materials for loose part materials**

Materials that can be used as loose part materials are materials that can be used to play imaginatively, solve problems, and provide a feeling of adventure, and also bring happiness to children in doing their activities (Beloglovsky & Daly, 2015; Priyanti & Warmansyah, 2021; Siantayani, 2020; Sukardjo et al., 2023). These materials can be obtained from the surrounding environment, but need to be chosen carefully if they are to be given in early childhood classes. The type of material can be either natural materials or recycled materials (Dewi & Hibana, 2022; Leichter-Saxiby, 2015; Wales, 2017). The requirements for choosing loose part materials must meet the criteria of being multifunctional, safe, comfortable, effective and efficient, durable, and aesthetically excellent (Haryanto & Twiningsih, 2024; Marbiyatun & Widyasari, 2023; Play Wales, 2017). This study discovered that in general, the three schools use natural materials and used materials as loose part materials used, as seen in the following table.

Table. 2. Loose parts materials

Material Category	TK Nuraini	TK Az Zahra	KB Annajmu Saqib
Natural materials	a. Stones b. Soil c. Water d. Shells e. Leaves f. Seeds.	a. Grains b. Stones	a. Seeds b. Leaves
Plastic	a. Bottles cups b. Buckets c. Other plastic containers.	a. PVC pipe.	a. Water bottles b. Food containers c. Spoons d. Jelly containers. e. PVC pipe pieces
Metal	-	a. Bicycle wheels b. Metal bottle caps c. Thick cables.	-
Wood/Bamboo	a. Pieces of wood b. Twigs c. Bamboo.	a. Wood.	a. Twigs.
Fabric/Thread	a. Ribbons b. Scraps of fabric c. Burlap d. Thread	-	-
Glass/Ceramics	a. Smooth glass marbles & small ceramic bowls, Active Use – TK B (Ages 5–6) only, 1:4 teacher supervision b. Thin glassware, Inventory Only, Not deployed to children	-	-
Discarded packaging	a. Toilet paper rolls b. Egg/fruit cartons, c. Paving stones d. Plastic cracker wrappers.		Packaging Bottle caps

Prior to selecting the research sites, preliminary identification of early childhood institutions implementing environmental resources indicated that systematic integration of loose parts into classroom arrangements remained relatively uncommon in routine practice. Accordingly, three institutions, TK Aisyiyah Nuraini, KB/TK Az Zahra, and KB Annajmu Saqib, were purposively selected for this study because their educators had completed formal loose parts training and consistently integrated these materials into classroom learning environments.

Further interviews with the principals of the three schools obtained data on references in choosing materials and reasons for using loose parts. TK Aisyiyah Nuraini chose the material to be used as the loose part material referring to the authentic ECE stimulation release book as a module of the training with Youedemi in Semarang. The reason TK Nuraini uses loose parts as a learning tool is that this school is a reference school that is used as a learning place for other schools throughout Indonesia. Therefore, TK Nuraini feels the need to update their knowledge first compared to other schools.

On the other hand, KB/TK Az Zahra uses training modules from Bukit Aksara School, Semarang, as a reference in selecting loose parts materials from around. The use of loose parts in KB/TK Az Zahra is carried out for the reasons of 1) making learning innovations; 2) preparing learning that makes children able to explore widely; 3) loose part presents play materials that can expand children's ideas; 4) Loose part contains toys that suit children's interests. Children's creativity in finding, changing, or modifying play materials can be facilitated by the loose parts (Luthra & Mackenzie, 2020; Safitri & Lestariningrum, 2021).

Another interview with the 3rd school, KB Anajmu Saqib, obtained that the material used as loose parts needs to meet the safety requirements of the object to be used; there are provisions in the use of sharp objects, the safety colors of paint coating loose parts materials, such as in the table. The use of loose parts in this school is carried out for the following reasons: (1) to provide fun activities for children with the use of these loose parts; (2) to provide play materials and materials that can stimulate children to be more creative and innovative; (3) to improve games that give children the freedom to determine ideas or ideas to be more active; (4) to encourage children to solve the problems they face by doing something using loose parts. This reason is mainly to give children flexibility in activities that produce products (Cankaya et al., 2023; Gibson et al., 2017; Kiewra & Veselack, 2016).

3.3 **Classroom arrangement using loose parts**

Cross-case analysis of loose parts-based learning in three PAUD units TK Nur Aini, TK Az Zahra, and TK Annajmu Saqib shows similarities and differences in four aspects: preparation, learning invitations, child exploration, and reflection. In terms of spatial arrangement, TK Nur Aini and TK Az Zahra apply a center-based classroom model, while TK Annajmu Saqib adopts a project-based class model. In the preparation stage, TK Nur Aini focuses on sorting and selecting loose materials according to the daily learning theme (OBS-A; DOC-A). The principal explains that preparing materials is aligned with the theme flow so that children have a focused exploratory foundation: 'We sort and prepare loose materials from the morning according to the day's theme to stay focused, but the children are free to choose how to play with them' (P1). TK Az Zahra completes the readiness of materials through collaboration among parents who donate unused materials such as boards, wood, and PVC pipes (DOC-B; T3), while TK Annajmu Saqib combines collaborative program planning between teachers and the curriculum team (C1; OBS-C). At the invitation to learn stage, TK Az Zahra arranges at least four invitation areas in each class according to the size of the room and number of children (OBS-B; DOC-B), while TK Annajmu Saqib prepared two learning invitations due to limited classroom size (OBS-C; T5). At the children's exploration stage, field notes showed that children actively selected, arranged, and combined various loose materials according to interests and classroom activity contexts, both individually in the center area (OBS-A; OBS-B) and through project-based group work (OBS-C; T6). At the reflection stage, the learning activities concluded with a review by the teacher together with the children to review the work and their play process before tidying up the materials (OBS-A; OBS-B). In the teacher's review at the closing, the educator confirmed the children's ideas through open-ended questions and linked the exploration experience to the daily theme (T2; T4). However, the closing reflection session at Annajmu Saqib Kindergarten and the follow-up teacher evaluation post-activity were not directly observed in all meetings, so the findings on the reflection aspect were limited to the observed closing session and were not generalized beyond the available evidence.

Regarding learning invitations, TK Aisyiyah Nuraini and KB/TK Az Zahra stimulated children's initial ideas through book reading, storytelling, or watching videos, followed by developing concept maps based on children's ideas. KB/TK Az Zahra further connected these concept maps with the materials and tools needed to realize children's selected activities. Meanwhile, KB Annajmu Saqib introduced learning activities through thematic discussions, observation, questioning, and opportunities for children to choose activities according to their interests and ideas. In the exploration stage, children at TK Aisyiyah Nuraini participated in small-group activities based on the available play invitations, while children at KB/TK Az Zahra explored various loose parts materials through the learning centers. At KB Annajmu Saqib, children were given approximately 60 minutes to explore materials and develop their ideas, while teachers took turns accompanying them, observing their activities, and asking questions to encourage their thinking. Classroom observations further indicated that children were given opportunities to select their preferred activities, explore materials, and communicate their experiences. At the end of the activities, children were invited to share their experiences and explain their work. Regarding reflection and evaluation, TK Aisyiyah Nuraini conducted evaluations during the closing activities, whereas KB Annajmu Saqib documented children's development through narrative assessments, learning stories, anecdotal records, and children's work. These assessment records enabled teachers to identify developmental aspects emerging during the learning process. Overall, the findings indicate that classroom arrangement models influenced the organization of loose parts learning, particularly in material preparation, learning invitations, children's exploration, and assessment practices. Nevertheless, all three institutions shared a common emphasis on providing opportunities for children to express their ideas, explore materials, develop creativity, make independent decisions, and actively participate in the learning process.

The data from the second research question is about the arrangement of loose parts in the PAUD class, which found that the class arrangement was carried out according to the 2013 PAUD curriculum, which consisted of a center model for TK Aisyiyah Nuraini and TK Az Zahra, as well as a project class model for KB Annajmu Saqib (Fadila et al., 2025; Maryatun et al., 2022). Further investigation through interviews with the principal of TK

Aisyiyah Nuraini found that the loose parts in their class were arranged in a center model, carried out from the preparation stage by sorting and selecting the loose parts materials to be used that day. At the stage of implementing learning using loose parts, it is carried out as follows: (1) reading books as a spark of ideas about the project theme; (2) inviting children to make a concept map about the theme to be studied; and (3) dividing the children into small groups according to the number of play invitations provided. The closing stage includes activities to evaluate the children's work.

KB/TK Az Zahra arranged the loose parts in the classroom, also using the center model. The arrangement is carried out in a way, as follows: (1) arrange a minimum of 4 (four) invitations in each class or adjusted to the size of the class and the number of children; (2) Forum Group Discussion to get information from teachers related to the implementation, difficulties, and challenges of using loose parts; (3) involve parents in supplying the loose parts materials, e.g. collecting and bringing unused items (boards, wood, pralon) to school; and (4) loose parts materials are provided by the school and added by parents.

The loose parts are arranged as in the figure and used by children in various activities. The use of loose parts in learning is carried out in stages: (1) Triggering children's initial ideas using the method of storytelling with books or watching videos; 2) Making a concept map based on the child's ideas; 3) Linking the concept map with the materials and tools needed to realize the activity; 4) Choosing an idea that will be realized by the loose part activity.

Children at KB/TK Az Zahra engaged with loose parts across various floor-based play invitations, combining wooden blocks, bamboo segments, fabric scraps, and recycled packaging into collaborative constructions (OBS-B). Institutional authorization from the school principal and written informed consent from parents/guardians were obtained for the academic publication of these classroom photographs, with children's facial features blurred to protect their privacy.



Figure 3. Children at KB/TK Az Zahra exploring curated loose parts invitations on classroom floor mats (Published with institutional and parental permission; facial features anonymized for privacy protection)

In contrast to KB Anajmu Saqib, the project model class arranged its loose parts. Operationally, the classroom arrangement of center, area, corner, and group models in early childhood education practice generally refers to a structured spatial pattern that facilitates five main contents (life practice, awareness education, language arts, mathematics and geometric shapes, and culture), but in the implementation of loose parts, it is often still limited to four play invitations with rigid rules. Conversely, the student-centered project approach aligns with the flexibility of the Independent Curriculum to give children and teachers the freedom to select, combine, and create materials repeatedly according to the child's interests through play flow, exploration, concept discovery, and further learning. In the early childhood class (age range from 3–4 years to 5–6 years from kindergarten B), loose parts materials include seven categories (natural, wood/bamboo, plastic, metal, used packaging, fabric, and glass) to support holistic development and STEAM literacy, while teachers act as designers of safe environments, facilitators/challenges, exploration facilitators, evaluators/assessors, and storage managers. Field implementation data show that the guidelines for arranging loose parts reached the Very Good category both in the limited test (average score 67.5 or 90% among two kindergarten B teachers with training) and in extended tests (scores 64 or 85% among three cross-school kindergarten/kindergarten teachers without training). Nevertheless, field usage patterns are still dominated by procuring materials through purchasing, arranging four invitations in group models, as well as challenges in pre-play safety checks, installation of hazard signs, and consistently accessible separated storage for children. This was carried out in stages, as follows: The first is the preparation stage. This stage contains activities to make program planning between teachers and curriculum teams together, prepare loose part materials, arrange loose parts in two invitations due to the reason that the classroom is not too spacious. Loose parts are laid out in class in the morning before children come to school. The second stage is the implementation of learning

using loose parts which is carried out by: (1) Initial activities that discuss the theme; (2) Children observe, ask questions, and obtain information about the theme; (3) The teacher explains the learning activities to be carried out using loose parts and makes an agreement on the learning rules; (4) The teacher gives a quiz to the child for the opportunity to choose learning activities first than other children; (5) The child chooses the desired learning activities or according to their ideas; (6) For about 60 minutes the child plays and learns with loose parts, the teacher takes turns accompanying the child and asks for ideas or ideas made by the child; and (7) When finished, children are given the opportunity one by one to tell their experiences while working using loose parts. The third stage is evaluation in the form of teacher activities to record children's development while observing what aspects arise. Assessment in the use of loose parts is a type of narrative so that it becomes a learning story. Evaluation materials are also obtained from anecdotes and notes of the work. Broadly speaking, the arrangement of loose parts in the PAUD class can be explained in the following table.

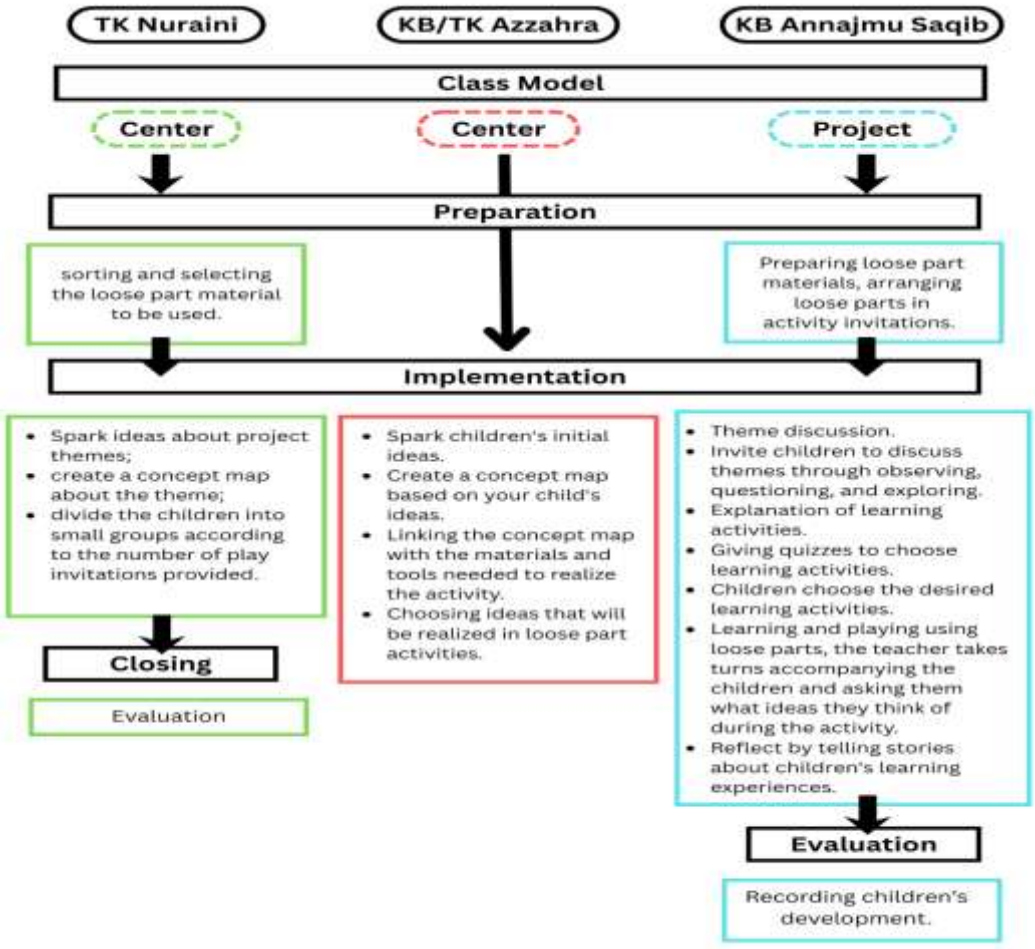


Figure 3. Classroom Arrangement and Pedagogical Use of Loose Parts

Casey suggested that preparing loose parts for learning should be done by preparing outdoor area zones first, paying attention to the flexibility of age and weather in using materials, agreements or learning rules about the use of loose parts, and ending with tidying up and gathering activities (Marina & Lessy, 2024; Rahardjo, 2019; Theresa Casey et al., 2016; Toran, 2019). The steps to organize and use loose parts can be seen from the three schools that are the subject of the research.

4. Discussion

4.1 Discussion and Implication

The trend of using the environment as a learning resource is currently being looked at by many early childhood educators. Research on the use of this environment is known as loose part materials, which include: (1) the type of materials used and (2) their arrangement in early childhood classes.

4.2 Types of materials for loose part materials

The initial discussion focused on environmental materials used as loose parts in early childhood education (ECE) classrooms. Many loose parts originate from nature and the surrounding environment, enabling teachers to foster creativity through classroom innovations (Chukwbikem, 2013; Essa, 2016; Rahardjo, 2019). Following training on utilizing loose parts as an early childhood learning medium, the three participating schools selected and used natural and recycled materials. Through this training, educators gained knowledge on selecting and using the environment as a learning resource, which they subsequently applied to implement varied classroom innovations using environmental materials in early childhood settings.

The findings indicate that the three PAUD institutions utilized natural and recycled materials as loose parts learning resources, including natural materials, wood, bamboo, plastic, metal, used packaging, fabric, and glass. This finding is consistent with previous studies emphasizing that materials available in children's surrounding environments can serve as flexible and open-ended learning resources (Dally & Beloglovsky, 2015; Gull et al., 2019; Leichter-Saxiby, 2015; Theresa Casey et al., 2016). The three institutions shared similarities in utilizing environmental materials as learning media; however, differences emerged in how teachers selected, organized, and incorporated these materials into classroom activities according to their respective learning models and classroom conditions.

Teacher training played an important role in supporting these practices. Through training, educators gained knowledge and practical skills in identifying, selecting, sorting, and organizing environmental materials as loose parts resources. This finding supports previous research highlighting the importance of teachers' knowledge and understanding in providing meaningful loose parts learning experiences (Chukwbikem, 2013; Essa, 2016; Rahardjo, 2019). The training also provided a foundation for teachers to develop learning environments that encouraged children's exploration and engagement with various materials. Nevertheless, the implementation differed across the three institutions because of variations in classroom arrangements, available materials, and learning approaches.

Within the three participating institutions all of which had prior exposure to loose parts training teachers integrated environmental resources into early childhood learning in ways shaped by institutional contexts and their capacity to adapt materials to learning objectives and classroom conditions. Because this study was not designed as a training effectiveness evaluation, references to prior training are treated as a contextual background of the participating sites rather than evidence of training impact. Accordingly, the findings should be interpreted within these three institutions rather than generalized to all early childhood education settings, with transferability depending on similarities in teacher preparation, availability of environmental materials, institutional support, and classroom arrangements. Furthermore, although diverse loose parts offer opportunities for exploration and creative expression, claims regarding improvements in children's creativity or developmental outcomes require supporting evidence from systematic child development assessments. Environmental and recycled materials that can serve as loose parts include natural materials, wood and bamboo, plastic, metal, used packaging, fabric, and glass (Dally & Beloglovsky, 2015; Dewi & Hibana, 2022; Gull et al., 2019; Leichter-Saxiby, 2015; Maryatun, 2022; Theresa Casey et al., 2016). In these three settings, practices around searching for, selecting, sorting, utilizing, and arranging loose parts in the classroom co-occurred with prior training participation and local classroom conditions, without implying causal effects of the training itself.

4.3 **Classroom arrangement using loose parts**

The second discussion is about the arrangement of loose part materials in early childhood classes. Classroom arrangement is needed to optimize all aspects of children's development: cognitive, language, and social-emotional (Almalki et al., 2024; Effane & Feriana, 2024; Mwatha et al., 2017) since children spend most of their time doing activities in the classroom (Widiasworo, 2018). The three schools that were the subject of this study arranged their classes using different models, namely the center and project. TK Aisyiyah Nuraini and KB/TK Az Zahra arranged their classes using the center model, while KB Annajmu Saqib arranged the class using the project model. The center classroom arrangement model applied by the two schools is a model regulated in the national curriculum in Indonesia, in addition to the area, group, and corner model (Peraturan Menteri Pendidikan Dan Kebudayaan Republik Indonesia Nomor 146 Tahun 2014 Tentang Kurikulum 2013 Pendidikan Anak Usia Dini, 2014). Meanwhile, the project model is still limited to being recommended in the current national curriculum. The project model is used as a form of teachers' courage in making changes and innovations in KB Annajmu Saqib.

The subjects that included three schools arranged loose part materials for early childhood classes using different stages, according to the understanding and acceptance of their respective training results,

which generally consisted of the preparation, implementation, and closing stages. This is also done in classroom settings, both indoor and outdoor, because loose parts can be arranged indoors and outdoors as well (Grindheim et al., 2021; Gull et al., 2019; Mackley et al., 2022; Theresa Casey et al., 2016). Loose parts are placed with the flexibility of age, weather, materials, and activities so that they can be used in a variety of conditions (Haryanto & Twiningsih, 2024; Sardi & Mayar, 2023). Our discussion began at the preparation stage carried out by the three schools, which included activities to prepare loose part materials by sorting, selecting, and arranging materials in the learning invitation. The implementation of the use of loose parts is carried out by sparking ideas, making concept maps, dividing children into small groups to enter learning invitations, core learning activities, and reflection activities. Meanwhile, the closing stage is filled with evaluation activities to record and discuss children's development during activities using loose parts.

The implications of this study provide an overview for early childhood educators who have not dared to innovate in utilizing the environment as a learning resource. The results of this study provide an overview and explanation of the materials that can be used as loose part materials. Materials from the environment that can be used are in the form of natural and recycled materials that are widely found around schools throughout Indonesia. The results of this study also provide knowledge about the arrangement of loose parts in early childhood classes. Educators should believe that class size is not an obstacle or weakness in utilizing loose parts for early childhood activities. Loose parts can be arranged in several invitations in the classroom according to the size of the room and the number of students. Educators can prepare materials that will be used to invite children to use loose parts in their activities.

5. Conclusion

This case study identified the diversity of locally sourced loose parts and their pedagogical patterns of organization and use across three early childhood education institutions in Yogyakarta, Indonesia. The materials encompassed natural, recycled, and selected manufactured items curated according to environmental availability and age-specific safety protocols. Cross-case findings also illustrated two classroom arrangement models: the center-based (sentra) model at TK Aisyiyah Nuraini and KB/TK Az Zahra, and the project-based model at KB Annajmu Saqib. Across both models, educators structured loose parts learning into three operational stages: preparation, implementation, and closing or evaluation, utilizing learning invitations and teacher scaffolding to facilitate children's engagement with the materials.

These findings extend prior literature that primarily cataloged loose parts material types by offering an empirical description of their classroom curation and instructional workflow within specific trained settings. Because this study focused on observational and descriptive documentation of teaching practices without empirically measuring changes in children's developmental outcomes, references to creativity, imagination, and independent decision-making represent potential pedagogical affordances rather than demonstrated developmental gains in the studied sample. Moreover, as a qualitative inquiry bounded by three purposively selected institutions, these practices offer context-sensitive references for analytical transferability rather than statistically generalizable prescriptions. Based on these insights, early childhood educators are encouraged to select, screen for safety, and organize loose parts in alignment with curricular objectives, spatial conditions, and children's developmental characteristics, while future studies should incorporate longitudinal or direct child assessments to examine developmental outcomes empirically.

Limitation

Two primary methodological limitations should be considered when interpreting the findings of this study. First, because the three participating institutionsTK Aisyiyah Nuraini, KB/TK Az Zahra, and KB Annajmu Saqib—were purposively selected based on their prior completion of formal loose parts training, the findings reflect practices within trained, early-adopter settings rather than typical Indonesian ECE classrooms, which limits statistical generalizability and requires educators to rely on thick contextual descriptions for analytical transferability. Second, data collection was restricted to short-term classroom observations, adult informants' perspectives (principals, teachers, and curriculum coordinators), and unstandardized safety inventories without direct developmental assessments of children, meaning that descriptions of children's engagement, creativity, and material safety represent observational snapshots rather than empirically measured developmental outcomes.

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