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The Role of Loose Parts Play in Supporting Creativity in Early Childhood

Muhammad Faiz Adibi[1]✉, **Laily Nur Aisiyah**[1]

[1]Universitas Jember, Jawa Timur, Indonesia

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ABSTRACT

Background of the study: Creativity is a core competence in early childhood education, yet classroom practices often remain teacher-directed and heavily dependent on structured worksheets, which may constrain children's opportunities for exploration, experimentation, and original expression. Loose parts play provides an open-ended learning approach that allows children to manipulate, combine, and transform diverse materials according to their own ideas.

Aims and scope of paper: This study aimed to examine the role of loose parts play in fostering creativity among children aged 4–5 years. The study focused on four dimensions of creativity: fluency, flexibility, originality, and elaboration within an early childhood learning context.

Methods: A quasi-experimental approach using a non-equivalent control group design was employed. The participants were 36 children aged 4–5 years who were divided into an experimental group and a control group. Children's creativity was assessed through structured observation based on indicators of fluency, flexibility, originality, and elaboration. The data were analyzed using the Mann–Whitney U test to determine differences in creativity between the two groups following the intervention.

Results: The findings revealed a statistically significant difference in creativity between the experimental and control groups after the intervention. Children who participated in loose parts play demonstrated higher levels of creativity than those who engaged in conventional learning activities. The findings indicate that open-ended manipulation of loose parts provided children with greater opportunities to explore ideas, experiment with materials, and produce varied forms of creative expression.

Contribution: This study contributes to the literature on play-based pedagogy by demonstrating the potential of loose parts play as an accessible, low-cost, and child-centered pedagogical approach for supporting creativity in early childhood education. It also highlights the value of open-ended materials in creating learning environments that encourage exploration, experimentation, symbolic representation, and children's autonomous expression.

✉ **Corresponding Author**
Address : Jember, Indonesia
Email : Faizadibi271@gmail.com

INTRODUCTION

Early childhood is a critical period for children's holistic development because experiences during the early years provide important foundations for cognitive, social-emotional, language, and learning development. Contemporary early childhood education emphasizes learning experiences that are developmentally appropriate, meaningful, and responsive to children's interests and individual characteristics. The National Association for the Education of Young Children (NAEYC) emphasizes that developmentally appropriate practice should provide young children with joyful, engaging, and play-based learning experiences that support development across domains (NAEYC,2020). Similarly, play has been recognized as an important context for young children to develop cognitive, social-emotional, language, self-regulation, and problem-solving abilities (Yogman et al., 2018). Therefore, early childhood education should not merely focus on the acquisition of predetermined academic skills but should also provide opportunities for children to explore, experiment, imagine, and generate their own ideas.

One important developmental capacity that needs to be supported during early childhood is creativity. Creativity involves the ability to generate, elaborate, transform, and communicate ideas in ways that are meaningful and original within a particular context. In early childhood settings, creativity can be observed through children's willingness to explore possibilities, produce multiple ideas, use materials in unconventional ways, imagine alternative solutions, and create products that reflect their own intentions. Research on play-based creativity indicates that the pedagogical conditions surrounding children's play are important because children's creative thinking is influenced not only by the availability of opportunities for choice but also by how teachers structure, guide, and extend children's exploration (Kangas et al.,2018). Thus, creativity should be understood not simply as the production of artistic products but as a process of exploration, experimentation, problem solving, imagination, and meaning making.

Play provides an especially important context for this process. Developmentally appropriate play allows children to engage actively with materials, make decisions, test ideas, and revise their actions without the pressure of producing a predetermined outcome. Yogman et al. (2018) argue that play provides opportunities for children to develop cognitive and self-regulatory skills while also strengthening social and emotional competencies. In addition, research on nature-based play indicates that environments containing natural and flexible materials can provide opportunities for children to engage in exploratory, imaginative, constructive, and creative forms of play (Dankiw et al., 2022). These findings suggest that the physical characteristics of the learning environment and the materials available to children are important components of creativity-supportive pedagogy.

The design of learning materials is particularly relevant because highly structured materials tend to communicate a predetermined function or expected outcome, whereas open-ended materials can provide children with greater opportunities to decide how objects should be used. Loose parts represent one form of open-ended material that can be incorporated into early childhood play. Loose parts are movable, combinable, and transformable objects that children can arrange, separate, combine, redesign, and use in different ways. They may include natural materials, recycled objects, construction materials, and everyday objects. Their educational value lies not primarily in the objects themselves but in the possibilities they provide for children to determine what to make, how to make it, and how to modify their creations.

Recent research has increasingly documented the potential of loose parts for supporting creativity in early childhood. Eriani et al. (2022), for example, found that loose parts can support children's creative thinking by allowing them to freely manipulate, combine, separate, redesign, and reconstruct materials. Similarly, research by Retnowati (2021) reported substantial improvement in children's creative abilities following the implementation of loose-parts activities, with learning completeness increasing across successive intervention cycles. Other Indonesian studies have reported comparable findings. Damayanti et al. (2020) demonstrated that STEAM learning supported by loose parts could improve children's creative work, while Rohmatun et al. (2021) found that children were able to explore and produce creative ideas

through loose-parts activities even in a learning-from-home context. These findings indicate that loose parts can create a more flexible learning environment in which children have greater opportunities to experiment with materials and express their ideas.

The relationship between loose parts and creativity may be explained by the open-ended nature of the materials. Unlike conventional instructional materials that may prescribe a single procedure or expected product, loose parts allow children to construct multiple possibilities from the same collection of objects. Sardi and Mayar (2023) reported that loose-parts activities encouraged children to become active, curious, and creative while constructing objects. Likewise, Komara and Rohmalina (2023) identified loose parts as a potential response to learning conditions in which children experience difficulties expressing their own ideas or creating products without following a teacher-provided model. More recent evidence from Indonesian early childhood settings also suggests that loose parts can support curiosity, independent creation, and the production of varied forms (Arifianti et al., 2025). These findings are consistent with the broader argument that creativity is more likely to emerge when children encounter learning environments that allow experimentation, choice, and multiple possible solutions.

However, the effectiveness of loose parts should not be interpreted as an automatic consequence of providing children with miscellaneous objects. Teacher mediation remains important. Evidence from play-based creativity research indicates that children may benefit from pedagogical guidance that provides sufficient structure while still preserving opportunities for exploration and choice. Kangas et al. (2018), for instance, found that teacher-guided approaches could promote creative thinking behaviours more effectively than completely hands-off approaches in a preschool context. This finding is important because it suggests that loose parts should be conceptualized not merely as a learning medium but as part of a pedagogical approach in which teachers prepare an enabling environment, introduce possibilities, ask open-ended questions, observe children's strategies, and provide appropriate scaffolding without determining the final product.

The use of loose parts is also consistent with the growing emphasis on open-ended and exploratory learning in early childhood education. A recent systematic narrative review found that the integration of loose parts with STEAM learning can stimulate children's creativity by providing opportunities for exploration, experimentation, construction, and problem solving (Qoumariah et al., 2025). A recent meta-analysis examining studies published between 2016 and 2026 likewise indicates that loose-parts interventions have potential to improve early childhood creativity, although differences in materials, teacher facilitation, research designs, and creativity measures remain across studies (Ar Raudloh, 2026). Thus, although the literature increasingly supports the use of loose parts, further empirical studies are still necessary to determine how loose-parts play influences specific dimensions of creativity under particular classroom conditions.

This issue is particularly relevant in the Indonesian early childhood education context, where learning practices may still rely heavily on worksheets, teacher-directed activities, and predetermined products. Recent studies have identified monotonous learning activities and limited opportunities for children to independently express ideas as factors associated with low levels of creativity (Komara & Rohmalina, 2023; Arifianti et al., 2025). When children are frequently expected to reproduce a teacher's model, opportunities to explore alternative possibilities and develop individual solutions may become restricted. Consequently, teachers need learning strategies and materials that are affordable, accessible, developmentally appropriate, and capable of providing children with meaningful opportunities to explore and create.

In the present study, this issue was identified through preliminary observation conducted by the researcher in September 2024 in Group A3 at TK Bina Anaprasa Nuris, Sumbersari District, Jember Regency. The class consisted of 18 children. The preliminary observation indicated that many children demonstrated limited imaginative exploration, low curiosity, and limited initiative in generating their own ideas. Several children were also hesitant to produce independent creations when participating in activities such as coloring, collage making, and painting. The classroom activities were frequently supported by worksheets (LKA), while

opportunities to manipulate open-ended materials and construct self-generated products were relatively limited. These observations indicate a need for learning experiences that provide children with greater opportunities to explore, make choices, experiment with materials, and communicate their own ideas.

Although previous studies have demonstrated positive associations between loose parts and children's creativity, important methodological gaps remain. A considerable proportion of existing studies employ qualitative descriptive approaches, literature reviews, or classroom action research (Laelasari et al., 2022; Komara & Rohmalina, 2023; Hernawati et al., 2025). Other studies use relatively small samples and pre-experimental or one-group designs, which limit the strength of causal conclusions (Wulandari et al., 2026). Although these studies provide valuable evidence regarding the potential of loose parts, there remains a need for empirical research that examines changes in children's creativity through a more explicit experimental framework and clearly defined observable creativity indicators.

Therefore, the present study examines the role of loose-parts play in supporting the creativity of children aged 4–5 years at TK Bina Anaprasa Nuris, Jember. The study contributes to the existing literature in three ways. First, it conceptualizes loose parts not simply as instructional materials but as an open-ended play-based pedagogical approach that provides children with opportunities for exploration, choice, experimentation, and creative construction. Second, it examines children's creativity through observable indicators that can be assessed systematically rather than relying solely on general impressions of children's creative behaviour. Third, it provides empirical evidence from an Indonesian early childhood classroom using a quasi-experimental framework. By examining the implementation of loose-parts play in an authentic early childhood setting, this study seeks to provide evidence regarding how open-ended materials can be used to create more creativity-supportive learning experiences for young children.

METHOD

Research Design

This study employed a quantitative quasi-experimental approach using a nonequivalent control group pretest–posttest design to examine whether loose-parts play was associated with changes in the creativity of children aged 4–5 years. A quasi-experimental design was selected because the study was conducted in an authentic kindergarten setting in which the researcher could not randomly assign individual children to experimental conditions. Instead, two existing classroom groups were retained and assigned as the experimental and control groups. Nonequivalent control group designs are commonly used in educational research when intact classes must be maintained while researchers seek to compare outcomes before and after an intervention (Kartika & Wulandari, 2020; Sidiq et al., 2021).

The design consisted of a pretest, an intervention, and a posttest administered to both groups:

Experimental group: $O_1 \rightarrow X \rightarrow O_2$

Control group: $O_1 \rightarrow - \rightarrow O_2$

where O_1 represents the pretest assessment of creativity, X represents the loose-parts play intervention, – represents regular classroom learning without the loose-parts intervention, and O_2 represents the posttest assessment. Similar pretest–posttest quasi-experimental designs have been used in early childhood research to examine the effects of loose-parts activities while retaining a comparison group (Hutajulu & Lukas, 2023; Utami & Sujarwo,2025).

The use of a pretest was particularly important because the two intact groups were not randomly assigned and could therefore differ in their initial levels of creativity. Accordingly, the pretest was used to describe baseline performance and to examine whether meaningful differences existed between the groups before the intervention. The findings were interpreted as evidence of short-term intervention-related change rather than as evidence of long-term developmental effects.

Participants and Sampling

The participants were 36 children aged 4–5 years enrolled at TK Bina Anaprasa Nuris, Sumbersari District, Jember Regency, Indonesia. The participants were distributed across two existing classes: Group A3 (n = 18) was assigned to the experimental group and Group A5 (n = 18) served as the control group. The classes were maintained as intact groups to avoid disrupting the school's regular organizational structure.

A purposive sampling strategy was used to select the two classes. Group A3 was selected as the experimental group based on preliminary classroom observations conducted in September 2024, which indicated that children in this group demonstrated relatively limited opportunities for independent exploration and creative production. Group A5 was selected as the comparison group because it was a comparable existing class within the same kindergarten context. The use of intact classes and purposive sampling is consistent with educational quasi-experimental research in which researchers work within naturally occurring classroom structures rather than randomly allocating individual children (Kartika & Wulandari, 2020).

Because the classes were not randomly assigned, the study does not claim full experimental equivalence between groups. Instead, baseline differences were examined through the pretest, and the interpretation of the intervention effect was restricted to the observed short-term change within this particular school context.

Intervention Procedure

The intervention was implemented over five instructional sessions: one pretest session, three intervention sessions, and one posttest session. The experimental group participated in structured loose-parts play activities, whereas the control group continued its regular classroom learning activities using the school's usual learning materials.

The loose-parts intervention was designed around open-ended construction and representational play. Children were introduced to a thematic context and were then encouraged to select, combine, rearrange, transform, and reconstruct materials according to their own ideas. Three thematic activities were implemented: (1) constructing animal forms, (2) constructing medical equipment or health-related objects, and (3) constructing transportation forms. Importantly, children were not required to reproduce a single teacher-provided model. Instead, the teacher provided the theme and materials while allowing children to determine the form, combination, and arrangement of the materials.

This open-ended structure is theoretically and empirically relevant to creativity because loose parts allow children to manipulate materials in multiple ways and create different possible products from the same resources. Previous studies have reported that loose-parts activities provide opportunities for children to explore, experiment, generate ideas, and construct original forms (Eriani et al., 2022; Sardi & Mayar, 2023; Lismayani et al., 2023). Quasi-experimental evidence has also indicated that loose-parts interventions can be used to compare creativity-related outcomes between experimental and control groups in kindergarten settings (Hutajulu & Lukas, 2023; Isnar-iyati, 2024).

The loose-parts materials consisted of natural materials, plastic materials, wood or bamboo materials, and selected household/recycled materials. If glass or ceramic materials were included, only intact, non-sharp, non-fragile, age-appropriate materials were used under close adult supervision. Given the age of the participants, materials presenting risks of breakage, sharp edges, choking, or other physical injury should be excluded from the intervention. This safety consideration is particularly important when implementing open-ended material-based activities with young children.

The intervention was conducted by the classroom teacher with researcher support. The researcher monitored the implementation to ensure that the experimental group received the intended loose-parts activities and that the control group continued its regular learning activities during the intervention period. The short intervention period was intended to examine immediate changes in observable creative behaviour. It was therefore not designed to establish whether the intervention produces sustained developmental changes over a longer period.

Creativity Indicators and Operational Definition

Children's creativity was operationalized using four observable dimensions: fluency, flexibility, originality, and elaboration. These dimensions have been widely used in creativity assessment and have also been applied in studies examining creativity development in preschool and school-age populations.

The four indicators were operationalized as follows: Fluency referred to the child's ability to generate several ideas, possibilities, or forms during the activity. Flexibility referred to the child's ability to use different strategies, approaches, or forms when constructing an object. Originality referred to the child's ability to produce an uncommon or distinctive idea or construction relative to the products generated by peers. Elaboration referred to the child's ability to add meaningful details, components, or complexity to an initial creation.

These indicators were translated into observable behavioural descriptors suitable for children aged 4–5 years. For example, fluency was observed through the number or variety of ideas generated by a child; flexibility through changes in construction strategies or forms; originality through distinctive combinations or representations; and elaboration through the addition of details to an initial construction.

The use of observable indicators was intended to reduce ambiguity in assessing creativity. This is particularly important in early childhood research because creativity is expressed through children's actions, verbal explanations, material manipulation, and constructed products rather than through a single conventional test score.

Research Instrument

Data were collected using a structured creativity observation rubric developed specifically for this study. The rubric consisted of items corresponding to the four creativity dimensions: fluency, flexibility, originality, and elaboration. Each indicator was assessed using predefined behavioural criteria so that observations were based on observable evidence rather than general impressions of whether a child appeared "creative."

The development of the instrument involved three stages. First, the researcher identified the construct dimensions and translated them into developmentally appropriate behavioural indicators. Second, the initial rubric and activity procedures were reviewed by experts in early childhood education and/or child development to examine the relevance, clarity, and developmental appropriateness of the indicators. Expert review is a recognized procedure for establishing evidence of content validity, although the selection of experts and the criteria used for their judgments should be explicitly reported (Beck, 2020; Terwee et al., 2018).

Third, the instrument was refined before implementation in the field. The final observation rubric was used consistently for both experimental and control groups during the pretest and posttest. For a stronger methodological report, the final manuscript should state the number of items, scoring range for each indicator, total possible score, number of experts, expert qualifications, and the method used to quantify content validity. If an Aiken's V or Content Validity Index was calculated, the coefficient and decision criterion should be reported. If such a coefficient was not calculated, the manuscript should describe the expert-review process transparently rather than claiming that the instrument was statistically validated.

Data Collection

Data were collected through direct structured observation of children during classroom activities. Observation was selected because creativity in early childhood is expressed through children's observable actions, interactions with materials, problem-solving strategies, and creative products. Observational assessment has been widely used in early childhood research, although evidence of reliability and validity is necessary to support the interpretation of observational scores (Duncan et al.,2020).

The same observation rubric and scoring criteria were used for the experimental and control groups. During the pretest, both groups completed comparable creativity-related activities before the intervention. During the three treatment sessions, the experimental group engaged in loose-

parts play while the control group participated in the regular classroom program. Following the intervention, both groups completed the posttest using comparable assessment procedures.

To reduce measurement bias, the researcher used standardized observation instructions, predetermined behavioural criteria, and the same scoring rubric across all observation sessions. The observation focused on children's observable behaviours and products rather than the researcher's subjective judgment of overall creativity.

If more than one observer was available, inter-rater reliability should be calculated using an appropriate coefficient, such as Cohen's kappa or an intraclass correlation coefficient, depending on the scoring structure. Reliability is particularly important in observational research because different observers may interpret the same child behaviour differently (Tong et al.,2020; King et al., 2021).

If only one observer actually collected and scored all observations, the manuscript should report this transparently and should not claim inter-rater reliability. In that situation, reliability can instead be strengthened through detailed scoring criteria, observer training, pilot observation, repeated review of observation records, and, where possible, independent checking of a subset of observations.

Data Analysis

Data were analyzed using IBM SPSS Statistics version 27. Descriptive statistics were first calculated for each group, including the median, minimum, maximum, and interquartile range. Because the sample consisted of two relatively small independent groups (n = 18 per group) and the creativity scores were derived from an observational rating scale, non-parametric analysis was considered appropriate when the assumptions for parametric analysis were not adequately satisfied.

The Mann–Whitney U test was used to compare the experimental and control groups because the groups were independent and the outcome distribution did not meet the assumptions required for a conventional independent-samples t-test. The Mann–Whitney U test is appropriate for comparing two independent groups when outcome distributions are non-normal or when data are ordinal/rank-based.

Importantly, because this study used a pretest–posttest nonequivalent group design, the analysis did not rely solely on a comparison of posttest scores. First, pretest scores were examined to describe the initial condition of the two groups. Second, an individual change score (gain score) was calculated as: Gain score = Posttest score − Pretest score

The Mann–Whitney U test was then used to compare gain scores between the experimental and control groups. This approach allowed the analysis to focus on the amount of change observed during the intervention period rather than simply comparing posttest scores between potentially nonequivalent groups.

The significance level was set at $\alpha = 0.05$. In addition to statistical significance, the study should report an appropriate effect-size estimate for the Mann–Whitney analysis, such as $r = Z/\sqrt{N}$, to indicate the magnitude of the observed difference. Reporting effect size is important because statistical significance alone does not indicate the practical magnitude of an intervention effect, particularly in studies with relatively small samples.

As a supplementary analysis, the Mann–Whitney U test may also be used to examine whether pretest scores differed between groups. However, a non-significant pretest test should not be interpreted as proof that the groups are "homogeneous" or fully equivalent. Because the groups were not randomly assigned, baseline differences may remain even when a statistical test does not detect a significant difference.

An alternative analysis, such as ANCOVA, could be considered if the creativity score is treated as a sufficiently continuous outcome and the relevant assumptions are met. Pretest adjustment is particularly relevant in nonequivalent-group designs because initial differences can influence estimates of treatment effects (Miyazaki et al., 2022). Nevertheless, given the small sample size and observational rating structure in the present study, the Mann–Whitney analysis of gain scores was retained as the primary inferential approach.

Ethical Considerations

Because the participants were children aged 4–5 years, particular attention was given to ethical safeguards. The study was conducted after obtaining permission from the participating kindergarten. Written informed consent/permission from parents or legal guardians should be explicitly reported, and children's willingness to participate should also be respected throughout the research process. Research involving children requires particular attention to voluntary participation, protection from harm, respect for children's developing autonomy, and appropriate parental permission (Fleet & Harcourt,2018; BERA, 2024).

The activities were integrated into ordinary classroom learning and were designed to involve minimal risk. Children were allowed to participate at their own pace and were not forced to complete a particular construction. Children who appeared uncomfortable, unwilling to participate, or fatigued were allowed to pause or withdraw from the activity without academic or social consequences.

Confidentiality was also maintained. Children's names were not used in the research dataset or manuscript; instead, participant codes were assigned for data management and analysis. Photographs or videos, if collected, should only be taken and used when specific parental permission has been obtained.

RESULTS

This section presents the findings of the quasi-experimental study examining the differences in creativity development between children who participated in loose parts play and those who engaged in conventional learning activities. The results are presented in three stages: (1) descriptive statistics of pretest and posttest creativity scores, (2) a homogeneity test, and (3) hypothesis testing using the Mann–Whitney U test.

Descriptive Statistics of Creativity Scores

Descriptive statistics were used to examine the creativity scores of the experimental and control groups before and after the intervention. Creativity was assessed through structured observation of children's performance during a block-building task. As shown in Table 1, the experimental group obtained a mean pretest score of 65.56, whereas the control group obtained a higher mean pretest score of 73.67. This indicates that the two groups did not have identical mean creativity scores at baseline, with the experimental group showing a lower average score before the intervention.

Following the intervention, the mean creativity score of the experimental group increased to 91.33, representing an increase of 25.77 points. Meanwhile, the mean score of the control group increased from 73.67 to 84.54, representing an increase of 10.87 points. Thus, the experimental group demonstrated a greater descriptive increase in creativity scores than the control group.

Table 1. Descriptive Statistics of Creativity Scores in the Experimental and Control Groups

Group	Test	N	Mean
Experimental	Pretest	18	65.56
Experimental	Posttest	18	91.33
Control	Pretest	18	73.67
Control	Posttest	18	84.54

The descriptive findings indicate that both groups experienced improvements in creativity scores. However, the increase was greater in the experimental group, which participated in loose parts play. Because the groups were non-equivalent and had different baseline means, the descriptive differences should be interpreted together with the inferential analysis rather than as evidence of an intervention effect by themselves.

Homogeneity Test

Before conducting the hypothesis test, a homogeneity test was performed to examine whether the variability of the pretest scores was comparable between the experimental and control groups. The homogeneity test produced a significance value of 0.693, which was greater than the 0.05 significance level. Therefore, the assumption of homogeneity of variance was met.

This result indicates that the variability of the pretest creativity scores was statistically comparable between the two groups. However, homogeneity of variance should not be interpreted as evidence that the two groups had equivalent mean creativity scores at baseline. As shown in Table 1, the experimental group had a lower pretest mean than the control group. Therefore, the non-equivalent nature of the groups should be considered when interpreting the subsequent findings.

Hypothesis Testing

The Mann–Whitney U test was used to examine whether the change in creativity scores differed significantly between the experimental and control groups. The analysis was conducted using SPSS version 27. The gain score for each child was calculated by subtracting the pretest score from the posttest score, and the resulting gain scores were compared between the two groups.

As presented in Table 2, the Mann–Whitney U test yielded a two-tailed significance value of 0.001, which was below the predetermined significance level of 0.05. This finding indicates a statistically significant difference in creativity score gains between the experimental and control groups.

Table 2. Mann–Whitney U Test of Creativity Score Gains Between the Experimental and Control Groups

Data Tested	Significance (2-tailed)	Interpretation
Difference between pretest and posttest scores in the experimental and control groups	0.001	Significant difference

Based on this result, the null hypothesis (H_0) was rejected, indicating that the gain in creativity scores differed significantly between the two groups. Given that the experimental group demonstrated a substantially greater mean increase than the control group (25.77 versus 10.87 points), the findings provide evidence that participation in loose parts play was associated with greater improvement in creativity among children aged 4–5 years at Bina Anaprasa Nuris Kindergarten, Jember.

In practical terms, children who participated in loose parts–based activities showed greater improvement in behaviors related to creative expression, including generating varied ideas, combining materials in different ways, and producing diverse constructions. These findings suggest that the open-ended characteristics of loose parts provided children with opportunities to explore materials, experiment with different possibilities, and express their ideas through self-directed construction.

DISCUSSION

Interpretation of the Findings

This study examined whether loose-parts play could support the creativity of children aged 4–5 years at TK Bina Anaprasa Nuris, Jember. The findings showed that children who participated in loose-parts activities demonstrated greater improvement in creativity than children who participated in regular classroom activities. This finding provides empirical support for the use of open-ended play materials as part of creativity-oriented early childhood pedagogy. The result is consistent with previous research indicating that loose parts can provide children with opportunities to explore, manipulate, combine, transform, and reconstruct materials according to their own ideas (Eriani et al., 2022; Lismayani et al., 2023; Sardi & Mayar, 2023).

The findings should nevertheless be interpreted as evidence of short-term intervention-related improvement, rather than as evidence that loose-parts play produces permanent changes in children's creativity. The intervention consisted of three treatment sessions, and the posttest

was administered immediately after the intervention. Thus, the findings demonstrate that children's observable creative performance increased following exposure to the intervention, but they do not establish whether these gains would remain over an extended period.

Why Loose Parts May Support Creativity

The positive findings can be explained by the open-ended affordances of loose parts. Unlike highly structured instructional materials, loose parts do not prescribe a single function, form, or correct final product. The same material can be used in multiple ways depending on the child's intention. Children can move, combine, separate, reconstruct, and reinterpret materials, thereby generating different possibilities from the same resources. This characteristic creates conditions that are particularly compatible with creative exploration.

Evidence from research on loose-parts play supports this interpretation. Eriani et al. (2022) describe loose parts as materials that can be moved, separated, recombined, redesigned, and used in multiple ways, providing opportunities for children to express ideas freely. Similarly, Rahardjo (2019) reported that early childhood educators viewed loose parts as useful for providing freedom of creation and supporting problem solving within STEAM-oriented learning. Research examining educators' perceptions has also identified creativity and imagination as important benefits of loose-parts play, particularly because of the open-ended nature and multiple possible uses of the materials.

The present findings can therefore be understood as reflecting a shift from product-oriented activity toward process-oriented creative exploration. In a conventional activity, children may be expected to reproduce a particular model provided by the teacher. In contrast, the loose-parts activities in this study provided a theme while allowing children to decide what to construct and how to construct it. This distinction is important because creativity in early childhood is not necessarily demonstrated by producing a sophisticated product; it is also expressed through children's willingness to explore possibilities, change strategies, generate alternatives, and add personal meanings to their creations.

Creativity as Exploration, Experimentation, and Problem Solving

The increase in creativity observed in the experimental group may also be related to the problem-solving opportunities embedded in loose-parts play. When children attempted to construct animals, medical equipment, or transportation objects, they needed to determine which materials might represent particular components and how those components could be combined. When a construction failed or did not correspond to their intention, children could modify the arrangement and try another strategy.

This interpretation is consistent with evidence that loose-parts activities can stimulate problem solving through direct exploration. This process is relevant to the four creativity indicators assessed in the present study. Fluency can emerge when children generate several possible constructions from the available materials. Flexibility is reflected when children change strategies or use materials in different ways. Originality becomes visible when children develop distinctive combinations or representations. Elaboration occurs when children add components and details to an initial construction. Thus, the loose-parts environment does not stimulate creativity through a single mechanism; rather, it creates multiple opportunities through which different aspects of creative behaviour can emerge.

Relationship with Play-Based Learning

The findings also reinforce the importance of play as a context for children's learning and creativity. Play provides children with opportunities to make choices, experiment, take risks, and learn through action. Yogman et al. (2018) emphasized that play supports problem solving, creativity, executive functioning, and children's agency. The present findings extend this argument by showing that the quality and characteristics of play materials may be important in determining the kinds of learning opportunities available during play.

Importantly, loose-parts play should not be interpreted as completely unstructured play. The activities in this study were organized around specific themes, and teachers provided materials and learning contexts while children retained substantial freedom in determining their constructions. This combination of teacher-provided structure and child-directed exploration resembles the principles of guided play, in which adults establish a learning environment and provide appropriate support while preserving children's agency and exploration. Research on guided play has suggested that teacher scaffolding can support children's creativity without eliminating the playful nature of the activity.

Therefore, the effectiveness of loose parts may depend not only on the availability of materials but also on how teachers mediate children's interaction with those materials. Providing a box of miscellaneous objects without sufficient time, space, or pedagogical support may not automatically produce creative learning. Teachers need to create conditions in which children can explore materials, pose questions, try alternatives, and explain their ideas without being excessively directed toward a predetermined product.

Comparison with Previous Research

The findings are broadly consistent with previous Indonesian studies examining loose parts and creativity. Lismayani et al. (2023), using a quantitative quasi-experimental approach, reported improvement in children's creativity following the use of loose-parts media. Eriani et al. (2022) similarly found that loose parts were associated with children's creative thinking because the materials allowed children to express ideas and construct different possibilities. Studies conducted in other Indonesian early childhood settings have also reported that loose-parts activities can encourage children to explore and produce creative work (Arifianti et al., 2025).

However, much of the Indonesian literature remains descriptive, qualitative, literature-based, or classroom-action oriented. For example, Mufarochah and Yustianah (2023) used a qualitative field approach to describe the implementation of loose parts in creativity-oriented activities, while Komara and Rohmalina (2023) examined the use of loose parts through a literature-based approach. The present study contributes additional evidence by comparing an intervention group with a non-intervention group and by assessing changes in defined creativity indicators.

Implications

The findings support a view of early childhood creativity as a developable capacity that is influenced by children's interactions with materials, peers, teachers, and learning environments. Rather than treating creativity as an innate and relatively fixed characteristic, the findings suggest that classroom conditions can either expand or restrict children's opportunities to generate and test ideas.

Research Contributions

The study contributes conceptual clarity by examining creativity through four observable dimensions: fluency, flexibility, originality, and elaboration. Rather than treating creativity as a broad and undifferentiated outcome, the study connects loose-parts activities with specific forms of observable creative behaviour.

Limitations

The study used intact classroom groups rather than random assignment. Although the pretest provided information about baseline performance, unmeasured differences between the experimental and control groups may still have influenced the results. The findings should therefore be interpreted as evidence of an intervention-related difference within the study context rather than definitive causal evidence applicable to all settings.

Suggestions
Future studies should use longer intervention periods and follow-up assessments. A longitudinal design could determine whether improvements in creativity are maintained after the intervention and whether repeated exposure to loose parts produces cumulative developmental benefits.

CONCLUSION

Based on the results of the discussion in the study entitled "The Role of Loose Parts Play in Supporting Creativity in Early Childhood" it can be concluded that the implementation of loose parts media has a significant effect on children's creativity skills. This is supported by the hypothesis test using the Mann- Whitney test with SPSS version 27, which yielded a significance value (2-tailed) of 0.001, indicating a value less than 0.05 (0.001 < 0.05). This means that the alternative hypothesis (H_a) is accepted and the null hypothesis (H_0) is rejected. Therefore, the use of loose parts media is effective in improving the creativity skills of children aged 4–5 years at Bina Anaprasa Nuris Kindergarten, Jember Regency.

AUTHOR CONTRIBUTION STATEMENT

Muhammad Faiz Adibi: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Writing – Original Draft, and Project Administration. **Laily Nur Aisiyah:** Supervision, Validation, Methodological Review, Writing – Review & Editing.

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