4717-Article Text-28869-1-2-20260327.docx

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Submission date: 26-Mar-2026 12:54PM (UTC+0700)
Submission ID: 2913447408
File name: 4717-Article_Text-28869-1-2-20260327.docx (122.71K)
Word count: 5129
Character count: 31754

ETDC Indonesian Journal of Research and Educational Review
Volume 5, No. 2, 2026, pp 1318 - 1330
e–ISSN 2809-3682
p–ISSN 2809-7505

https://doi.org/10.51574/ijrer.v5i2.4717

Clay Play on the Creativity of 4–5-Year-Old Children at State Kindergarten

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Article Info

Article history:

Received January 05, 2026
Accepted March 19, 2026
Published March 26, 2026

Keywords:

Children's Creativity;
Clay Play;
Early Childhood;
Fine Motor Development;
National Kindergarten.

ABSTRACT

The development of creativity in early childhood is a crucial aspect in education, but often the stimulation provided is not varied enough. In Amatullah Kire State Kindergarten, the level of creativity of children aged 4–5 years still requires optimization through more interactive and exploratory learning media such as clay play. This study aims to describe the application of clay play to children aged 4–5 years, determine the picture of children's creativity before and after the intervention, and test the effect of clay play on increasing children's creativity in Amatullah Kire State Kindergarten. This study used a quantitative approach with a pre-experimental design of the One-Group Pretest-Posttest type. The study sample consisted of 10 children aged 4–5 years who were given treatment in the form of structured clay play activities. Data was collected through creativity observations and analyzed using descriptive statistics and the Wilcoxon Signed Rank Test. The results showed that the application of clay play went very well with high enthusiasm from children. Children's creativity before treatment was in the medium category ("Starting to Emerge") but increased significantly after treatment to the high category ("Always Emerging"). The Wilcoxon test confirmed a significant effect with a significant value of 0.004 ($p < 0.05$). It was concluded that clay play is effective in enhancing the creativity of children aged 4–5 years. This study provides a practical contribution for early childhood educators in adopting clay as an effective learning method to optimize children's creative potential. Furthermore, these results serve as a scientific reference for the development of an arts-based curriculum at the kindergarten level.

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1. INTRODUCTION

Education today faces significant challenges in providing learning methods relevant to the era of globalization and technological advancement (Rahimi & Oh, 2024). Social change demands that educational institutions create environments that support children's holistic development, yet many institutions remain stuck in traditional approaches that limit the exploration of children's abilities. Modern education should emphasize the

development of motor, social, and emotional aspects through enjoyable, activity-based methods (Skulmowski, 2024). However, in reality, disparities in access and quality of education remain major obstacles in various regions (Meiliandari & Yunesti, 2024).

Early Childhood Education (PAUD) plays a crucial role in shaping children's character and basic skills as a foundation for subsequent levels of education (Haslip & Gullo, 2018; Tahlia et al., 2024). The primary focus of PAUD is to provide meaningful early learning experiences, but the implementation of global standards in Indonesia is often hampered by limited resources and a lack of training for educators (Octarra & Hendriati, 2018). Therefore, continuous innovation in curriculum and learning tools is needed to meet the needs of children's holistic development and overcome existing institutional barriers (Aldhilan et al., 2024; Apriyansyah et al., 2024).

The legal framework in Indonesia, such as Law No. 20 of 2003 and Law No. Law No. 23 of 2002 explicitly guarantees every child's right to receive an adequate education tailored to their needs. This is reinforced by Minister of Education and Culture Regulation No. 137 of 2014, which requires the holistic implementation of Early Childhood Education (PAUD), encompassing the readiness of facilities and infrastructure and educator competence (Soraya et al., 2024). Through the 2013 Early Childhood Education Curriculum, education is directed toward a constructivist approach that emphasizes activity-based learning and independent problem-solving to optimally foster children's self-confidence, critical thinking, and motor skills (Ramadhani & Nurhalimah, 2025; Sabilla, 2022).

Children aged 4-5 years are at a crucial developmental stage where their interest in exploring their surroundings begins to grow rapidly (Saracho, 2023; van Aswegen & Pendergast, 2023). At this stage, they require learning experiences that stimulate their imagination, engage their various senses, and allow for simple experiments in a supportive environment (Mardiana, 2024). Therefore, an ideal educational environment should be equipped with a variety of teaching aids, interactive approaches, and full support from educators to ensure children feel safe and comfortable while exploring (Makeleni & Ndu, 2025; Sabilla, 2022).

Objective conditions at Amatullah Kire State Kindergarten, Central Mamuju Regency, indicate that the creativity of children aged 4-5 years has not yet developed optimally. This phenomenon is evident in students' lack of courage to innovate or try new things during play, where they tend to simply follow teacher instructions without demonstrating personal initiative. For example, in drawing or paper-making activities, children prefer to imitate examples given by educators rather than create original works, indicating that creativity stimulation at the school still requires significant improvement to maximize student potential.

The low level of creativity at Amatullah Kire State Kindergarten is triggered by a lack of varied learning methods and an over-focus on passive activities, such as lectures or providing color schemes that limit children's imagination. Furthermore, the limited availability of Educational Play Tools (APT) poses a serious obstacle; media that support creativity, such as construction toys, clay, or natural materials, are largely unavailable or rarely used. As a result, children interact more frequently with repetitive,

ready-made toys, thus missing valuable opportunities to hone critical thinking skills and develop imagination through the creation of unique objects.

The use of clay play presents a strategic solution and an effective alternative to enhance children's creativity at Amatullah Kire State Kindergarten (Septiarsih, 2025). Through this medium, children have ample opportunities to experiment and create various shapes according to their imagination, while also practicing fine motor skills through molding, rolling, pressing, and shaping objects (Sutapa et al., 2021). In addition to providing a fun learning experience, this play allows children to explore color, texture, and shape more freely, which is expected to have a significant positive impact on the development of students' creativity at the school (Aeni, 2024; Gamamedaliyanage, 2025; Yunengsih & Fitri, 2025).

Conceptually, clay play is defined as a play activity using flour-based materials designed to engage children's various senses through the exploration of shape and color (Solicha & Hasibuan, 2022). These activities are structured to provide an interactive and recreational learning experience. In the context of this study, clay play serves as a learning tool that allows children to develop not only fine motor skills but also problem-solving and social interaction skills through structured play (Ramadhani & Nurhalimah, 2025).

This research is highly urgent in providing practical solutions to address the limitations of relevant play-based learning methods in early childhood education. This approach is expected to create more meaningful learning experiences that are aligned with children's developmental needs. Furthermore, the results of this study can serve as an important reference for educators in selecting adaptive and effective methods to address the challenges of modern learning.

2. METHOD

This study employed a quantitative approach with a pre-experimental approach. The design employed was a One-Group Pretest–Posttest Design, involving only one group of subjects without a control group. In this design, the subjects were first given a pre-test to measure their initial creativity levels before being given a clay play activity. After the treatment was completed, a post-test was administered to measure changes in creativity levels. This allowed the influence of the clay play to be identified through differences in pre- and post-intervention results.

The research location was Amatullah Kire State Kindergarten, Central Mamuju Regency, planned for the 2025/2026 academic year. The study population included all children aged 4–5 years at the institution. The sampling technique used was saturated sampling, with the entire population being sampled, with a total of 10 children. This technique was chosen to ensure that the data obtained comprehensively represented the condition of all subjects in that age group at the research location.

Data collection techniques were conducted through observation using a children's creativity observation sheet instrument compiled based on four main indicators: fluency, flexibility, originality, and elaboration. The collected data were then analyzed using descriptive statistics to provide an overview of the students' creativity levels.

Furthermore, to test the significance of the influence of clay play, the Wilcoxon Signed Rank Test was used with a significance level of 0.05, considering the limited sample size and the nature of this research data.

Table 1. Variable Operational Definition

No	Variable	Operational Definition	Indicator	Scale
1	Clay Games (X)	Play activities using clay flour that children do in a structured manner to form various objects according to children's imagination	1) Squeezing and forming clay2) Rolling and pressing clay3) Making simple shapes according to children's ideas	Ordinal
2	Children's Creativity (Y)	The ability of children aged 4–5 years to generate new ideas, shapes, and works through clay playing activities	1) Fluency2) Flexibility3) Originality4) Elaboration	Ordinal

3. RESULTS AND DISCUSSION

Results

Overview of Children's Creativity Aged 4–5 Years Before and After *Clay Game*

Pretest Analysis

Table 2. Frequency Distribution of Children's Creativity Before *Clay Game*

Interval	Categories	Experimental Group	
		(F)	(%)
8 – 13	Not Visible	3	30%
14 – 19	Start Appearing	7	70%
20 – 25	Frequently Seen	0	0%
26 – 32	Always Visible	0	0%
Total		**10**	**100%**

Table 2 shows that the creativity levels of 4–5-year-old children at Amatullah Kire State Kindergarten, Central Mamuju Regency, before being exposed to clay play, showed suboptimal performance. Most of the study subjects, 7 children (70%), were in the "Beginning to Emerge" category. Meanwhile, 3 other children, 30%, were still in the "Not Yet Emerging" category, and none reached the "Frequently Emerging" or "Always Emerging" categories.

These initial findings indicate that children's creative abilities before the implementation of clay play activities were still in the low to moderate range. This situation underscores the urgent need for more intensive stimulation through innovative learning activities. Therefore, planned interventions are needed to stimulate and enhance children's creative potential more optimally and sustainably.

Post-test Analysis Results

Table 3. Frequency Distribution of Children's Creativity After *Clay Game*

Interval	Categories	Experimental Group	
		(F)	(%)
8 – 13	Not Visible	0	0%
14 – 19	Start Appearing	0	0%
20 – 25	Frequently Seen	1	10%
26 – 32	Always Visible	9	90%
Total		**10**	**10**

Table 3 shows a significant increase in the creativity levels of 4–5-year-old children at Amatullah Kire State Kindergarten in Central Mamuju Regency after being treated with clay play activities. Most of the study subjects, 9 children (90%), reached the "Always Emerging" category, while 1 child (10%) fell into the "Frequently Emerging" category. These results represent a drastic change compared to the initial condition, where no children were in the "Beginning to Emerge" or "Not Yet Emerging" category.

These findings indicate that children's creative abilities transformed from a low to high category after participating in a series of clay play activities. This empirically demonstrates that the use of clay is an effective method for stimulating and developing creativity and imagination in early childhood. Therefore, this play-based approach is highly worthy of consideration as a routine learning strategy to optimize students' creative potential.

Comparison of Pre *Test* and *Post Test Description Analysis Results*

After measuring children's creativity through pre- and post-tests, the next step was to compare the data to identify the level of improvement in the creativity of 4-5-year-old children at Amatullah Kire State Kindergarten in Central Mamuju Regency. This comparison aimed to map the significant influence of clay play activities on the development of students' creativity. This comparative analysis served as an empirical basis for evaluating the effectiveness of the interventions implemented during the study period.

By comparing data from before (pre-test) and after (post-test) the treatment, the effectiveness of clay plays as a learning medium, stimulating children's creativity, imagination, and skills in expressing their creative ideas, was determined. The results of this evaluation not only demonstrate the success of using clay in improving children's cognitive and psychomotor skills but also provide insight into the potential for developing play-based methods within the broader early childhood education curriculum.

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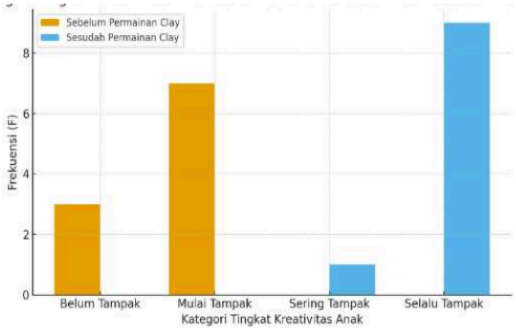

Figure 1. Comparison Chart of the Distribution of the Creativity Level of Children Aged 4–5 Years Before and After Clay Game

A comparative analysis of the creativity levels of 4–5-year-old children at Amatullah Kire State Kindergarten in Central Mamuju Regency showed a significant increase in capabilities between the pre- and post-intervention phases. Initial data indicated that 70% of children were in the "Beginning to Emerge" category, while 30% were still in the "Not Yet Emerged" category. None of the children reached the "Frequently Emerged" or "Always Emerged" criteria. However, after the implementation of clay play, there was a drastic shift in achievement, with 90% of children achieving the "Always Emerged" category, while the remaining 10% were in the "Frequently Emerged" category.

This surge in data empirically proves that clay play activities can stimulate and optimally enhance children's creativity. This shift from a dominant low to a dominant high indicates that the use of clay media is effective in igniting children's courage to explore and express original ideas. Therefore, the results of this study reinforce the urgency of implementing adaptive and interactive learning media to facilitate the cognitive development and creativity of early childhood.

Table 4. Results of Descriptive Statistics Analysis of Pre-Test and Post-Test Scores

Variable	N	Range	Min	Max	Sum	Red	Std. Dvt	Variance
Pretest	10	4	12	16	143	14.30	1.337	1.789
Posttest	10	3	26	29	276	27.60	0.843	0.711
Valid N (listwise)	10	—	—	—	—	—	—	—

The descriptive analysis results in Table 4 show a significant increase in the creativity levels of 4-5-year-old children at Amatullah Kire State Kindergarten, Central Mamuju Regency, after receiving clay play. The average score in the pre-test was 14.30, with a minimum score range of 12 to a maximum of 16. This score jumped sharply in the post-test to 27.60, with the minimum score increasing to 26 and the maximum score reaching 29. This nearly doubling of the average score confirms the effectiveness of clay play in quantitatively stimulating students' creative abilities.

In addition to the increase in the average score, there was a decrease in the standard deviation from 1.337 to 0.843, indicating that the children's creative outcomes after the treatment became more homogeneous or even. This is reinforced by a decrease in the variance from 1.789 to 0.711, indicating a narrowing of the ability gap between individuals within the group. Overall, these statistical data provide an objective picture that clay play not only has a positive influence on significantly increasing creativity but is also able to standardize children's creative competencies at a higher level.

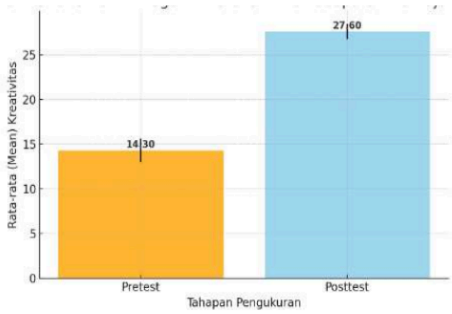

Figure 2. Comparison Chart of Average *Pretest* and *Posttest Results* of Children's Creativity Level 4–5 Years

Figure 2 shows a comparison between the results of *the pretest* and *posttest of the* creativity level of children aged 4-5 years at Amatullah Kire State Kindergarten, Central Mamuju Regency. This graph illustrates the average creativity score at both stages of measurement. In the *pretest stage,* the average children's creativity score was 14.30, while in the *posttest stage,* the average increased to 27.60. This shows a significant increase in children's creativity levels after intervention using clay games. This graph reflects the positive influence of the activities carried out on the development of children's creativity, which can be seen from the considerable difference in scores between *the pretest* and *posttest.* The data source used for this graph comes from the processing of SPSS data in 2025.

The Effect of *Clay* Games on the Increase in Creativity of Children Aged 4–5 Years

The results of the hypothesis test using the Wilcoxon Signed Rank Test were conducted to examine the significance of the influence of clay play on children's creativity levels in the experimental group. This analysis aimed to determine whether the differences in scores between the pre- and post-treatment stages were the result of the intervention or simply a coincidence. This test is crucial in providing a strong inferential basis for the effectiveness of clay play at Amatullah Kire State Kindergarten.

Details of the statistical calculation results, including Z-scores and significance values (Asymp. Sig., 2-tailed), are comprehensively presented in Table 5 below. The data provides an objective overview of the direction and magnitude of changes in students' creative behavior after engaging in clay play activities. These findings provide

the primary statistical evidence supporting the study's conclusions regarding optimizing the creative potential of early childhood through this clay-based learning medium.

Table 5. Wilcoxon Sign Rank Test for Creativity Ability for Children

Variable	Posttest - Pretest
Z	-2.844b
Asymp. Sig. (2-tailed)	0.004

The Wilcoxon Signed Ranks Test results presented in Table 5 yield a Z-value of -2.844 with a 2-tailed significance level (Asymp. Sig.) of 0.004. Given that this significance value is much smaller than the established significance level (alpha = 0.05), it can be concluded that there is a highly significant difference between the pre-test and post-test results in the experimental group. This statistical finding provides a strong basis for rejecting the null hypothesis (H_0) and accepting the alternative hypothesis (H_a), confirming a significant effect of the treatment.

These results demonstrate that clay play activities have a significant positive impact on increasing the creativity of 4–5-year-old children at Amatullah Kire State Kindergarten, Central Mamuju Regency. The use of this medium has proven effective in stimulating students' creative thinking skills through texture exploration and artistic expression. Therefore, clay play can be recommended as an innovative learning tool to optimize children's creative potential and imagination from an early age.

Discussion

Preliminary analysis showed that the creativity of 4–5-year-old children at Amatullah Kire State Kindergarten before the intervention was limited, with the majority of students in the "Beginning to Emerge" category and an average pre-test score of 14.30. This condition reflects low fluency in generating ideas, where children tend to hesitate and prefer to imitate examples given. This phenomenon aligns with cognitive development theory, which states that without adequate sensory stimulation, children's creative potential will remain latent (Baduni et al., 2025; Clemente-Suárez et al., 2024; Lin & Shih, 2016). As noted in previous studies, passive learning environments and a lack of educational props are often major obstacles to children's concrete expression of ideas (Mardiana, 2024; Sabilla, 2022).

After the implementation of clay play, a significant transformation occurred, with the average score jumping to 27.60, with 90% of children achieving the "Always Emerging" category. This improvement demonstrates that clay is effective in honing the four main pillars of creativity: fluency, flexibility, originality, and elaboration. Theoretically, manipulative activities using soft materials such as clay provide tactile experiences that stimulate brain function in processing imagination into physical forms (Solicha & Hasibuan, 2022). These results reinforce the findings of Hasanah (2024) and Kurniasari (2025) that a constructivist approach through play not only improves fine motor skills but also fosters children's courage to experiment and confidence in creating original and unique works.

The increase in children's creativity at Amatullah Kire State Kindergarten after the intervention is fundamentally correlated with Friedrich Wilhelm Froebel's Play Theory. Froebel asserted that play is a natural means for children to learn, express themselves, and understand the world (Friedman & Muñoz Alvis, 2023; Smedley & Hoskins, 2020). Through the manipulation of clay, children engage in hands-on experiences that simultaneously integrate cognitive, motor, and emotional aspects without pressure. This activity reflects Froebel's principle that play is the primary foundation of early childhood education; where the process of shaping, pressing, and creating new objects from soft materials provides a bridge for children to build a comprehensive understanding of themselves and their environment in a fun and meaningful way (McNair & Powell, 2021; Teichert & Helbig, 2024).

This finding aligns with research by Septiarsih (2025), which states that clay significantly improves four key aspects of creative thinking: fluency, flexibility, originality, and elaboration. This finding is further supported by a study by Kalsum et al. (2021), which confirmed that the use of this medium not only stimulates imagination but also optimizes fine motor coordination. Empirical evidence in this study, demonstrated by a Wilcoxon test significance value of 0.004 (<0.05), confirms that changes in children's behavior—such as the courage to try new shapes and confidence in expressing themselves—are tangible results of clay media stimulation. Thus, the use of clay has proven to be an effective educational instrument in transforming children's creative potential from the imitation stage to a more mature innovation stage.

The increasing creativity of children at Amatullah Kire State Kindergarten is clearly reflected in their ability to transform their imaginations into concrete forms, such as animals, flowers, and surrounding objects. This phenomenon indicates a shift from imitation to independent creation, where children begin to demonstrate originality and a strong curiosity in solving simple problems while manipulating clay. This development aligns with Friedrich Wilhelm Froebel's play theory, which views play as a natural means for children to express themselves and develop a holistic understanding of their environment (Aisyah et al., 2023). According to Froebel, exploratory play activities such as these have high educational value because they provide a space for children to channel their creative impulses without pressure, allowing the learning process to occur intrinsically and meaningfully (Smedley & Hoskins, 2020).

The effectiveness of clay play in stimulating creative potential is reinforced by the findings of Istikhakimi (2024), who stated that the use of flour-based clay significantly increases children's fluency of thought and courage in experimenting with shape and color. Furthermore, Septiarsih et al. (2026) emphasized that constructive activities using clay can integrate fine motor development with strong cognitive stimulation. Through hands-on manipulative experiences, children not only hone their manual skills but also build self-confidence and motivation to continue innovating. Therefore, the role of educators as facilitators in creating a supportive play environment is key to optimizing all aspects of children's development, including cognitive, motor, and socio-emotional development (Arda Tuncdemir, 2025; Qayyum et al., 2024).

This research makes significant contributions, divided into three main aspects: theoretical, practical, and policy aspects of early childhood education. Theoretically, this research strengthens the relevance of Friedrich Wilhelm Froebel's Play Theory in the context of modern education. These findings demonstrate that the principle of learning through direct object manipulation (such as clay) remains the most effective method for stimulating the four pillars of creativity: fluency, flexibility, originality, and elaboration. Furthermore, this research adds to the literature on the integration of psychomotor (fine motor) aspects with higher-level cognitive functions in children aged 4-5 years through soft materials.

Practically, this research presents empirical evidence that clay play can be used as an alternative learning medium that is cheap, flexible, and effective compared to static fabricated play tools. Teachers can adopt this research procedure to create a more exploratory learning environment and reduce children's dependence on rigid instruction patterns. Providing meaningful learning experiences that increase self-confidence, courage to experiment, and simple problem-solving skills through artistic expression for students. In addition, the results of this study can be a basis for schools (Kindergarten Amatullah Kire) and the local education office in developing a more varied activity-based curriculum. This contribution emphasizes the importance of providing appropriate educational play equipment and natural materials in each class to support the optimal achievement of child development achievement standards, especially in the aspects of art and creativity.

4. CONCLUSION

The implementation of clay play at Amatullah Kire State Kindergarten has proven effective and has created an enthusiastic, active, and exploratory learning environment for children aged 4–5. Data analysis revealed a significant increase in children's creativity, with the majority of subjects transitioning from the "Beginning to Emerge" category to "Constantly Emerging" in terms of fluency, flexibility, originality, and elaboration of creative thinking. This finding was supported by the Wilcoxon Signed Ranks Test, which showed a significance value of 0.004 (<0.05), empirically confirming the significant influence of clay play on stimulating students' creativity. This success aligns with the principles of Friedrich Wilhelm Froebel's Play Theory, which asserts that children learn optimally through natural play activities that integrate fine motor development, independence, and self-confidence.

As a suggestion, kindergarten teachers are recommended to regularly integrate clay play into their daily learning schedules, developing a more dynamic variety of themes to maintain student motivation. Schools are expected to provide structural support by providing adequate clay media facilities and conducting training for educators on innovative, creative play-based learning methods. Future researchers are advised to expand the scope of their studies by including other developmental variables, such as socio-emotional aspects or motor coordination, and to reach a wider age group to obtain a comprehensive picture of the effectiveness of clay media in stimulating all dimensions of child development.

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