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Enhancing Creativity in 4-5-Year-Olds: A Quasi-Experimental Study of Nature-Based Leaf-Stamp Batik

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Abstrak:

Penelitian ini mengkaji efektivitas kegiatan membatik cap dari bahan alam (daun) sebagai strategi untuk menstimulasi kreativitas anak usia 4-5 tahun (Kelompok A). Masalah utama yang melatarbelakangi studi ini adalah masih dominannya pembelajaran seni konvensional yang berpusat pada guru, sehingga menghambat perkembangan orisinalitas dan fleksibilitas berpikir anak. Metode penelitian yang digunakan adalah kuantitatif dengan desain kuasi eksperimen tipe One-Group Pretest-Posttest yang melibatkan 14 subjek. Kreativitas diukur menggunakan empat indikator Torrance: kelancaran, keluwesan, orisinalitas, dan pemerincian. Analisis data menggunakan uji-t berpasangan menunjukkan peningkatan kreativitas anak yang signifikan, dengan kenaikan skor rata-rata dari 5,00 pada saat pre-test menjadi 15,71 pada saat post-test ($t = -48,568$ $p < 0,001$). Hasil ini memberikan justifikasi empiris bahwa integrasi bahan alam di lingkungan sekitar sebagai media cetak tinggi merupakan strategi yang efektif dan berkelanjutan dalam membangun kepercayaan diri kreatif anak. Simpulan penelitian menegaskan bahwa modifikasi teknik membatik tradisional menjadi kegiatan membatik cap daun mampu menciptakan pengalaman belajar bermakna yang mengoptimalkan capaian perkembangan anak usia dini.

Kata Kunci: Kreativitas; Membatik Cap Daun; Bahan Alam; Anak Usia Dini

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Abstract
This research examines the effectiveness of leaf-based batik stamping activities as a strategy to stimulate the creativity of children aged 4-5 years (Group A). The study addresses the dominance of conventional, teacher-centered art learning that hinders the development of children's originality and flexible thinking. The research employed a quantitative approach with a One-Group Pretest-Posttest quasi-experimental design involving 14 subjects. Creativity was measured using Torrance's four indicators: fluency, flexibility, originality, and elaboration. Data analysis using a paired t-test revealed a significant increase in children's creativity, with the mean score rising from 5.00 in the pre-test to 15.71 in the post-test ($t = -48.568$ $p < 0.001$). The results empirically justify that integrating surrounding natural materials as a relief print medium is an effective and sustainable strategy for enhancing creative confidence. The study concludes that modifying traditional batik into leaf-stamping activities creates meaningful learning experiences that optimize developmental outcomes in early childhood.
Keywords: Creativity; Leaf Stamping Batik; Natural Materials; Early Childhood

INTRODUCTION

Early Childhood Education (ECE) serves as a fundamental cornerstone of human development, often characterized as the golden age, a period in which neural plasticity reaches its peak for the absorption of external stimuli. At the age range of 4–5 years (Group A), children are at the transitional threshold toward primary education, which necessitates the maturation of cognitive, affective, and psychomotor readiness. A key developmental indicator of educational success at this stage is the Creativity dimension, which serves as a core graduate profile within the foundation phase of the *Kurikulum Merdeka*. This framework shifts the focus from mere aesthetic production toward the cultivation of children's ability to express thoughts and feelings through diverse media exploration, fostering an authentic creative process. The development of creativity at this age is not merely an effort to produce aesthetic products, but rather a process of honing divergent thinking skills that enable children to explore solutions from various perspectives (Irna, 2024). However, in many pedagogical practices, creativity is often marginalized by the dominance of literacy-and-numeracy-oriented learning (*calistung*) or rigid conventional methods (Nadhifah & Aisyah, 2025). Nevertheless, without adequate

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creative stimulation, a child's imaginative potential may undergo atrophy, which in the long term hinders future adaptability and problem-solving capabilities. Therefore, a reorientation of the arts curriculum in ECE institutions is required to integrate freedom of expression with the use of media that challenges children's curiosity (Nurfaizah & Na'imah, 2021).

From the perspective of developmental psychology, creativity is a multidimensional construct involving original mental processes and the courage to deviate from conventional norms (Agustina & Nurhayati, 2021). Drawing upon Rhodes' (1961) 4P theory, creativity must be understood as a synergy between Person, Process, Press, and Product ('Athiya & Fauzi, 2025). In children aged 5–6 years, the process dimension plays the most crucial role, as it is within this phase that they learn to experiment with failure and discovery. E. Paul Torrance's indicators of creative thinking, comprising fluency, flexibility, originality, and elaboration serve as essential parameters in assessing the extent to which an artistic activity stimulates creativity (Mulyadi, 2024). Empirical evidence reveals that many educators still implement teacher-centered methods, in which children are merely tasked with coloring predefined patterns, thereby hindering the development of their originality and flexibility. This aligns with the critiques of educational experts, who assert that the standardization of children's artwork ultimately stifles their authentic character. In the absence of opportunities for autonomous elaboration, artistic activities remain mere exercises in gross motor skills without engaging higher-order executive functions, necessitating the intervention of more dynamic media that resonates with the child's world.

The utilization of natural materials as a pedagogical medium for art education offers distinct advantages that are not present in synthetic media (Aisyiah & Pamungkas, 2023). Natural media are concrete, multisensory, and rich in texture, which is highly relevant to the pre-operational stage of cognitive development according to Jean Piaget (Iryouw et al., 2025). Leaves, as an abundant natural material, possess unique morphological variations, ranging from pinnate and palmate to curved shapes alongside prominent venation textures that function as natural clichés in printing techniques. The use of leaves in artistic activities facilitates what Viktor Lowenfeld refers to as the pre-schematic stage of visual development, where children begin to establish connections between visual symbols and real-world objects in their environment. From a sociocultural perspective, the use of leaves as a

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medium also teaches children to appreciate ecosystems and fosters naturalist intelligence from an early age (Yunita et al., 2024). Through leaf exploration, children not only learn about color and shape composition but also engage in tactile experiences that stimulate their fine motor nerves more intensely than using standard writing instruments (Fitrianingsih et al., 2018). Therefore, the integration of natural materials into the ECE arts curriculum becomes a necessity to create meaningful learning that is simultaneously economical and sustainable (Safura et al., 2024).

Batik-making is an intangible cultural heritage characterized by high technical complexity; however, through the modification of stamping techniques, this activity can be adapted into an effective stimulatory medium for early childhood (Adhe et al., 2023). Batik stamping (*batik cap*) is essentially a form of relief printing (high-print) that transfers motifs from a master template onto a fabric or paper surface. For children aged 4–5 years, this technique is ideal because it provides instant gratification upon seeing the printed result, yet still demands precision during the pressing and coloring processes. The modification of batik-making using leaf stamping replaces the function of the *canting* and hazardous hot wax, thereby providing a sense of safety for children to experiment freely. In this process, children are encouraged to understand the cause-and-effect concepts behind why certain leaf veins produce clearer prints, or how the blending of two colors during the stamping process creates a new color. This leaf-stamping batik activity also serves as a means of practicing fine motor control and hand-eye coordination that is more complex than simple free drawing, as it involves the use of proportional pressure to ensure the leaf motifs are perfectly transferred onto the medium (Putri & Maulana, 2025).

While previous studies have explored techniques such as *jumputan* (tie-dye) and banana frond stamping, these methods have limitations. *Jumputan* tends to emphasize gross motor skills over visual detail, and banana fronds often produce monotonous motifs. Similarly, ecoprint techniques involving pounding often damage the leaf structure, reducing the opportunity for children to engage in flexible compositional layouting. There is currently a lack of empirical research specifically investigating how the diverse morphological structures of leaves can be utilized in a single session to trigger creative decision-making and satisfy all four of Torrance's creativity indicators.

The state of the art, or the positioning of this research within the academic discourse, can be discerned through a comparison with relevant prior studies. While

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the use of the *jumputan* (tie-dye) technique is capable of enhancing children's creativity, it tends to emphasize gross motor skills through the wringing of fabric rather than the mastery of visual detail. Meanwhile, studies on the use of banana fronds in batik stamping show significant improvements in the fluency of ideas; however, banana frond media tends to produce monotonous motifs (circular or oval) compared to the diverse variations offered by leaves. Studies exploring the *ecoprint* technique through the pounding method, while effective, often result in the destruction of the leaf structure, leaving little room for children to engage in flexible compositional arrangements. In contrast to those studies, the present research focuses on the natural relief printing technique using leaves with diverse venation textures, enabling children to achieve deeper levels of the elaboration and flexibility indicators through the strategic layouting of motifs on paper (Rahmawati, 2025).

This study aims to analyze the effectiveness of nature-based leaf-stamp batik as a strategic intervention to stimulate creativity in children aged 4-5. The research focuses on behavioral dynamics and score improvements across the dimensions of fluency, flexibility, originality, and elaboration. By providing empirical evidence, this study justifies the use of local, sustainable materials as high-quality pedagogical tools that can enhance the creative graduate profile within the foundation phase framework.

The urgency of this research is also driven by the phenomenon of creativity degradation caused by excessive gadget exposure in early childhood post-pandemic, where children have become passive consumers of content rather than active producers of ideas. Leaf-stamping batik activities serve as a pedagogical intervention to return children to physical activities that involve direct sensorimotor engagement (Hida et al., 2022). Through interaction with leaves in their immediate environment, children reconnect with nature and cultivate focus and patience, two essential elements of the creative process that are often lost in digital activities. Furthermore, this activity provides space for children to express their emotions and personal identities through subjective color choices. If this creativity is not nurtured from an early age through provocative media such as natural materials, there is a concern that children will grow into conformist and less innovative individuals. Therefore, scientific documentation regarding the process of enhancing creativity through leaf-stamping batik is crucial as a reference for Early Childhood Education (ECE)

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practitioners in designing activities capable of optimizing children's multiple intelligences.

Theoretically, this research also seeks to prove that the lack of infrastructure and facilities in Early Childhood Education (ECE) institutions should not be an obstacle to the development of creativity. The utilization of leaves, which are freely available in the school's immediate environment, refutes the paradigm that high-quality educational media must always be expensive or factory-produced. The concept of educational teaching aids (*Alat Permainan Edukatif* or APE) must be redefined as anything in a child's environment capable of triggering cognitive processes (Rakhmawati, 2022). In the context of leaf-stamping batik, the Press (environmental stimulus) aspect is particularly potent because children are actively engaged starting from the material collection phase. This fosters a sense of ownership over the work to be created. When children feel they have full control over their medium, their intrinsic motivation increases, which, according to Amabile's theory, is the primary key to creative productivity. Thus, the theoretical foundation of this research bridges the gap between creative psychology and practical implementation in the ECE classroom.

The primary objective of this research is to provide an in-depth description of how the creativity stimulation process occurs and to analyze the effectiveness of the leaf-stamping batik technique in increasing the creativity scores of children aged 5–6 years. The observational focus is not merely on the final output on fabric or paper, but rather on the behavioral dynamics of the child during the process, how they navigate challenges when the ink is too thick, how they decide to layer leaf motifs, and how they articulate the meaning behind their color compositions. This research adopts a holistic approach to ensure that each creativity indicator, comprising fluency, flexibility, originality, and elaboration can be observed objectively. The findings of this study are expected to provide a theoretical contribution to the development of early childhood art education through the implementation of deep learning approaches, while simultaneously offering applicable solutions for educators in stimulating the creativity dimensiona, key profile for graduates in the foundation phase within the Kurikulum Merdeka framework.

Leaf-stamping batik is not merely a filler activity; it is an instructional strategy deliberately designed to trigger an explosion of children's imagination. By integrating local wisdom (batik), nature exploration (leaves), and creative psychology theories

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(Torrance & Rhodes), this article seeks to present a comprehensive discourse on the significance of authentic media in early childhood education (Nururrohmah et al., 2025). Innovation in art education represents a strategic necessity for fostering a future generation equipped with creative confidence through deep learning approaches. By establishing a comprehensive theoretical and empirical foundation, this research provides a robust justification for positioning leaf-stamping batik as a flagship learning model within the foundation phase. Furthermore, this study serves as a primary reference for future inquiries focused on Creativity dimension development as a core graduate profile, leveraging the synergy between local wisdom and natural materials.

METHOD

This study employed a quantitative approach with a pre-experimental one-group pretest-posttest design. This design was selected to measure the changes in creativity levels within a single group before and after the introduction of the leaf-stamping batik intervention. The research was conducted at TK Adhyaksa III Surabaya with a total sampling technique involving 14 children aged 4–5 years (Group A).

Instrumental Framework and Operationalization

The research instrument was adapted from the Torrance Tests of Creative Thinking (TTCT), specifically operationalized into four behavioral indicators suitable for the early childhood context:

1. Fluency: The child's ability to produce a variety of leaf-stamping patterns within a set duration.
2. Flexibility: The variety of leaf types (pinnate, palmate, curved) and color combinations used in the composition.
3. Originality: The uniqueness of the stamping arrangement that deviates from the teacher's initial example.
4. Elaboration: The child's ability to add decorative details or fill the negative space around the stamps to complete the artwork.

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Data Collection and Scoring

The assessment was conducted using a structured observation rubric with a 4-point Likert scale: 1 (Not Yet Developed), 2 (Starting to Develop), 3 (Developing According to Expectations), and 4 (Developing Very Well). To ensure instrument validity, the rubric underwent expert judgment by a senior practitioner in early childhood education. Reliability was maintained through inter-rater reliability, where the researcher and the mentor teacher (*Guru Pamong*) independently scored the children's work, followed by a consensus on any scoring discrepancies to minimize subjective bias.

Procedures and Analysis

The research procedure followed three stages: (1) Pre-test, to assess initial creativity through a conventional coloring task; (2) Treatment, consisting of four sessions of nature-based leaf-stamping batik; and (3) Post-test, to evaluate the final creativity scores. Data were analyzed using a paired sample t-test via SPSS to determine the significance of the mean difference between the pre-test and post-test results.

RESULTS AND DISCUSSION

RESULTS

This study aims to determine the effectiveness of the leaf-stamping batik intervention on creativity variables by comparing pretest and posttest scores within a single subject group. Based on the descriptive statistical analysis, the data overview is presented in Table 1.:

Table 1: Summary of Descriptive Statistics (Paired Samples Statistics)

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pretest	5.0000	14	.78446	.20966
	posttest	15.7143	14	.46881	.12529

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Figure 1. Implementation of leaf-stamping batik activities

Based on Table 1, there is a measurable difference in the mean scores. The pretest mean score of 5.00 represents the subjects' baseline ability level prior to the intervention. Following the treatment, the posttest mean score rose to 15.71, indicating an absolute increase of 10.71. Furthermore, the Standard Deviation for the posttest (0.468) is lower than that of the pretest (0.784), suggesting that following the treatment, the distribution of student scores became more homogeneous.

The next stage involved examining the correlation between the pretest and posttest scores to determine the consistency of subject performance.

Table 2: Paired Samples Correlations Results

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	pretest & posttest	14	.209	.473

The correlation test results show a coefficient of 0.209 with a significance value (Sig.) of 0.473. Since $p > 0.05$, there is no statistically significant correlation between the pretest and posttest scores. This suggests that the improvement observed was relatively independent of the subjects' initial abilities, indicating that the intervention was beneficial across different baseline levels within the group.

Table 3: Paired Samples T-Test Results

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	pretest - posttest	-10.71429	.82542	.22060	-11.19087	-10.23770	-48.568	13	.000

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Which is below the significance threshold of $p < 0.05$ therefore, the Null Hypothesis (H_0) is rejected. The t-value of -48.568 reinforces these findings, where the negative sign indicates that the posttest scores were consistently higher than the pretest scores. To determine the magnitude of this effect, Cohen's *d* was calculated as follows:

$$d = \frac{Mean\ difference}{Standart\ Deviation\ Difference} = \frac{10.714}{0.825} \approx 12.98$$

An effect size of 12.98 is categorized as large (Cohen, 1988), providing empirical evidence that the intervention had a substantial impact on the participants' creativity scores.

Figure 2. Children's leaf-stamping batik artworks

The increase from 5.00 to 15.71 represents a notable improvement in the subjects' creative performance. In early childhood education contexts, such a trend suggests that the sensory-motor involvement in leaf-stamping batik is a viable method for stimulating creativity. The decrease in the Standard Deviation suggests that the intervention helped in narrowing the competency gap among the subjects.

The t-value of 48.568 significantly exceeds the t-table value for d = 13 (approximately 2.160), which indicates that the observed change is statistically significant and likely associated with the intervention. These results offer a basis for the argument that nature-based art activities can positively influence the development of creativity in children aged 4–5. This aligns with the view that sensory-motor engagement is a key factor in early childhood cognitive and creative development.

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Figure 3. Implementation of leaf-stamping batik activities

DISCUSSION

Dynamics of Torrance's Creativity Indicators

The significant increase in creativity scores—from a pretest mean of 5.00 to a posttest mean of 15.71—suggests that nature-based leaf-stamp batik is an effective pedagogical intervention. This improvement can be analyzed through the four dimensions of Torrance's creativity framework. Fluency was observed as children gained the confidence to produce multiple motifs, while flexibility emerged from the cognitive process of selecting various leaf morphologies (pinnate, palmate, etc.) to create diverse patterns. Originality and elaboration were manifested in the subjective color choices and the meticulous pressure applied to transfer intricate vein textures onto the medium.

This success is attributable to the fulfillment of the four indicators of creativity proposed by E. Paul Torrance within the context of the leaf-stamped batik (*batik cap daun*) activities. First, Fluency is evidenced by the children's ability to produce numerous motif imprints on a single worksheet; this abundance of ideas represents the initial stage of expressive courage. Second, Flexibility emerges as children select diverse leaf types such as palmate, pinnate, and curved to create varied patterns. The use of diverse leaf types encourages children to move beyond a single pattern (Haryanti, 2019).

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Third, the aspect of Originality is reflected in the children's creative decisions regarding color combinations and motif layouting, which result in unique outputs distinct to each individual (Ismar & Sandra, 2024). The freedom to select natural media fosters the emergence of authentic works. Finally, Elaboration is evidenced when children meticulously press leaf veins or layer motifs to produce richer visual effects. The intricate details in children's artwork signify the engagement of higher-order brain executive functions (Pujhana et al., 2024).

These research findings reinforce the assertion that a one-group design is highly sensitive in monitoring individual subject development (Laksana & Wulandari, 2022). The Torrance instrument remains the most valid parameter for measuring children's imaginative bursts (Ulya Ainur Rofi'ah et al., 2023). A score increase exceeding 100% serves as a primary indicator of a successful arts curriculum. A significance level of 0.000 validates the pedagogical efficacy of the intervention (Qohar et al., 2026). The homogeneity of scores at the conclusion of the study reflects consistent instructional effectiveness across the teaching process.

The low correlation (0.209) serves as evidence that the intervention achieved a total transformation of the subjects, rather than a mere linear progression. The sample size of 14 subjects is ideal for in-depth ethnographic behavioral observation; furthermore, the implementation of a single-group control minimizes the bias of external variables within the Early Childhood Education (ECE) environment. The utilization of natural materials significantly enhances children's intrinsic motivation (Suryadi, 2025). The high t-value (-48.5) represents a remarkably robust effect size.

Furthermore, the score increase of over 200% demonstrates that leaf media can effectively mitigate post-pandemic creativity degradation. The implementation of relief printing techniques is utilized due to its capacity to foster complex hand-eye coordination. The exploration of leaf morphology fosters the development of children's naturalistic intelligence from an early age (Marwah, 2017). Children with the lowest baseline abilities often exhibit the most dramatic surges when interacting with natural materials (Herayati & Patilima, 2023). The importance of data reliability is evident from the small standard error (0.22).

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The effectiveness of this intervention is rooted in the Constructivist learning theory, where children are not passive recipients but active constructors of knowledge through direct interaction with their environment. The use of leaves as a "natural cliché" provides a concrete sensory-motor experience that aligns with Piaget's pre-operational stage. Unlike synthetic media, the organic textures of leaves offer unpredictable results that challenge children to adapt their techniques, thereby stimulating divergent thinking. This process aligns with Mel Rhodes' 4P Theory, specifically the 'Press' (environmental stimulus) and 'Process' aspects; the availability of diverse natural materials (Press) encourages an exploratory creative process that ultimately leads to a unique 'Product' (Rhodes, 1961).

Creative decision-making in selecting leaf media is a tangible manifestation of self-directed learning. The novelty of this research lies in the utilization of pluralistic media to stimulate originality. Furthermore, the leaf-stamping batik technique challenges the paradigm that high-quality artistic media must be costly. A significance level of 0.000 serves as irrefutable empirical evidence of these findings. Collectively, these results demonstrate that the children have achieved the Creativity indicators within the Foundation Phase; they are now capable of independently communicating their thoughts and feelings through ideas and tangible works generated from the exploration of diverse media.

The narrowing gap between subjects indicates the success of equitable stimulation. These results serve as a validation of Mel Rhodes' 4P Theory (Person, Process, Press, Product) (Rhodes, 1961). Furthermore, the meticulous process of selecting the appropriate leaves cultivates children's focus and patience (Lubis, 2026). The satisfaction derived from seeing the final printed results significantly boosts children's learning motivation. Furthermore, the mean difference of -10.71 serves as tangible evidence of the transformation in their capabilities.

These activities successfully reconnect children with meaningful physical engagement. Observed upward trends suggest that this approach serves as an innovative solution to infrastructure and resource limitations. Furthermore, the research data exhibits high internal consistency. Leaf-stamping batik (*batik cap daun*) acts as a bridge between local wisdom and modern creativity (Safitri et al., 2024).

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Compared to previous studies, these findings extend the discourse on early childhood art education. While studies on jumputan (tie-dye) emphasize gross motor skills, leaf-stamping requires a higher level of fine motor precision and spatial awareness (Adhe et al., 2023). Furthermore, while banana frond stamping often results in repetitive patterns, the morphological diversity of leaves encourages more complex compositional decision-making. The low correlation (0.209) between pretest and posttest scores in this study is particularly noteworthy; it suggests that the intervention provided a transformative learning experience that benefited all participants regardless of their initial ability levels, narrowing the competency gap within the group.

However, these findings must be interpreted with caution due to several methodological limitations. First, the use of a One-Group Pretest-Posttest design without a control group makes it difficult to completely isolate the intervention's effects from external factors, such as natural maturation or other classroom activities. Second, the small sample size (n=14) limits the generalizability of the results to a broader population. Despite these constraints, the high effect size (Cohen's $d \approx 12.98$) and the low standard error (0.22) indicate that within this specific context, the intervention had a robust and consistent impact.

In conclusion, leaf-stamping batik serves as a bridge between local wisdom and modern creative pedagogy. It offers a sustainable solution to resource limitations in ECE institutions while effectively reconnecting children with meaningful physical engagement. Future research should consider employing a randomized controlled trial (RCT) with a larger and more diverse demographic to further validate the longitudinal effects of nature-based interventions on creative development.

CONCLUSION

This study concludes that the leaf-stamping batik technique is significantly effective in enhancing the creativity of children aged 4-5 years, as shown by the significant surge in scores between the pretest and posttest. This intervention successfully stimulated indicators of fluency, flexibility, originality, and elaboration through the use of concrete and multisensory natural materials. The use of these pluralistic media is proven to build children's confidence in creative decision-making

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and create an active, enjoyable, and deep learning environment. Substantively, this research provides a real contribution to the development of the creativity dimension as one of the graduate profiles at the early childhood education level through the implementation of a deep learning approach.

This study indicates the potential effectiveness of the leaf-stamping batik technique in supporting the development of creativity among children aged 4-5 years. The observed increase in scores between the pretest and posttest suggests that this intervention can stimulate key creativity indicators, including fluency, flexibility, originality, and elaboration. By utilizing concrete and multisensory natural materials, the activity appeared to encourage children's confidence in creative decision-making and provided an engaging learning environment. The main contribution of this research lies in providing an empirical basis for integrating local, sustainable resources into the early childhood curriculum to support the "Creativity" dimension as part of the graduate profile (Fase Fondasi) in the Kurikulum Merdeka framework.

However, the findings of this study are subject to several limitations. The use of a One-Group Pretest-Posttest design without a control group makes it difficult to exclude the influence of external factors or natural maturation on the results. Additionally, the small sample size (14 participants) and the relatively short intervention period mean that these results may not be generalizable to larger or more diverse populations, nor do they account for long-term creative retention.

Based on these considerations, future research is recommended to employ a True Experimental design with a control group and a larger sample size to enhance external validity. Further studies could also explore a wider variety of natural materials and adopt a longitudinal approach to monitor the sustained impact of such artistic stimulations on children's creative and academic development as they progress to higher educational levels.

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