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DEVELOPING CREATIVITY IN EARLY CHILDHOOD USING NATURE-BASED MEDIA

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Abstract

Background: *Creativity is a fundamental aspect of early childhood development because it supports children's ability to think creatively, solve problems, explore their environment, and express original ideas. Nature-based learning has been widely recommended as an experiential approach that provides meaningful opportunities for exploration and creativity.* ***Objective:*** *This study aimed to examine the effect of nature-based media on the creativity of children aged 4–6 years at TK Cemara Liliba.* ***Method:*** *This quantitative study employed an ex-post facto research design involving 16 children selected through purposive sampling. Data were collected using structured questionnaires and observation sheets measuring the implementation of nature-based media and children's creativity. Instrument validity and reliability were established prior to data collection. Data were analyzed using descriptive statistics and simple linear regression with SPSS version 25.0.* ***Results:*** *The findings showed that nature-based media contributed 12.3% of the variance in children's creativity ($R^2 = 0.123$). However, the relationship was not statistically significant ($F = 1.966$; $p = 0.183 > 0.05$), indicating that children's creativity was largely influenced by other factors beyond the scope of this study.* ***Novelty:*** *This study provides empirical evidence regarding the implementation of nature-based media in an authentic early childhood education setting while demonstrating its limited independent contribution to creativity development.* ***Conclusion:*** *Nature-based media can enrich children's learning experiences, but its effectiveness should be strengthened through inquiry-based activities, teacher guidance, and collaboration with families to optimize creativity development.*

Keywords: *Nature Based Media, Early Childhood Creativity, Early Childhood*

INTRODUCTION

Early childhood education plays a fundamental role in supporting children's holistic development during the golden age, a period characterized by rapid physical, cognitive, language, social-emotional, and creative growth. Appropriate educational stimulation during this stage enables children to develop their potential and establish the foundation for lifelong learning. According to Amseke (2023), early childhood education provides planned and meaningful learning experiences that optimize children's developmental outcomes while preparing them for subsequent educational stages.

One of the essential developmental domains that should be nurtured during early childhood is creativity. Creativity enables children to generate original ideas, solve problems, express imagination, and produce meaningful works through exploration and experimentation. In early childhood settings, creativity is reflected in children's ability to create, modify, and communicate ideas using various materials and experiences. Lestari et al. (2022) explain that creativity develops when children are given opportunities to explore their environment, think flexibly, and express their ideas freely within enjoyable learning experiences.

Despite its importance, previous studies indicate that children's creativity remains below expectations in many early childhood education settings. Learning activities continue to rely predominantly on teacher-centered instruction, worksheets, and commercially produced learning materials, limiting opportunities for children to explore, experiment, and develop original ideas independently. Rahmawati and Nurhayati (2023) reported that limited variation in instructional media reduces children's participation and creative engagement during classroom activities. Consequently, many children tend to imitate their peers' work rather than produce their own creative products.

One promising strategy to address this challenge is the utilization of nature-based media, which incorporates natural materials such as leaves, flowers, twigs, stones, seeds, and sand into classroom learning activities. Nature-based media provide authentic learning experiences that encourage children to observe, manipulate, classify, and transform natural objects into creative products. Such experiences stimulate imagination, curiosity, problem-solving abilities, and creative thinking while simultaneously fostering environmental awareness. According to Suryana and Hijriani (2022), nature-based learning promotes active exploration and enables children to construct knowledge through direct interaction with their surroundings.

Previous empirical studies have consistently demonstrated the educational benefits of nature-based learning. Wulandari et al. (2024) found that the use of natural materials significantly enhanced children's creativity through exploration and collaborative play. Similarly, other studies have shown that hands-on activities using environmental resources encourage originality, flexibility, and creative expression because children are actively involved in constructing their own learning experiences rather than merely following teacher instructions.

However, an important research gap remains. Most previous studies have primarily described the implementation of nature-based learning or examined its general benefits without specifically investigating its effect on the creativity of children aged 5–6 years using a quantitative approach in the context of early childhood education institutions in East Nusa Tenggara. In addition, limited empirical evidence is available regarding the effectiveness of nature-based media in stimulating children's creativity through structured classroom learning activities. This gap highlights the need for further investigation to provide stronger empirical evidence concerning the educational value of nature-based media.

Preliminary observations conducted at TK Cemara Liliba revealed that many children aged 5–6 years had not yet demonstrated optimal creativity. Several children tended to imitate their classmates' work, showed limited confidence in expressing original ideas, and experienced difficulties creating products based on their own imagination. Classroom learning was also dominated by worksheets and commercially produced learning materials, providing few opportunities for creative exploration using the surrounding environment. These findings indicate the necessity of implementing more meaningful and experience-based learning approaches to stimulate children's creativity.

Based on these considerations, this study aims to examine the effect of using nature-based media on the creativity of children aged 5–6 years at TK Cemara Liliba. The findings are expected to contribute empirical evidence regarding the effectiveness of nature-based learning in early childhood education and provide practical recommendations for teachers to develop more creative, meaningful, and child-centered learning environments.

METHODS

This study employed a quantitative approach using an ex post facto research design to examine the effect of nature-based media on the creativity of children aged 5–6 years at TK Cemara Liliba. The ex post facto design was selected because the independent variable had naturally occurred during the learning process without experimental manipulation. The study aimed to determine whether the implementation of nature-based media was significantly associated with children's creativity.

The study was conducted at TK Cemara Liliba, Kupang City, East Nusa Tenggara, Indonesia. The research population consisted of all children aged 5–6 years enrolled in Group B during the 2025/2026 academic year. Because the population was relatively small, the study employed a total sampling technique, involving 30 children as research participants.

This research consisted of two variables. The independent variable (X) was the implementation of nature-based media, defined as the use of natural materials such as leaves, twigs, flowers, seeds, stones, sand, and other environmental resources as learning media to provide meaningful learning experiences and stimulate children's creativity (Suryana & Hijriani, 2022). The dependent variable (Y)

was children's creativity, defined as the ability to generate original ideas, create imaginative products, solve simple problems, and express ideas independently during learning activities (Lestari et al., 2022).

Data were collected using two structured questionnaires completed through teacher observation. The Nature-Based Media Scale was developed based on the indicators proposed by Suryana and Hijriani (2022), including: (1) utilization of natural materials, (2) exploration of the environment, (3) hands-on learning activities, and (4) opportunities for creative expression. The Children's Creativity Scale was adapted from the creativity indicators described by Lestari et al. (2022), covering: (1) originality, (2) flexibility, (3) fluency of ideas, (4) imagination, and (5) elaboration of creative products. Prior to data collection, both instruments were tested for validity using the corrected item-total correlation and for reliability using Cronbach's Alpha, indicating that the instruments met acceptable psychometric standards.

Data analysis was conducted using descriptive statistics and simple linear regression with IBM SPSS Statistics version 25.0. Descriptive statistics were used to describe the levels of nature-based media implementation and children's creativity. Before hypothesis testing, prerequisite analyses consisting of normality, linearity, and homogeneity tests were performed to ensure that the data met the assumptions of linear regression. The research hypothesis was tested using simple linear regression at a significance level of 0.05. The coefficient of determination (R^2) was calculated to determine the magnitude of the contribution of nature-based media to children's creativity, while statistical significance was determined based on the F-test and t-test results. Statistical significance was established when $p < 0.05$.

RESULTS AND DISCUSSION

RESULTS

This section presents the findings of the descriptive and inferential statistical analyses examining the relationship between the use of nature-based media and the creativity development of children aged 5–6 years at TK Cemara Liliba. The results are organized into descriptive statistics, hypothesis testing, and discussion. Descriptive analysis was first conducted to identify the distribution of respondents based on the level of children's creativity and the implementation of nature-based media. Subsequently, inferential statistical analyses, including simple linear regression, were performed to determine whether nature-based media significantly influenced children's creativity. The findings are interpreted by considering previous empirical studies and theoretical perspectives related to creativity development in early childhood.

Table 1. Results of Early Childhood Creativity Development

Category	Interval	Frequency	Percentage
High	90–120	3	18.75%
Medium	60–89	13	81.25%

Low	30–59	0	0%
Total		16	100%

Table 1 shows the distribution of children's creativity levels based on the research data collected from sixteen participants. The results indicate that most children were classified in the medium creativity category, accounting for 13 children (81.25%), while only three children (18.75%) reached the high category. None of the participants were categorized as having low creativity. These findings suggest that although creativity has developed reasonably well among the participants, there is still considerable opportunity for further improvement through more stimulating and child-centered learning experiences.

The predominance of the medium category indicates that most children have begun to demonstrate creative behaviors such as expressing ideas, producing simple creative products, solving everyday problems, and exploring learning materials. However, these creative abilities have not yet reached an optimal level for the majority of participants. This condition implies that continuous educational stimulation remains necessary to strengthen children's originality, flexibility, imagination, and confidence in expressing their own ideas.

These findings are consistent with the view of Ernst (2022)**,** who argues that creativity develops most effectively when children are actively engaged in exploring their natural surroundings. Nature-based learning encourages children to observe, experiment, manipulate objects, and discover new experiences independently, thereby promoting divergent thinking and creative problem-solving. Similarly, Lestari et al. (2022) explain that creativity in early childhood is reflected in children's ability to generate original ideas, create meaningful products, and adapt flexibly to different situations through enjoyable learning experiences.

Observations conducted during the research revealed that children participated in various nature-related activities, including collecting leaves, arranging stones, creating collages from natural materials, and observing plants around the school environment. These activities provided opportunities for exploration and imagination, although differences in children's participation and confidence resulted in varying levels of creative performance.

Overall, the findings indicate that children's creativity at TK Cemara Liliba has developed at a moderate level, suggesting that further improvements in instructional strategies and learning experiences are still needed to maximize children's creative potential.

Table 2. Results of Nature-Based Media

Category	**Interval**	**Frequency**	**Percentage**
High	49–58	3	18.75%
Medium	39–48	13	81.25%

Low	30–38	0	0%
Total		16	100%

Table 2 presents the descriptive results regarding the implementation of nature-based media during classroom learning. Similar to the creativity variable, the majority of respondents were classified in the medium category, representing 13 children (81.25%), while three children (18.75%) were categorized in the high category. No respondents were included in the low category.

These findings indicate that nature-based media have been incorporated into classroom learning to a moderate extent. Teachers have introduced learning activities utilizing natural materials available in the surrounding environment, such as leaves, flowers, twigs, stones, sand, and seeds. Such activities provide children with opportunities to manipulate concrete objects, engage in exploration, and experience learning directly through interaction with nature.

According to Khadijah (2022), learning becomes more meaningful when children actively interact with real objects rather than relying solely on abstract explanations. Likewise, Ernst (2022) emphasizes that nature-based learning promotes curiosity, observation skills, experimentation, and independent exploration, all of which are important foundations for creativity development during early childhood.

Field observations demonstrated that teachers frequently encouraged outdoor learning activities, allowing children to explore the school environment while collecting natural materials for classroom projects. Children appeared enthusiastic when participating in these activities because they were able to touch, observe, classify, and transform natural objects into creative products. Nevertheless, the implementation of nature-based media was not consistently integrated into every learning session. Some classroom activities still relied heavily on conventional instructional materials, worksheets, and teacher-centered approaches, thereby reducing opportunities for children to engage in open-ended creative exploration.

The predominance of the medium category therefore indicates that although nature-based media have been implemented, their application has not yet reached an optimal level. Increasing the frequency, consistency, and variety of nature-based learning experiences may further enhance children's opportunities to explore their environment and express creative ideas more independently.
Furthermore, these descriptive findings suggest that both children's creativity and the implementation of nature-based media remain at moderate levels. Consequently, further statistical analyses are required to determine whether the observed implementation of nature-based media significantly contributes to creativity development. The results of the regression analysis are presented in the following section.

Following the descriptive analysis, inferential statistical analyses were conducted to determine whether the implementation of nature-based media significantly influenced the creativity development

of children aged 5–6 years at TK Cemara Liliba. The analyses included the simultaneous regression test (F-test), the coefficient of determination (R^2), and the partial regression test (t-test). These analyses provide evidence regarding both the statistical significance and the magnitude of the relationship between the independent and dependent variables.

Table 3. Summary of Simple Linear Regression Analysis (Simultaneous F-Test)

Relationship	F	p	Note	Conclusion
Creativity Development and Nature-Based Media	1.966	0.183	0.183 > 0.05	Hypothesis Rejected

Table 3 presents the results of the simultaneous regression analysis. The statistical analysis produced an F-value of 1.966 with a significance value (p) of 0.183**.** Since the significance value is greater than the predetermined significance level of 0.05, the regression model is not statistically significant. Therefore, the proposed research hypothesis stating that nature-based media significantly influence children's creativity is rejected.

These findings indicate that although nature-based learning was implemented in the classroom, the variation in children's creativity scores could not be explained sufficiently by the use of nature-based media alone. In other words, the observed differences in creativity among children were more likely influenced by other developmental and environmental factors that were not included in the present study.

Importantly, a non-significant statistical result should not be interpreted as evidence that nature-based media are ineffective. Rather, it suggests that within the context of this study, the implementation of nature-based media alone was insufficient to produce a statistically measurable improvement in children's creativity. Creativity is a multidimensional developmental construct influenced by numerous interacting variables beyond classroom learning media.

Table 4. Summary of Coefficient of Determination (R Square)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.351	0.123	0.060	11.080

The coefficient of determination analysis shown in Table 4 indicates an R Square value of 0.123, meaning that nature-based media explain only 12.3**%** of the variance in children's creativity. Consequently, approximately 87.7**%** of creativity development is influenced by factors beyond the scope of this research.

The relatively small coefficient of determination demonstrates that children's creativity cannot be explained solely by exposure to nature-based learning activities. Creativity develops through the interaction of multiple internal and external factors, including children's cognitive readiness,

imagination, intrinsic motivation, family support, parenting practices, classroom climate, teacher competence, peer interaction, and opportunities for independent exploration.

From an educational perspective, these findings suggest that nature-based media should be considered one component within a broader child-centered learning environment rather than a single determinant of creativity development. Effective creativity enhancement requires continuous stimulation through diverse instructional strategies that encourage exploration, experimentation, collaboration, and reflective thinking.

Table 5. Summary of Partial Regression Analysis (t-Test)

Relationship	**t**	**p**	**Note**	**Conclusion**
Creativity Development and Nature-Based Media	1.402	0.183	0.183 > 0.05	Hypothesis Rejected

The partial regression analysis was conducted to determine whether nature-based media individually contributed to children's creativity. As presented in Table 5, the analysis yielded **a** t-value of 1.402 with a significance value of 0.183**,** which exceeds the significance criterion of 0.05**.**

results confirm that the independent variable does not have a statistically significant individual effect on early childhood creativity. Consequently, the alternative hypothesis (Ha) is rejected, while the null hypothesis (H_0) is accepted.

Although statistical significance was not achieved, the positive regression coefficient suggests that nature-based media may still provide educational benefits by supporting children's opportunities to explore, manipulate natural materials, and engage in meaningful learning experiences. However, these contributions were not sufficiently strong to produce statistically significant differences within the relatively small sample included in this study.

Several factors may explain these findings. First, the sample consisted of only 16 children**,** limiting the statistical power of the regression analysis. Second, the frequency and intensity of nature-based learning activities may not have been consistent enough to produce measurable changes in creativity. Third, creativity itself develops gradually over time and is influenced by long-term educational experiences rather than short-term exposure to a single learning approach.

Furthermore, children's creativity is strongly associated with individual characteristics such as curiosity, self-confidence, divergent thinking, emotional development, and previous learning experiences. Environmental influences, including parental involvement, availability of creative materials at home, teacher instructional quality, and classroom interaction patterns, may also contribute substantially to creativity development. These uncontrolled variables may explain why nature-based media accounted for only a small proportion of the observed variance.

Overall, the inferential statistical findings indicate that while nature-based media showed a positive tendency toward supporting creativity, the relationship was *not statistically significant* in the present study. Therefore, creativity development among children aged 5–6 years at TK Cemara Liliba appears to depend on a broader combination of educational, family, and individual factors rather than on the implementation of nature-based media alone.

Table 6. Descriptive Statistics of Early Childhood Creativity and Nature-Based Media

Variable	Early Childhood Creativity	Nature-Based Media
Valid (N)	16	16
Missing	0	0
Mean	43.88	78.38
Median	41.00	74.00
Mode	39 and 40	68 and 71
Standard Deviation	11.93	7.09
Range	37	28
Minimum	63	30
Maximum	100	58

Table 6 summarizes the descriptive statistics of both research variables. The mean score for nature-based media (78.38) was considerably higher than the mean score for children's creativity (43.88). The relatively small standard deviation for nature-based media indicates that teachers implemented nature-based activities with relatively consistent intensity across participants. In contrast, the larger variation in creativity scores suggests that children's creative abilities differed substantially despite experiencing similar learning activities.

These findings imply that although the implementation of nature-based media was relatively consistent, children's responses to these learning experiences varied considerably. Such variation is expected because creativity is an individual developmental characteristic influenced by numerous cognitive, emotional, and environmental factors.

The descriptive findings also support the regression results presented earlier. Although children experienced nature-based learning activities, the statistical analyses indicate that these experiences alone were insufficient to explain significant differences in creativity development.

DISCUSSION

The present study examined whether nature-based media significantly influenced the creativity development of children aged 5–6 years at TK Cemara Liliba. The results demonstrated that the relationship between the two variables was positive but not statistically significant ($F = 1.966$; $p = 0.183$), indicating that the proposed hypothesis was not supported.

The coefficient of determination ($R^2 = 0.123$) further revealed that nature-based media explained only 12.3% of the variance in children's creativity, while 87.7% was attributable to other variables beyond the scope of this study. These findings suggest that creativity development cannot be explained solely by classroom learning media but rather emerges through complex interactions among children's individual characteristics, educational experiences, family support, and social environments.

This finding differs from several previous studies that reported statistically significant positive effects of nature-based learning on children's creativity. For example, Nadhifah (2020) reported that nature-based learning explained 23.7% of children's developmental outcomes. Similarly, Irzalinda, Sofia, and Lestari (2022) identified a strong positive relationship between environmental learning and children's creative abilities, while Akmalia and Rahayuningsih (2018) also reported significant improvements following the implementation of environmental learning activities.

The differences between those studies and the present research may be explained by several methodological and contextual factors. First, the present study involved only 16 participants, limiting statistical power and reducing the likelihood of detecting significant relationships. Second, the frequency and duration of nature-based learning activities at TK Cemara Liliba may not have been sufficient to produce measurable improvements in creativity. Third, differences in research instruments, classroom implementation, participant characteristics, and school environments may also account for the variation in findings.

From a theoretical perspective, these results are understandable because creativity is recognized as a multidimensional developmental construct. Munandar describes creativity as the ability to generate original, flexible, and useful ideas, while emphasizing that creativity develops gradually through continuous stimulation rather than through isolated learning experiences. Likewise, Ernst (2022) explains that nature-based learning provides opportunities for exploration, experimentation, and environmental interaction; however, these opportunities must be supported by effective teacher facilitation and repeated learning experiences before substantial improvements in creativity become evident.

The findings can also be interpreted through Piaget's cognitive development theory. Children aged 5–6 years are in the preoperational stage, during which they actively construct knowledge through concrete experiences and symbolic play. Although nature-based media provide valuable concrete experiences, children's creative thinking develops progressively as they repeatedly interact with diverse learning situations. Therefore, occasional exposure to natural materials may not be sufficient to generate statistically significant improvements in creativity.

Similarly, Vygotsky's sociocultural theory emphasizes that creativity develops through meaningful social interaction and guidance from more knowledgeable adults. Nature-based media become more effective when teachers intentionally scaffold children's thinking by encouraging

questioning, discussion, reflection, and collaborative problem-solving. Without sufficient instructional support, natural materials alone may not maximize children's creative potential.

The findings are also consistent with Erikson's psychosocial theory, which states that preschool children experience the stage of initiative versus guilt. During this period, children develop creativity when they are encouraged to initiate activities independently, experiment with new ideas, and solve problems without fear of making mistakes. Consequently, creativity depends not only on learning materials but also on classroom environments that provide emotional support, autonomy, encouragement, and opportunities for independent exploration.

Field observations further support these interpretations. Teachers at TK Cemara Liliba regularly incorporated natural materials such as leaves, stones, flowers, sand, and twigs into classroom activities. Children enthusiastically participated in creating collages, constructing simple artworks, observing plants, and engaging in outdoor exploration. These activities appeared to increase children's motivation and enjoyment during learning. Nevertheless, teachers also reported that several children remained hesitant to express original ideas and frequently imitated their peers' work, suggesting that creativity requires longer-term developmental support beyond exposure to nature-based materials.

Another possible explanation concerns the role of the home environment. Interviews with teachers indicated that children's opportunities for creative exploration outside school differed considerably depending on parental support, availability of learning resources, and family attitudes toward independent play. These environmental differences likely contributed to the substantial variation in creativity scores observed among participants.

Overall, the findings indicate that nature-based media should not be viewed as an independent determinant of creativity development. Instead, they should be integrated with other child-centered instructional approaches that promote imagination, inquiry, collaboration, reflection, and problem-solving. Teachers should provide opportunities for open-ended exploration, encourage children to explain their ideas, appreciate originality, and create supportive classroom environments that foster creative confidence.

Although this study did not identify a statistically significant relationship, the findings remain important because they demonstrate that creativity is a complex developmental outcome requiring comprehensive educational support. Nature-based media continue to offer meaningful learning experiences, but their effectiveness depends on the quality of implementation, teacher competence, learning intensity, parental involvement, and children's individual developmental characteristics.

CONCLUSION

Main Findings: This study found that the use of nature-based media was positively associated with the creativity of children aged 4–6 years at TK Cemara Liliba; however, the relationship was not statistically significant ($p = 0.183$). The coefficient of determination ($R^2 = 0.123$) indicates that nature-

based media explained only 12.3% of the variance in children's creativity, while the remaining 87.7% was influenced by other factors beyond the scope of this study, including parenting practices, teacher instructional strategies, classroom climate, children's individual characteristics, and opportunities for creative exploration. **Research Contribution:** This study provides empirical evidence regarding the implementation of nature-based media in an authentic early childhood education setting while highlighting its limited independent contribution to children's creativity. **Theoretical and Practical Implications:** The findings support constructivist learning theory, suggesting that creativity develops through meaningful experiences, active exploration, and supportive social interactions rather than learning media alone. Teachers are encouraged to combine nature-based media with inquiry-based activities, project learning, collaborative play, and reflective discussions to optimize creativity development. **Research Limitations and Future Directions:** This study involved only 16 children from one kindergarten using an ex-post facto design, limiting the generalizability of the findings. Future research should employ larger samples, experimental or longitudinal designs, and include additional variables such as parenting style, teacher competence, classroom environment, and children's intrinsic motivation to provide a more comprehensive understanding of creativity development in early childhood.

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