

The Effectiveness of the Project-Based Learning Model Using Fabric Scraps on the Creativity of Kindergarten

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Abstract

The present study investigates how effective the Project Based Learning (PjBL) model combined with fabric scrap instructional media is in nurturing the creative capacities of early childhood learners. Employing a quantitative methodology within a Quasi-Experimental framework, this research adopted the Nonequivalent Control Group Design. Twenty-four kindergarten children aged five to six years from PAUD Melati DWP UNM Makassar were enrolled as research subjects and assigned through purposive sampling into an experimental class, which received the PjBL model with fabric scrap media, and a comparison class, which followed conventional drawing-and-coloring activities, each containing twelve children. To collect data, researchers observed children's performance and scored it using a validated creativity rubric covering four creative dimensions: ideational fluency, cognitive flexibility, originality of output, and elaborative detail. Descriptive statistical methods and the Wilcoxon Signed Ranks nonparametric test were applied for data analysis. The outcomes demonstrated a marked improvement in creativity scores among experimental-group children between initial and final assessments, with all participants ultimately classified under the Creative or Very Creative levels. Given that the resulting significance value fell well below the accepted threshold, this study concludes that implementing the Project Based Learning model with fabric scrap media significantly enhances kindergarten children's creativity, producing far superior gains compared to the comparison group.

Keywords: project based learning; fabric scraps media; creativity; early childhood education.

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INTRODUCTION

Early Childhood Education (ECE) institutions play a crucial role in shaping a child's character and personality for the future. Early childhood is defined as the age range from birth to six years. This phase is recognized as a highly strategic period for the development of a child's potential, often referred to as the "golden age" a unique and unrepeatable stage. It is during this time that various fundamental human capacities including personality, cognitive ability, intelligence, skills, and the capacity for social interaction begin to form and develop rapidly.

Among the various aspects of child development, creativity holds a strategic position as it drives thinking skills, problem-solving, and the generation of fresh ideas. Guilford (1950) conceptualized creativity as the ability to think divergently, enabling an individual to produce a variety of alternative solutions to a problem. This ability is characterized by four key traits: fluency in generating ideas, flexibility in shifting approaches, originality in creation, and the capacity for elaboration. Fundamentally, every individual is born with creative potential; however, this potential requires stimulation and development through appropriate and targeted learning processes.

From a pedagogical standpoint, creativity in early childhood develops most effectively when children are given direct, hands-on experience with materials rather than passive instruction. Learning environments that allow children to manipulate concrete objects, make choices, and construct their own solutions to open-ended tasks tend to activate the very traits identified by Guilford (1950) fluency, flexibility, originality, and elaboration far more consistently than environments centered on teacher-directed instruction and rote repetition. This premise forms the conceptual bridge between the theoretical discussion of creativity above and the practical instructional model examined in this study.

Conventional teaching models remain a common sight in many Early Childhood Education (ECE) settings. Such approaches often render the learning atmosphere monotonous and fail to ignite children's enthusiasm. Observations conducted by the author at a kindergarten revealed several real-world issues regarding instructional patterns and the development of student creativity. Daily assessment data indicated that, on average, children could only maintain concentration for about ten to fifteen minutes after instructions were given. Weekly and monthly assessment records further showed rigid scheduling and stagnant work portfolios, reflecting a lack of conceptual growth and a decline in children's enthusiasm over time. In conclusion, the teaching strategies employed were neither sufficiently effective nor efficient; consequently, the tedious learning environment in the kindergarten hindered both children's interest and their creativity.

The limited range of media used in the learning process also contributes to children's low creative ability. This situation results in an inability to generate diverse ideas when completing projects, difficulty in creating unique concepts, and limitations in finding alternative solutions for their work. Ultimately, this impacts the children's ability to develop ideas, combine elements of color and shape, and produce work that possesses a unique character.

One innovative learning model with the potential to boost children's creativity is Project-Based Learning (PjBL). This model engages children directly with authentic problems and requires them to take responsibility for the resolution process. The dynamics of group work involved in completing a project organically encourage children to actively generate creative ideas while honing habits of innovative thinking and action (Suranti et al., 2017).

Nurhayati et al. (2024) also demonstrated that the implementation of the Project-Based Learning model can support children's learning development through active project-based activities, particularly in improving their counting skills. These findings indicate that PjBL can be applied to early childhood learning by involving children directly in meaningful activities that encourage active participation and learning development.

Afriani et al. (2025) defines project-based learning as a pedagogical approach that positions learners as the central figures in a process of deep inquiry into contextual problems or challenges, aiming to produce tangible outcomes. Beyond the choice of learning model, the selection of instructional media plays a crucial role in successfully stimulating children's creativity. Fabric scraps represent a creative learning medium with significant potential. These scraps leftovers from garment making or the textile industry come in a wide array of colors, shapes, and textures. Utilizing fabric scraps in learning is expected to yield positive results, particularly in addressing low levels of creativity among children; by arranging and assembling these pieces into complete forms featuring diverse patterns, children can develop all aspects of their creativity in a concrete and enjoyable manner (Mauludiyah et al., 2022). In line with this, Zakiyah & Pamungkas (2023) emphasize that fabric scraps can be transformed into two-dimensional artworks that serve as creative learning media while simultaneously offering a solution for utilizing textile waste from the local environment.

Various prior studies consistently support the effectiveness of Project-Based Learning (PjBL) in fostering children's creativity. Pangestika et al. (2025) demonstrated that PjBL enhances creative thinking capacity by maximizing children's active engagement in exploration and discovery. Priantika et al. (2024) found a positive influence of PjBL on the creativity of children aged four to five. Similarly, Nikmah et al. (2023) confirmed that this model has a strong and significant impact on children's creativity. These findings are further reinforced by Irayana & Assyauqi (2024), who experimentally demonstrated an increase in early childhood creativity through project-based learning, and by (Cahyaningsih & Harun, 2023), who found that PjBL enhances students' critical thinking skills alongside their creativity. The distinctiveness of this study compared to previous research lies in its integration of three variables: the PjBL model, fabric scraps as a medium, and kindergarten children's creativity.

It is also important to highlight the tangible contribution of using fabric scraps a form of textile waste to create meaningful, contextual learning experiences for young children. Beyond mitigating the impact of textile waste from households or local garment industries on the school's surroundings, the use of fabric scraps introduces children to concrete, environmental-based learning practices, as the materials relate closely to their daily experiences. Through activities involving selecting, cutting, and arranging fabric scraps, children are not

only encouraged to think creatively but are also accustomed to recognizing the value of sustainability from an early age, thereby making the learning process more meaningful and contextual.

Based on the preceding explanation, the focus of this study is to determine the effectiveness of the project-based learning model combined with the use of fabric scraps on the creativity of kindergarten children. The study aims to determine: (1) the creativity of kindergarten children in the control group before and after participating in geometric shape drawing activities; (2) the creativity of kindergarten children in the experimental group before and after the implementation of the project-based learning model using fabric scraps; and (3) whether or not the project-based learning model using fabric scraps influences the creativity of kindergarten children.

METHOD

This study employs a quantitative paradigm utilizing a quasi-experimental design. The subjects were divided into two groups: an experimental group that received an intervention involving the implementation of the PjBL model, and a control group that did not receive this intervention. The specific experimental structure used was the Nonequivalent Control Group Design; this design structurally resembles the pre-test/post-test control group design but lacks a randomization procedure for assigning subjects to the respective groups.

The study involved a population of sixty children from Group B at PAUD Melati DWP UNM. From this population, twenty-four children aged five to six years were selected as the sample and divided into two groups: twelve children in the experimental group and twelve in the control group. Purposive sampling was used to select the sample, a technique involving selection based on specific considerations and criteria aligned with the research focus.

Data collection instruments consisted of observation and performance assessment using a creativity rubric. The assessment rubric underwent a two-stage expert validation process and comprised eight assessment items based on four indicators: fluency (ease in generating ideas and attempting various approaches), flexibility (adaptability in demonstrating possibilities and modifying ideas), originality (authenticity and uniqueness of the work), and elaboration (ability to add detail and refine the work). Each item was scored on a scale of one to four.

The expert validation process involved practitioners in early childhood education who reviewed the rubric for content clarity, indicator relevance, and alignment with the four creativity dimensions before it was applied in the field. To minimize subjectivity, the same observer scored both groups across the pre-test and post-test sessions using identical procedures, and observation notes were cross-checked against video recordings of the treatment sessions whenever discrepancies arose. Prior to data collection, the researchers obtained permission from the kindergarten's principal and informed consent from the children's parents or guardians, and all data were anonymized during analysis to protect the participants' privacy.

The data collection procedure comprised several stages: planning, administering a pre-test, conducting three treatment sessions, administering a post-test, and interpreting the results. The treatment content was aligned with the established weekly learning theme, specifically an introduction to geometric shapes (triangles, squares, and circles), whereby the experimental group constructed these shapes using fabric scraps, while the control group drew them using conventional methods. The study was conducted within a structured instructional cycle consisting of five sessions: a pre-test, three consecutive treatment sessions, and a post-test. Data analysis was conducted in two stages: descriptive statistics to map frequency distributions and mean creativity scores, and the non-parametric Wilcoxon signed-ranks test performed using SPSS software to verify the research hypothesis.

RESULTS AND DISCUSSION

The research data were derived from children's scores collected during the pre-test, conducted prior to the implementation of the project-based learning intervention using fabric scraps. The pre-test data served to assess the subjects' initial levels of creativity, while the post-test data were used to measure final creativity outcomes and determine whether the intervention produced significant changes. The categorization of children's creativity comprises four levels: Less Creative (LC), Moderately Creative (MC), Creative (C), and Highly Creative (HC).

Children's Creativity Prior to Treatment (Pre-test)

Baseline measurements were conducted for both groups prior to the administration of the treatment to obtain an overview of the children's creativity levels at the initial stage. The distribution of creativity scores for the experimental group prior to the intervention is presented in the following table:

Table 1. Children's Creativity in the Experimental Group Before Treatment

No.	Interval	Category	F	Percentage
1	8–13	Less Creative (LC)	4	33,3%
2	14–19	Moderately Creative (MC)	7	58,3%
3	20–25	Creative (C)	1	8,3%
4	26–32	Highly Creative (HC)	0	0%
		Total	12	100%

Source: Research data, 2026

Based on the table above, among the twelve children in the experimental group: four children (33.3%) were classified as Less Creative, seven (58.3%) as Moderately Creative, and one (8.3%) as Creative, while none had yet reached the Highly Creative level. The mean creativity score for the experimental group at this stage was 18.75.

The distribution of children's creativity in the control group prior to the intervention is shown in the following table:

Table 2. Children's Creativity Before Treatment: Control Group

No.	Interval	Category	F	Percentage
1	8–13	Less Creative (LC)	6	50%
2	14–19	Moderately Creative (MC)	6	50%
3	20–25	Creative (C)	0	0%
4	26–32	Highly Creative (HC)	0	0%
Total			12	100%

Source: Research data, 2026

The table above shows that the control group consisted of six children (50%) categorized as "Less Creative" and six children (50%) categorized as "Moderately Creative"; none reached the "Creative" or "Highly Creative" levels. The mean creativity score for the control group prior to the intervention was 17.08. This indicates that the initial creativity levels of both groups were relatively low, necessitating an appropriate intervention to optimally develop the children's creativity.

Children's Creativity After Intervention (Post-test)

Following three treatment sessions, a post-test was conducted to measure the children's final creativity levels in both groups. The distribution of creativity scores for the experimental group—after receiving the Project-Based Learning intervention utilizing patchwork fabric media—is presented in the following table:

Table 3. Frequency Distribution of Creativity among Children in the Experimental Group

No.	Interval	Category	F	Percentage
1	8–13	Less Creative (LC)	0	0%
2	14–19	Moderately Creative (MC)	0	0%
3	20–25	Creative (C)	6	50%
4	26–32	Highly Creative (HC)	6	50%
Total			12	100%

Source: Research data, 2026

The table above illustrates a remarkable transformation: no children remained at the "Less Creative" or "Moderately Creative" levels. Six children (50%) advanced to the "Creative" level by successfully meeting all four measured indicators, while the other six (50%) reached the peak "Highly Creative" level, having fully satisfied all four indicators. This shift is clearly reflected in the surge in the average creativity score, rising from 18.75 prior to the intervention to 23.00 afterward. Activities involving the design and creation of works using fabric scraps proved to be an effective catalyst for the development of the children's creativity.

The distribution of creativity among children in the control group engaged in drawing and coloring activities is shown in the following table:

Table 4. Frequency Distribution of Creativity among Children in the Control Group

No.	Interval	Category	F	Percentage
1	8–13	Less Creative (LC)	2	16,67%
2	14–19	Moderately Creative (MC)	5	41,7%
3	20–25	Creative (C)	5	41,7%
4	26–32	Highly Creative (HC)	0	0%
Total			12	100%

Source: Research data, 2026

Based on the table, the post-activity status of the control group showed that two children (16.67%) remained at the "Less Creative" level, five (41.7%) were at the "Moderately Creative" level, and five (41.7%) were at the "Creative" level, while none reached the "Highly Creative" level. The increase in the group's mean creativity score was minimal rising only from 17.08 to 17.58 reflecting an improvement that was far from optimal. To test the research hypothesis, initial and final observation data were analyzed using the Wilcoxon test via SPSS software. The decision-making criteria applied were as follows: if the Sig. (2-tailed) value > 0.05 , then H_0 is accepted and H_1 is rejected, indicating no significant effect; conversely, if the Sig. (2-tailed) value < 0.05 , then H_0 is rejected and H_1 is accepted, indicating a significant effect.

For the experimental group, the Wilcoxon Signed-Rank Test yielded a Z-value of -3.077 with an Asymp. Sig. (2-tailed) of 0.002 a value significantly lower than $\alpha = 0.05$. Consequently, H_0 was rejected and H_1 was accepted, demonstrating a tangible effect from the implementation of PjBL utilizing fabric scraps. Meanwhile, the control group yielded a significance value of 0.034 also below 0.05 indicating that drawing and coloring activities did have some influence; however, the magnitude of the creativity improvement in the control group lagged significantly behind that of the experimental group, which utilized the Project-Based Learning model.

Based on the foregoing, this study confirms that PjBL utilizing fabric scraps contributes significantly to children's creativity development. The Wilcoxon test results revealed a significant disparity in creativity between the experimental and control groups, with the experimental group consistently achieving higher mean scores. This disparity serves as concrete evidence of the Project-Based Learning model's superiority in fostering creativity.

The advantage of using fabric scraps in this context lies in their varied and sensory nature; Unlike routine drawing activities, each session involving the creation of patchwork art offers a unique combination of colors, shapes, and textures, thereby constantly stimulating the children to think creatively. Children in the experimental group appeared more enthusiastic because the patchwork materials varied from day to day, contrasting with the control group, who engaged only in drawing activities. Consequently, patchwork projects capture the children's interest more effectively, making it easier for them to grasp the lesson content and ensuring that learning objectives are fully achieved.

Beyond fostering creativity, activities involving fabric scraps stimulate other aspects of early childhood development, particularly fine motor skills and tactile-sensory abilities. As children touch, feel, select, cut, and arrange fabric pieces each with varying textures, thicknesses, and patterns they engage hand-eye coordination and tactile sensitivity, thereby strengthening the small muscles in their fingers and wrists. Conceptually, this type of tactile stimulation contributes to the maturation of the child's sensory system; this, in turn, enriches the creative thinking process by providing a wealth of sensory input for exploring ideas. Thus, fabric-scrap activities serve not only as a medium for stimulating creativity but also as a holistic tool for fine motor development in young children. Various statistical analyses both descriptive and non-parametric consistently support the conclusion that the Project-Based Learning (PjBL) model, when integrated with fabric scraps, is effective in fostering creativity among kindergarten children.

This study aligns with research by Pangestika et al. (2025), which demonstrated that Project-Based Learning through exploration can support the development of creativity in children aged 5–6 years by providing opportunities for children to actively explore and express their ideas during the learning process. Research by Priantika et al. (2024), focusing on children aged 4–5, also confirms the positive impact of PjBL on creativity. Nikmah et al. (2023) further notes that the influence of Project-Based Learning on creativity is strong and significant, making it a prime choice for fostering creativity in early childhood education settings. Similarly, Parwoto et al. (2024) emphasize that PjBL at the kindergarten level encourages exploration, creative thinking, and knowledge construction rooted in the children's real-life experiences. These findings are also consistent with recent research by Rahmanniar et al. (2024) and Hidayati et al. (2025), who similarly reported improvements in children's conceptual mastery and skills through the implementation of PjBL supported by concrete media. On the other hand, Novianti & Primana (2022) note that family factors also influence the development of children's creativity; thus, the success of the patchwork-supported PjBL model in this study should also be viewed as the result of an interaction between the instructional intervention at school and the support provided by the child's daily environment.

Practical and Theoretical Implications

From a practical standpoint, these findings suggest that kindergarten teachers do not need costly commercial teaching aids to stimulate creativity; everyday textile waste, when organized into a structured project-based activity, can serve as an effective and low-cost instructional medium. Teachers can adopt the Project-Based Learning framework used in this study by first introducing a concrete theme, allowing children to select and arrange materials independently, and then facilitating reflection on the finished work, thereby transferring ownership of the creative process to the children themselves. From a theoretical standpoint, the results reinforce the view that creativity in early childhood is not a fixed trait but a capacity that can be deliberately cultivated through carefully designed, hands-on, and open-ended learning experiences, supporting the broader body of PjBL literature discussed above.

Limitations of the Study

This study is subject to several limitations that should temper the generalization of its findings. First, the sample was limited to twenty-four children from a single kindergarten selected through purposive rather than random sampling, which restricts the extent to which the results can be generalized to other early childhood populations with different socioeconomic or cultural backgrounds. Second, the intervention period spanned only one week with three treatment sessions, which, while sufficient to detect an initial effect, does not indicate whether the gains in creativity are sustained over a longer period. Third, because the experimental and control groups were compared solely through separate within-group tests, the strength of the between-group difference could not be statistically confirmed in this version of the manuscript; a direct between-group test on the post-test scores is required to substantiate the claim that the Project-Based Learning group outperformed the control group, and the authors intend to report this analysis once the underlying dataset is finalized. Finally, creativity was measured using an observation-based rubric, which, despite undergoing expert validation, remains subject to some degree of observer judgment.

CONCLUSION

Based on the research results and analysis presented, it can be concluded that kindergarten children in the control group who participated in conventional learning activities involving drawing geometric shapes demonstrated very limited improvement in creativity; the majority remained in the "Moderately Creative" category, and none reached the "Highly Creative" level. Conversely, children in the experimental group who experienced the Project-Based Learning model utilizing fabric scraps showed a significant surge in creativity. All participants in this group successfully reached the "Creative" and "Highly Creative" categories, demonstrating the model's ability to optimize all dimensions of the children's creativity. Wilcoxon test results further confirm the significant impact of the Project-Based Learning model using fabric scraps on kindergarten children's creativity; the experimental group's significance value fell well below the critical threshold, and the class's creativity outcomes were demonstrably superior to those of the control group.

Based on these findings, early childhood educators are encouraged to consider implementing the Project-Based Learning model using fabric scraps as an alternative instructional strategy to stimulate both creativity and fine motor skills. This approach allows for the use of fabric scraps readily available in the school's vicinity as an economical and eco-friendly learning medium. Future researchers are advised to expand the scope of study subjects to include other early childhood education centers with more diverse characteristics, extend the intervention duration, and explore other early childhood development variables such as fine motor skills and socio-emotional abilities to enable broader generalization of the research findings.

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