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The Effect of Kirigami Activities on Fine Motor Skills in Group B Children

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Abstrak

Penelitian ini berawal dari minimnya kemampuan motorik halus pada anak, terutama dalam aspek menggunting, melipat, dan menggambar. Kurangnya stimulasi yang menarik dan berkelanjutan menjadi salah satu penyebabnya. Kegiatan kirigami, yang melibatkan aktivitas melipat dan menggunting, diyakini bisa meningkatkan kemampuan motorik halus anak. Metode yang dipakai dalam penelitian ini adalah kuantitatif dengan desain *pre-eksperimen one group pretest-posttest*. Penelitian dilaksanakan di Taman Kanak-kanak (TK) Bintang Kembar dengan populasi sebanyak 34 anak kelompok B. Sampel penelitian berjumlah 16 anak yang dipilih dengan teknik *purposive sampling* berdasarkan rekomendasi guru, karena anak-anak tersebut menunjukkan keterlambatan dalam motorik halus. Pengumpulan data melalui observasi, tes, dan dokumentasi. Analisis data meliputi uji validitas, reliabilitas, normalitas, homogenitas, serta uji t (paired sample t-test). Hasil penelitian memperlihatkan adanya pengaruh signifikan kegiatan kirigami terhadap kemampuan motorik halus anak. Hal ini dibuktikan dengan nilai t-hitung sebesar -27,571. Dengan derajat kebebasan (df) = 15 dan taraf signifikansi 5% (0,05), diperoleh nilai t-tabel sebesar ±2,131. Karena nilai |t-hitung| > t-tabel (27,571 > 2,131), maka hipotesis nol (H_0) ditolak dan hipotesis alternatif (H_a) diterima. Ini berarti terdapat pengaruh yang signifikan dari kegiatan kirigami terhadap peningkatan kemampuan motorik halus anak kelompok B di TK Bintang Kembar.

Kata Kunci: *Kirigami, Motorik Halus, Anak Usia Dini.*

Abstract

The inadequate fine motor skills of young children, particularly in the areas of cutting, folding, and drawing, are the driving force for this study. One of the contributing reasons is the absence of constant and interesting stimulation. Kirigami activities, which involve folding and cutting, are believed to improve children's fine motor skills. This study used a pre-experimental one-group pretest-posttest design and a quantitative methodology. There were 34 children in group B at Bintang Kembar Kindergarten when the study was carried out. 16 kids who displayed delays in fine motor abilities were chosen for the sample using purposive sampling at the teacher's recommendation. Tests, documentation, and observation were used to gather data. Validity, reliability, normalcy, homogeneity, and paired sample t-test tests were all used in the data analysis. The findings demonstrated that kirigami activities significantly improved children's fine motor abilities. This is evidenced by a t-value of -27.571. With a degree of freedom (df) = 15 and a significance level of 5% (0.05), the critical t-value is ±2.131. Since the absolute value of the t-calculated is greater than the t-table value (|−27.571| > 2.131), the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted. This indicates that the kirigami activity has a significant effect on improving the fine motor skills of Group B children at TK Bintang Kembar.

Keywords: *Kirigami, Fine Motor Skills, Early Childhood.*

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INTRODUCTION

The age range of 0–6 years is a crucial period often referred to as the golden age, which determines the direction of a child's development (Kembuan et al., 2019), including fine motor development, which is essential for learning readiness. This development requires appropriate stimulation from the environment, particularly through play-based activities designed by teachers (Aulina, 2017).

Based on the 2015 Denver Developmental Screening Test (DDST) II survey, 25% of Indonesian children experience issues related to motor development (Sadiman et al., 2023; Suryadi & Daryati, 2022). A study published in the JECIE journal also reported that at PAUD Al-Usman, 13% of children showed questionable or delayed fine motor development, such as difficulty drawing straight lines or circles (Widyawaty, 2021). Delays in motor development can impact academic performance by up to 29%, and approximately 12% to 18% of children in developing countries experience delays in psychomotor development (Destiana et al., 2024).

These findings indicate that the fine motor skills of early childhood children in Indonesia still require special attention (Latifah & Prasetiya, 2023). Providing appropriate stimulation to support children's optimal growth and development is therefore essential, particularly through activities that engage the small muscles (Almuna et al., 2022; Surbakti et al., 2021). Early childhood educators play a crucial role in designing activities that foster the development of these skills, including creative tasks such as kirigami, folding, cutting, and drawing, all of which have been shown to effectively improve children's fine motor abilities (Apriani et al., 2021; Rahayu et al., 2023).

Fine motor skills involve the control of small muscles in the body to achieve specific goals. This aspect requires strong hand-eye coordination and a high level of precision. Examples of fine motor skills include writing, drawing, playing the piano, painting, sewing, cutting, pasting, and buttoning clothes (Magill, 1980; Rohmah et al., 2019). Fine motor indicators are associated with movements of small muscles, particularly the fingers, to perform coordinated and precise actions. The coordination between the hands and eyes plays a key role in enhancing accuracy and agility in young children's daily activities (Santrock, 2007).

Young children are expected to begin demonstrating independence in daily tasks such as bathing, dressing, tying shoelaces, and grooming, either independently or with assistance. By the age of 5 to 6 years, children are typically capable of catching and swinging a ball, using cutting tools,

shaping clay, baking, sewing, and painting or drawing human figures using crayons and colored pencils (Afrianti et al., 2021; Elizabeth Bergner Hurlock, 1980).

In alignment with the Ministry of Education and Culture Regulation No. 137 of 2014 concerning the Standards of Child Development Achievement Levels (STPPA), fine motor development in children aged 5 to 6 includes the ability to draw based on their own ideas, replicate given shapes, engage in creative activities using eating utensils properly, cut along lines, paste objects, and express themselves through artistic work (MENTERI PENDIDIKAN DAN KEBUDAYAAN REPUBLIK INDONESIA, 2014).

According to Sunani as cited in Claudia (2018), the goal of fine motor skills is to help children make use of the small muscles in their fingers and hands, quickly coordinate hand and eye movements, and manage their emotions effectively. These skills are essential for supporting children in completing everyday tasks that require precision and concentration, such as writing, drawing, or cutting.

Elizabeth B. Hurlock, as quoted by Putri (2021), stated that fine motor development plays a vital role in a child's life. First, motor skills help children experience enjoyment and pleasure through the activities they engage in. Second, these skills allow children to progress from early helplessness toward independence, enabling them to move freely and complete tasks on their own, thus fostering self-confidence. Third, fine motor skills aid children in adjusting to school environments, for instance through mastery of foundational skills such as drawing, lining up, and pre-writing activities.

Observations conducted at TK Bintang Kembar revealed that the fine motor skills of children in Group B had not yet reached an adequate level. Of the 16 children observed, 10 were unable to tie their shoelaces independently, 5 had difficulty closing food containers, 7 did not hold writing tools properly, and 2 struggled to zip or close their bags. Additionally, the limited use of interactive learning media restricted mostly to blackboard-based teaching—and the lack of activities such as folding, cutting, and pasting may have contributed to the suboptimal development of fine motor skills.

One activity that can support the development of fine motor skills is kirigami, an art form that involves folding and cutting paper. Kirigami requires hand-eye coordination, precision, and tool control. It has proven effective in enhancing fine motor skills, as it engages movements such as grasping, folding, cutting, and drawing along patterns (Almuna et al., 2022; Rofi'ah et al., 2018).

According to Mitarwan (2011), kirigami is a Japanese term derived from "kiru," meaning to cut, and "kami," meaning paper. Kirigami is a paper-cutting art that can be taught easily using only

paper and scissors. The process typically begins with folding before making cuts to achieve the desired shapes. Mitarwan also explained that kirigami is a variation of paper folding art, where artists are permitted to make small cuts on the paper.

Teaching kirigami regularly to children offers several benefits. First, it introduces them to basic geometric concepts such as lines, center points, and triangles, which are often used in kirigami. Second, the process of making kirigami enhances fine motor skills, as folding and pressing paper with fingertips trains precise finger movements. Third, kirigami emphasizes accuracy—particularly in dividing paper into equal parts—which helps children learn about size, shape, and precision (Supadmi, 2021).

In my analysis, these theories are interrelated. Magill explains that fine motor skills require control of small muscles, and kirigami activities—such as cutting and using various tools—engage the fine muscles of children's hands and fingers. For instance, when folding and cutting paper, children must carefully control their movements to create the desired shapes.

Moreover, Magill (1980) states that fine motor skills generally involve cooperation between vision and hand movement, requiring a high level of accuracy. This directly relates to kirigami activities, which require children to observe a pattern or guideline on the paper and cut along those lines. Such tasks demand well-coordinated hand and eye movements. Children must direct their hand movements based on visual input, thereby strengthening their visual-motor coordination. Kirigami also demands a high level of precision to produce accurate shapes. Children must cut exactly along the pattern lines, which sharpens their ability to perform precise and deliberate actions.

Empirical research supports the link between kirigami activities and fine motor skills. A study by Rakimahwati (2018), found that kirigami activities significantly improved fine motor abilities. This improvement occurred because kirigami engages children in a series of actions that involve fine motor skills, such as cutting and folding paper. These activities require children to move the small muscles of their hands and fingers in a coordinated manner. Children who participated in kirigami activities showed better control of hand and finger movements compared to those who did not.

Kirigami is closely linked to the development of fine motor skills, as both involve training for precise and controlled movements. Given the identified challenges, kirigami activities are expected to serve as an alternative method to enhance children's fine motor abilities. Through these

engaging and enjoyable activities, children are more likely to feel excited and motivated during the learning process.

METHODOLOGY

Type of Research

This study employs a quantitative approach with a pre-experimental design. Based on the positivist paradigm, a quantitative approach is a research methodology applied to examine populations or samples. Sampling techniques are often conducted randomly, and data collection utilizes research instruments. The aim of data analysis is to test hypotheses (Sugiyono, 2020).

The *one-group pretest–posttest* design was chosen because it enables researchers to measure changes in children's fine motor skills before and after receiving the kirigami activity intervention. This design is considered appropriate as it is practical for early childhood education settings and can demonstrate the direct effects of the treatment, despite the absence of a control group. A detailed illustration of the research plan is presented in the table below:

Table 1. Research Plan

Pretest	Treatment	Posttest
O_1	X	O_2

Time and Location of the Research

The study was conducted at TK Bintang Kembar Palembang, located on Jalan Husin Basri, Kelurahan Sukamulya, Kecamatan Sematang Borang, Palembang City. The research took place from February 5 to February 13, 2025.

Research Subjects

This research involved Group B students at the kindergarten, totaling 34 children. From this population, 16 children from class B2 were selected as the sample using purposive sampling, a method based on specific considerations (Sahir, 2021). The researcher relied on recommendations from the classroom teacher, who assessed fine motor development through daily observation notes and prior skill assessments. Children who demonstrated below-average development in skills such as cutting, drawing, folding, and pasting according to the standards for 5–6-year-olds—were selected as participants. Based on these criteria, 16 children from class B2 were chosen as the sample, as they were deemed in need of additional stimulation through kirigami activities.

Data Collection Techniques and Instrument Development

Data were collected using tests, documentation, and observations through structured instruments. These instruments functioned as measurement tools to identify and record data related to kirigami activities and fine motor skill development (Sugiyono, 2023).

The researcher developed the instrument grid based on theories from experts such as Magill, Santrock, and Hurlock, as well as indicators from the *Standards of Child Development Achievement* outlined in Ministry Regulation No. 137 of 2014. The grid was designed to suit the developmental characteristics of children aged 5–6 years. The instrument was validated by an expert in Islamic Early Childhood Education (PIAUD) to ensure the indicators were appropriate and the instrument was suitable for research use.

Table 2. Instrument Grid

Aspect	Indicator
Hand–eye coordination accuracy	The child can control movements to fold paper accurately
Precision in using small muscles	The child can draw a simple pattern
Tool control skills	The child can cut along a pattern accurately

Data Analysis Technique

Data analysis involved several stages. Prior to implementation, the instrument was tested for validity and reliability. After data collection, tests for normality and homogeneity were conducted as prerequisites for further analysis. The data were then analyzed using the paired sample *t*-test manually to determine the difference between pretest and posttest results.

RESULTS AND DISCUSSION

RESULTS

Pretest and Posttest Results

The study aimed to examine the effect of kirigami activities on the fine motor skills of Group B children at TK Bintang Kembar. The research design used was the pre-experimental one-group pretest–posttest design. Pre-experimental research is conducted on a single experimental group without a comparison or control group (Yusuf, 2017). Before the treatment, children were given a pretest using a craft magazine booklet containing fine motor skill activities such as cutting along a pattern, folding paper based on instructions, and copying or completing letters or words. These

activities were observed and evaluated using an observation sheet developed based on fine motor skill criteria from relevant experts. After the intervention in the form of kirigami activities, the children completed a posttest using the same method. The average scores from the pretest and posttest are shown in the table below for further analysis.

Table 3. Tabulated Pretest Results

Sample	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Total Score
HP	2	1	2	2	1	1	1	2	1	1	2	**16**
MA	2	2	2	1	2	2	2	2	1	1	2	**19**
HAZ	2	1	2	2	2	1	1	1	1	1	1	**15**
MIA	2	1	2	2	2	2	2	2	2	2	2	**22**
NNH	1	2	2	2	2	2	1	2	2	2	2	**20**
DDA	2	1	1	2	2	2	1	2	2	1	2	**18**
RS	2	2	2	2	2	1	2	2	2	1	2	**20**
WN	2	2	2	2	2	1	1	1	1	1	1	**16**
AHS	2	2	1	2	2	2	2	2	2	2	2	**21**
SK	2	1	2	1	1	1	1	2	1	1	2	**15**
DPS	2	1	1	2	1	1	1	2	2	2	2	**17**
NSS	2	1	1	2	2	2	2	2	2	1	2	**19**
AAF	2	2	1	2	2	1	1	2	2	1	2	**18**
ARA	2	1	1	2	1	1	1	2	1	1	2	**15**
AM	2	2	2	1	1	1	1	1	1	2	2	**16**
KTL	2	1	1	1	1	1	1	2	1	1	1	**13**
16											Total	**280**
											$\bar{X}$ Mean	**17,5**

Table 4. Tabulated Posttest Results

Sample	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Total Score
HP	4	2	3	3	2	2	2	4	3	3	4	**32**
MA	4	3	4	4	3	3	3	4	2	2	3	**35**
HAZ	3	3	3	3	3	2	2	3	3	2	3	**30**
MIA	4	4	4	4	4	3	4	4	4	3	4	**42**
NNH	3	4	3	3	3	3	3	3	4	4	3	**40**
DDA	4	2	3	4	3	4	3	3	4	3	4	**37**
RS	4	3	3	4	3	3	4	3	4	2	4	**39**
WN	3	3	4	4	3	2	3	3	2	2	2	**31**
AHS	4	4	3	4	4	4	4	4	4	4	4	43
SK	4	2	3	3	3	2	3	4	2	2	3	**31**
DPS	4	3	3	4	3	2	2	4	3	3	4	**35**
NSS	3	3	3	4	3	3	3	4	3	2	4	**35**
AAF	4	3	3	4	3	3	3	4	3	2	4	**36**
ARA	3	2	3	3	3	2	3	3	3	2	3	**32**
AM	4	4	4	3	3	2	2	3	3	3	3	**34**
KTL	3	2	3	3	3	2	2	3	3	2	3	29
16											Total	**561**
											$\bar{X}$ Mean	**35.0625**

The table above shows an increase in scores following the implementation of the kirigami activity, indicating that kirigami had a positive influence on the development of children's fine motor skills. This improvement is evident in the comparison between pretest and posttest scores, where a consistent increase was observed in the majority of research subjects.

Validity and Reliability Testing

The data were collected using an observation sheet for fine motor skills, developed by the researcher based on indicators from various experts. The validity test was conducted to evaluate the effectiveness of the instrument in measuring the intended outcomes. An instrument is considered valid if it can accurately measure the research variables (Muin, 2023). The results of the validity test indicated that all observed items had an *r-count* value greater than the *r-table* value (0.497), thus confirming their validity.

Reliability was calculated using the Cronbach's Alpha formula, and the result showed an *r-count* of 0.888, which is ≥ the *r-table* value of 0.497. Therefore, the instrument was deemed reliable and suitable for data collection in this study.

Assumption Testing for Analysis

The data were tested using the normality test based on the curve skewness formula. The analysis results showed that the skewness value for the pretest was 0.774, while the posttest skewness value was -0.137. Since both values are less than 1, the data are considered to follow a normal distribution.

Next, a homogeneity test was conducted to examine the equality of variances between the pretest and posttest data collected from the children. The result of the homogeneity test indicated that the F-count was 1.675, with the degrees of freedom for the numerator (df_1) = 16 – 1 = 15 and for the denominator (df_2) = 16 – 1 = 15. At a significance level of 5%, the F-table value was obtained using linear interpolation, yielding $F_{0.05}(15,15) = 2.40$. Since F-count < F-table (1.675 < 2.48), it can be concluded that the data have similar variances, meaning they are homogeneous.

Hypothesis Testing (t-Test)

After confirming that the research data met the assumptions of normality and homogeneity, the next step was to test the research hypothesis. The hypothesis testing was conducted manually using the t-test formula. The formula applied in this study is shown below:

Table 5. t-Test Results

Variable Tested	Mean Pretest	Mean Posttest	t-count	t-table (df = 15; α = 0,05)	Decision
Fine Motor Skills of Group B Children	2,421	4,057	-27,571	±2,131	H_0 rejected

Based on the above calculation, the t-count was -27.571, which falls within the rejection region for H_0. Therefore, H_a is accepted, indicating that the kirigami activity has a significant effect on the fine motor skills of Group B children at TK Bintang Kembar. A further explanation is illustrated in the two-tailed test curve.

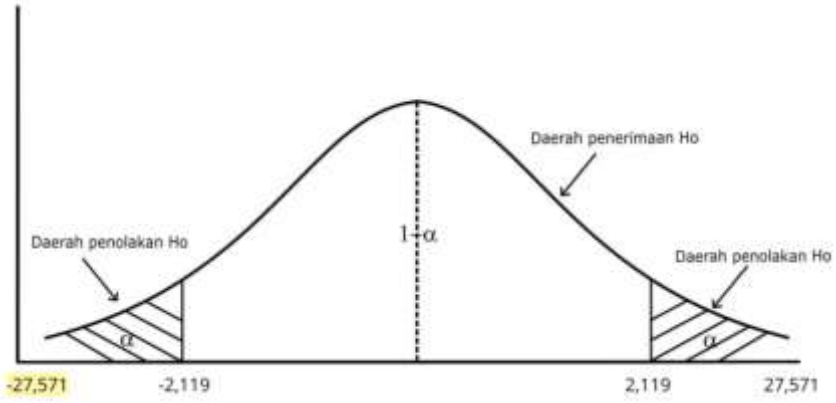

Figure 1. Two-Tailed Test

Activity Documentation

During the research process, the researcher also documented the children's participation in the kirigami activities. The purpose of this documentation was to visually illustrate the children's engagement during the learning process. The following are some of the documented moments captured throughout the research:

Figure 2. Children Decorating Their Kirigami Artwork on the Theme My Family

Figure 3. Explaining to the Children How to Create Kirigami on the Theme Vehicles

DISCUSSION

The findings of this study indicate that kirigami activities have a positive impact on improving the fine motor skills of Group B children at TK Bintang Kembar. This is evident from the pretest and posttest results, which show an increase in fine motor abilities such as writing, folding, and cutting. These findings align with Magill's theory (1980), which states that fine motor skills involve coordination between vision and hand movement, as well as control of small muscles to perform precise actions.

In addition, Santrock (2007) explains that fine motor development increases rapidly during early childhood and includes activities such as drawing, cutting, and writing. The improvements observed in children after participating in kirigami activities support this theory, as they were able to perform those tasks more proficiently. Elizabeth Bergner Hurlock (1980) also reinforces the idea that ages 5 to 6 are a critical period for developing the ability to use tools like scissors and colored pencils effectively.

These findings are further supported by previous empirical studies showing that kirigami activities can enhance fine motor skills in preschool-aged children. Dewi (2019), in her research at TK Ikal Widya Kumara Sidakarya, found a significant improvement in children's fine motor skills after engaging in kirigami activities, with average posttest scores increasing from 27.93 to 64.22. This demonstrates that kirigami is effective in strengthening small muscle coordination and enhancing hand-eye coordination in young children.

Similarly, Rakimahwati (2018) found that kirigami was more effective than origami in improving fine motor skills. In her study at TK Yayasan Amalan Parupuk Tabing Padang, children participating in kirigami scored an average of 83.25, significantly higher than the 76 scored by

children in the origami group. This suggests that the more complex actions involved in kirigami, such as both cutting and folding, provide stronger stimulation for developing motor skills.

Furthermore, Trilaelasari (2021), in her research at TK Iqro Islamic Preschool Bekasi, found that sustained kirigami activities over two cycles of intervention successfully enhanced children's fine motor skills. The percentage of children showing improvement increased from 43.79% before the intervention to 68.4% in the first cycle and 73.9% in the second cycle. These results indicate that consistent kirigami practice helps children improve their skills in cutting, folding, and composing shapes with greater precision and coordination.

The interpretation of these results shows that the increase in posttest scores supports the acceptance of the research hypothesis: kirigami activities positively impact children's fine motor development. This confirms that systematic and repetitive activities such as cutting and folding in kirigami can gradually and measurably train the small muscles. Children who initially struggled to hold scissors or fold paper became more accustomed and skilled after the intervention.

Theoretically, this study strengthens the understanding of fine motor development in early childhood as described by child development experts. Practically, the findings serve as a recommendation for educators and parents to consider kirigami as an engaging and effective method for enhancing fine motor skills. Implementing kirigami may also help reduce reliance on digital media by offering hands-on stimulation through paper-based physical activities.

However, this study has limitations. One of them is that the research subjects were limited to a single kindergarten, which restricts the generalizability of the findings. Additionally, the relatively short intervention period (five days) may not fully capture the long-term impact of kirigami activities. Future studies are encouraged to involve larger and more diverse samples from various schools and to extend the duration of interventions for more comprehensive and in-depth results.

CONCLUSION

Based on the research conducted at TK Bintang Kembar involving 16 children as research subjects, it can be concluded that kirigami activities have a significant effect on the fine motor skills of Group B children at TK Bintang Kembar. The data analysis showed a t-value of -27.571, which falls within the rejection region of H_0. Thus, H_a is accepted, indicating that kirigami activities contribute to the development of children's fine motor skills. The improvement in fine motor skills was evident in the children's enhanced ability to control tools, such as holding scissors with the correct finger positioning, cutting more neatly along patterns, accurately folding paper, and

demonstrating greater precision when using writing instruments. These improvements enabled the children to produce clearer and more defined lines.

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