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The effect of playing playdough and collage on improving fine motor skills in early childhood in terms of independence

El efecto de jugar plastilina y collage en la mejora de las habilidades motoras finas en la primera infancia en términos de independencia

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Abstract. Early childhood needs to get stimulation of fine motor skills, but most play models train gross motor skills. This study aims to find out: (1) the difference in the effect of playdough and collage play models on improving fine motor skills in early childhood. (2) the difference in the effect between high and low independence on improving fine motor skills in early childhood. (3) The interaction between playdough and collage playing models is viewed from the aspect of independence to improve early childhood fine motor skills. This type of research is an experiment using a 2 x 2 factorial design. The population in this study was 38 Yogyakarta National Kindergarten children. The sample in this study amounted to 20 children taken using purposive sampling criteria (1) specific children aged 5-6 years, (2) children who are actively attending school, (3) children who are not sick, (4) willing to follow the learning process (5) Able to follow all learning model programs that have been prepared, then ordinal pairing is carried out to divide each group. The instruments used to measure fine motor use are (1) pattern thickening test, (2) coloring test, (3) Patterning test (4) scissors test, (5) bead crocheting test with string thread. The data analysis technique used is ANOVA two-way. Among early childhood, playdough play models outperform collage play models with a high level of independence. Conversely, collage play models are better than playdough play models in improving fine motor skills in early childhood with low levels of independence. Children who have high independence are higher (good) than children who have low independence, with an average posttest difference of 2.1. There is an interaction between the playdough playing model and collage playing in terms of independence (high and low) to improve fine motor skills in early childhood, with an F value of 93.633 and a significance value of p 0.000 (< 0.05). With the results of this study can consider in determining the type of play model for early childhood. However, future research may be suggested to reconfirm these findings.
Key Words: playdough, collage, independence, fine motor

Resumen. La primera infancia necesita estimulación de la motricidad fina, pero la mayoría de los modelos de juego entrenan la motricidad gruesa. Este estudio tiene como objetivo averiguar: (1) la diferencia en el efecto de los modelos de plastilina y collage en la mejora de la motricidad fina en la primera infancia. (2) la diferencia en el efecto entre alta y baja independencia en la mejora de las habilidades motoras finas en la primera infancia. (3) La interacción entre los modelos de plastilina y collage se ve desde el aspecto de la independencia para mejorar las habilidades motoras finas de la primera infancia. Este tipo de investigación es un experimento que utiliza un diseño factorial 2 x 2. La población de este estudio fue de 38 niños del Jardín Nacional de Infantes de Yogyakarta. La muestra en este estudio ascendió a 20 niños tomados utilizando criterios de muestreo intencional (1) niños específicos de 5-6 años, (2) niños que asisten activamente a la escuela, (3) niños que no están enfermos, (4) dispuestos a seguir el proceso de aprendizaje (5) capaces de seguir todos los programas modelo de aprendizaje que se han preparado, luego se realiza un emparejamiento ordinal para dividir cada grupo. Los instrumentos utilizados para medir el uso de la motricidad fina son (1) la prueba de engrosamiento del patrón, (2) la prueba de coloración, (3) la prueba del patrón, (4) la prueba de las tijeras, (5) la prueba de ganchillo con hilo de cuerda. La técnica de análisis de datos utilizada es ANOVA de dos vías. Entre la primera infancia, los modelos de juguetes de plastilina superan a los modelos de collage con un alto nivel de independencia. Por el contrario, los modelos de juego de collage son mejores que los modelos de juego de plastilina para mejorar las habilidades motoras finas en la primera infancia con bajos niveles de independencia. Los niños que tienen una independencia alta son más altos (buenos) que los niños que tienen una independencia baja, con una diferencia promedio después de la prueba de 2.1. Existe una interacción entre el modelo de plastilina y el collage en términos de independencia (alta y baja) para mejorar la motricidad fina en la primera infancia, con un valor de F de 93,633 y un valor de significación de p 0,000 (< 0,05). Con los resultados de este estudio se puede considerar en la determinación del tipo de modelo de juego para la primera infancia. Sin embargo, se pueden sugerir futuras investigaciones para reconfirmar estos hallazgos.
Palabras clave: plastilina, collage, independencia, motricidad fina

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Introduction

Education has an important role in childhood because the improvement of personality abilities, mental and intellectual attitudes is formed in the early years. The quality in the early days of children including preschool is a reflection of the quality of the nation to come. Early childhood education is defined as the basic foundation for the next child's education (Giráldez, 2020; Williams et al., 2019). Early childhood education is becoming a concern in Indonesia because of the early childhood period when absorbing a lot of information easily. Through early childhood, coaching should be given games to stimulate the growth and motor skills of children. Previous research provides evidence that there is a positive association between play activities and motor skills in young children (Figueroa & An, 2017; Massri et al., 2022) Although many studies investigating the relationship of play-type model activity with gross motor skills, i.e. movements produced by large muscle groups, dominate the field of research, the effect of play-type model relationships and fine motor skills has been poorly studied (Gaul & Issartel, 2016). Based on this, this

study answers the question of whether different types of play models are very appropriate in improving children's fine motor skills.

Early childhood development efforts can be done in various ways, including play activities to improve fine motor skills (McClelland & Cameron, 2019). Play activities can stimulate the development of muscles when squeezing, cutting, and matching shapes. Early childhood development efforts can be done in various ways, including play activities to improve fine motor skills. Fine motor aims to help children move limbs, especially parts of children's hand movements, to give birth to meaningful independence (Linda & Suryana, 2020). Training the fine motor skills of early childhood requires eye and hand coordination. Early childhood in the age range of 5-6 years is the golden age (golden age) everything is very valuable, both physical, emotional, and intellectual (Bakken et al., 2017; Hasanah & Deiniatur, 2020).

Fine motor development is related to a child's ability to use limbs (Webster et al., 2019). Motor processes involve a system of coordinated movement patterns (brain, nerves, muscles, and skeleton) with complex mental processes, referred to as motion creation processes (Concha-Cisternas et al., 2023). The four elements cannot work individually but are always coordinated. If one element experiences interference, then the motion carried out can experience interference. The movements made by the child are consciously influenced by stimuli from his environment (verbal or verbal information, pictures, and other tools) that can be responded to by the child.

However, based on preliminary observations made by researchers in April 2023 at Yogyakarta National Kindergarten from two classes of kindergarten B teachers, revealed that children's fine motor skills are still low. This is evidenced by data obtained from two grades of 38 kindergarten B children of Yogyakarta National Kindergarten obtained an average fine motor score of children worth 1, when viewed from normative data, of course, this is included in the less category, while the standard value is worth 3. Effective play models to train children's fine motor skills are also lacking. The previous playing method used the method of jumping rope, walking on small sidewalks, putting the ball into the basket, and imitating animal movements, of course, this game trains children's gross motor movements, not training children's fine motor skills. Problems are seen during the learning process, namely: (1) when free drawing activities children have difficulty in holding stationery, (2) children have difficulty in drawing and coloring, (3) children have difficulty in using stationery and cutlery correctly, (4) children are still difficult in cutting according to patterns (5) children are still guided by teachers when writing, taking pictures, Shape Styling.

Education in this case must be more observant in paying attention to improving the fine motor skills of their students, and strive for appropriate solutions for solving the problems faced. If the teacher wants the child's fine motor skills to increase according to the age and ability of the child, then the teacher must arrange appropriate and fun learning activities and use media that are suitable for aspects of improving children's abilities so that learning objectives are achieved properly. One way to improve children's fine motor skills is to use playdough and collage models.

Playdough is a fun play activity at a low cost and has the value of flexibility, both for teachers and for children in designing patterns to be made according to plans and imagination (Setiawati, 2022). While collage is a fine art activity that is realized by attaching techniques and arranging the materials provided can help children in improving fine motor aspects (Fitrianingsih et al., 2018). Previous research, it shows that there is an influence of playing with playdough in providing stimulation of children's fine motor improvement (Sutapa et al., 2018). According to literature research, there is an effect of collage play improving early childhood fine motor skills (Fazira et al., 2018). Playing playdough and collage can improve children's fine motor skills, indirectly children will be able to improve their abilities through squeezing, pressing, cutting, and matching pattern shapes according to their imagination.

From the analysis process of several previous research results, game-based learning models such as playing playdough and playing collage can improve early childhood motor skills, by using playdough and collage play models to improve fine motor skills that require coordination of body movements involving muscles and nerves. This muscle and nerve ability is what will be able to improve fine motor skills such as squeezing, tearing, forming patterns, and sticking (Kristiantari & Negara, 2017). Fine motor delays are due to a lack of opportunities for children to learn fine motor skills and exercises, whereas collage games and scrap materials can develop early childhood fine motor skills.

Playing playdough and collage is a solution to improving children's fine motor skills so that educational activities are interesting and meaningful for children. According to (Kirsch & Buchholz, 2020), it is stated that instinctively children have the drive to develop from a dependent position (dependence) to an independent position (being independent), independent children will act confidently and do not always rely on adult assistance in acting (Chen et al., 2019). Independence is the ability to break away from dependence on others in carrying out daily activities or tasks on their own or with a little guidance according to the stage of ability and capacity (Chairilsyah, 2019). According to previous research, independence affects early childhood in aspects of physical motor development, the more supportive independence will be the higher early childhood in aspects of physical motor development (Aisah, 2019). In this study, independence influenced more in aspects of early childhood fine motor development with this type of play model.

The position of early childhood is in a vulnerable and labile period so children need to get positive and thorough stimulation (Lisa et al., 2020). The provision of stimulation through early childhood education needs to be given comprehensively, in the sense that children not only educate

their brains but are also intelligent in other aspects, because in the field there are still many individuals who have problems seen from fine motor movements and independence, such as not being able to write correctly, not being able to button clothes independently, writing, drawing, still guided by teachers. This often causes problems and often makes the child get obstacles when completing his task. Most of the playing methods taught previously use playing methods, of jumping rope, walking on small sidewalks, putting balls in baskets, and imitating animal movements, of course, this game trains children's gross motor movements, not training children's fine motor skills. So based on the previous error, the purpose of this study is to prove the difference in the influence of playdough and collage play models on early childhood fine motor improvement in terms of a child's independence.

Material & methods

Research Design

This type of research uses quantitative methods with a 2 x 2 factorial design experimental approach. This experimental study used two groups that received different treatments, namely the provision of playdough play models and collages on fine motor skills in early childhood.

Research Procedure

The method of data collection in this study is test and measurement. Before the pretest and posttest measurements, the sample is first measured for independence, to determine high and low independence. To measure independence in this study is to use the questionnaire method. The scale used in this study is the Likert scale. To determine the child's fine motor skills, a test was carried out consisting of (1) thickening patterns, (2) coloring, (3) shaping shapes, (4) scissors, and (5) stringing beads with string threads. The treatment of the play model is carried out following a learning program that has been compiled and validated. The research process was carried out for 16 meetings, where in one week 3 meetings were conducted. And ended with taking a final test or posttest to measure fine motor skills to recognize the comparison of fine motor ability scores after treatment.

Research Participants

The population in this study was all 38 kindergarten B children. In this study applying occultion criteria to determine the sample of this study, namely based on certain criteria desired by the researcher, including: children aged 5-6 years, children who are active in school, children willing to follow the learning process, children are able to follow all learning model programs that have been prepared by researchers. While the exclusion criteria in this study are things that cause the sample does not meet the criteria to be sampled, such as: children are sick.. The sample grouping was taken from children who had high independence as much as 27% and children who had low independence as much as 27% from the data that had been ranked. Based on this, a sample of 10 children who have high independence and 10 children who have low independence were obtained, so that the total sample was 20 children. This research has received approval from all samples who have filled out a statement of ability to become a research sample and have met the requirements of the research code of ethics.

Data Analysis

The information analysis method used in this research using SPSS 23 is to use ANOVA 2 lane (ANOVA two-way) at the level of significance 0.05. Next to compare the average companion treatment used the Tukey test (Coves et al., 2020). Before arriving at the use of ANOVA 2 road (ANOVA two-way), it is necessary to try prerequisite tests which include: (1) normality tests and (2) variant homogeneity tests and hypothesis tests.

Results

The chapters on research results and discussion will be presented sequentially, including (1) research data, (2) analysis prerequisite tests, and (3) hypothesis tests. The hypothesis test in this study will be presented sequentially, among others: (a) differences in the influence between playdough and collage play models on improving early childhood fine motor skills: (b) differences in the influence of children who have high and low independence on improving early childhood fine motor skills: and (c) interactions between playdough play models and collage play and independence on early childhood fine motor improvement. In full it will be presented as follows:

A1B1: The group of early childhood children who were trained using a playdough play model with high independence.

A2B1: Early childhood group trained using collage models with high independence.

A1B2: The group of early childhood children who were trained using a playdough play model with low independence.

A2B2: The group of kindergarten children who were trained to use a collage play model with low independence.

Based on Figure 1 above, shows that the fine motor of early childhood group A1B1 averaged the pretest by 11.2 and increased at the posttest by 18.8, group A2B1 averaged the pretest by 7.4 and increased at the posttest by 12.2, group A1B2 average pretest by 7.4 and increased at posttest by 11.4 A2B2 group averaged pretest by 9.5 and increased at posttest by 15.4.

Prerequisite Test Results

a. Normality Test

Test the normality of the data in this study using the Shapiro-Wilk method. The results of the data normality test conducted in each analysis group were carried out with the SPSS software program version 23.0 for Windows with a

significance level of 5% or 0.05. More results are in the appendix. The summary of the data in Table 1 is as follows:

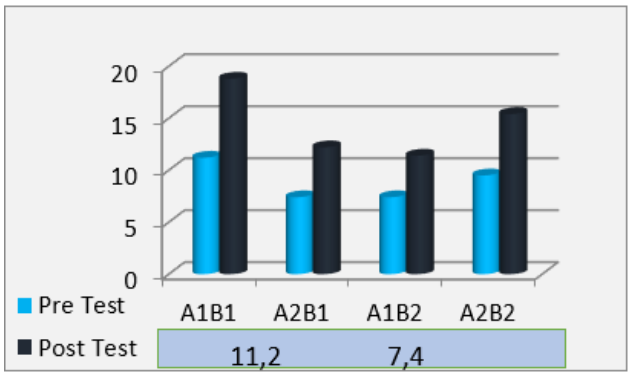

Figure 1. Early Childhood Fine Motor Pretest and Posttest Bar Diagram

Table 1.
Normality Test Results Summary

Group	*p*	Significance	Information
Pretest A1BI	0.421	0,05	Usual
Posttest A1B1	0.421		Usual
Pretest A2B1	0.814		Usual
Posttest A2B1	0.421		Usual
Pretest A1B2	0.814		Usual
Posttest A1B2	0.814		Usual
PretestA2B2	0.814		Usual
Posttest A2B2	0.814		Usual

Based on a statistical analysis of normality tests that have been carried out using the Shapiro-Wilk test, all pretest and posttest fine motor data in early childhood were obtained from the results of the normality test data significance value $p > 0.05$, which means the data is normally distributed.

b. Homogeneity Test

The homogeneity test is carried out to test the equation of several samples, namely homogeneous or not. The homogeneity test is intended to test the similarity of variance between the pretest and posttest. The homogeneity test in this study is the Levene Test. The homogeneity test results are presented in Table 2 as follows:

Table 2.
Summary of Homogeneity Test Results

F	df1	df2	*Sig.*
0,125	3	16	0,944

Based on a statistical analysis of homogeneity tests that have been carried out using the Levene Test. The calculation results obtained a significance value of $0.944 \geq 0.05$. This means that in a data group, it has a homogeneous variance. Thus populations have variance or homogeny in common.

c. Hypothesis Testing Results

Hypothesis testing in this study can be done based on the results of data analysis and interpretation of two-way ANOVA analysis. The sequence of the results of hypothesis testing is adjusted to the hypothesis formulated as follows:

1. The effect between playdough and collage play models on improving fine motor skills in early childhood

The first hypothesis reads "There is a significant difference in the effect between playdough and collage play models on early childhood fine motor improvement". Based on the results of the analysis, data were obtained in Table 3 as follows:

Table 3.
ANOVA Test Results between Playdough Play Model and Collage Play on Improving Early Childhood Fine Motor Skills.

Source	Df	*F*	*Sig.*
Play Model	1	6	0,030

From the results of the ANOVA Table 3 test above, it can be seen that the significance value of p is 0.030 and the value of F is 6. Since the significance value of p is $0.030 < 0.05$, it means that H0 is rejected. Thus there is a significant difference in influence. Based on the results of the analysis, it turned out that the playdough model group was 15.10 higher (good) than the college playing group of 13.80 with an average posttest difference of 1.3. This means that the research hypothesis that "There is a significant difference in the effect between playdough and collage training models on improving early childhood fine motor skills" has been proven.

2. The effect between children who have high and low independence on the improvement of fine motor in early childhood

The second hypothesis reads "There is a significant difference in the effect between children who have high and low independence on the improvement of fine motor in early childhood". The calculation results are presented in Table 4 as follows:

Table 4.
ANOVA Test Results Differences between Children Who Have High and Low Independence on Improving Fine Motor Skills in Early Childhood

Source	Df	*F*	*Sig.*
Child Independence	1	14,700	0,001

From the ANOVA test results in Table 4 above, it can be seen that the significance value of p is 0.001 and the F value is 14.700. Since the significance value of p is $0.001 < 0.05$, it means that H0 is rejected. Based on this means that there is a significant difference in influence. Based on the results of the analysis, it turned out that children who had high independence were 15.50 higher (good) than children who had low independence of 13.40, with an average posttest difference of 2.1. This means that the research hypothesis that "There is a significant difference in the effect between children who have high and low independence on improving fine motor skills in early childhood", has been proven.

3. Interaction between playdough and collage play models and independence (high and low) toward improving early childhood fine motor skills

The third hypothesis reads "There is a significant interaction between game models (Playdough Play and Collage Play) and independence (high and low) to improve early childhood fine motor skills". The calculation results are presented in Table 5 as follows:

Table 5.
ANOVA Test Results Interaction between Play Model (Playdough and Collage) and Independence (High and Low) on Improving Fine Motor Skills in Early Childhood.

Source	Df	*F*	*Sig.*
Play Model and Child Independence	1	93,633	0,000

From the ANOVA test results in Table 5 above, it can be seen that the significance value of p is 0.000 and the F value is 93.633. Since the significance value of p is 0.000 < 0.05, Ho is rejected. Based on this means the hypothesis that states "There is a significant interaction between play models (playdough and collage) and child independence (high and low) to fine motor improvement of early childhood", has been proven. of early childhood", has been proven.

After testing the interaction between play models (Playdough and Collage) and independence (high and low) to improve fine motor skills in early childhood, it is necessary to do further tests using the Tukey test. Further test results can be seen in Table 6 below:

Table 6.
Summary of Post-Hoc Test Results

Group	Interaction	Mean Difference	Std.Error	Sig.
	A1B2	5,6000*	1,44990	0,002
A1B1	A2B1	5,2000*	1,44990	0,005
	A2B2	2,6000	1,44990	0,293
	A1B1	-5,6000*	1,44990	0,002
A1B2	A2B1	-0,4000	1,44990	0,993
	A2B2	-3,0000	1,44990	0,183
	A1B1	-5,2000*	1,44990	0,05
A2B1	A1B2	0,4000	1,44990	0,993
	A1B2	-2,6000	1,44990	0,293
	A1B1	-2,6000	1,44990	0,293
A2B2	A1B2	3,0000	1,44990	0,183
	A2B1	2,6000	1,44990	0,293

Based on the table of Tukey test calculation results on the asterisk sign (*) shows that pairs that have significantly different interactions or pairs are: (1) A1B2-A2B1, (2) A1B1, (3) A1B2, while other pairs stated to have no difference in influence are: (1) A2B2 (2) A2B1 – A2B2. (3) A1B2-A1B2. (4). A1B1-A1B2-A2B2.

A1B1: The group of early childhood children who were trained using a playdough play model with high independence.

A2B1: Early childhood group trained using collage models with high independence.

A1B2: The group of early childhood children who were trained using a playdough play model with low independence.

A2B2: The group of kindergarten children who were trained to use a collage play model with low independence.

Discussion

The discussion of the results of this study provides a further interpretation of the results of the data analysis that has been presented. The discussion of the results of the analysis can be further described as follows.

1. The difference in the effect between playdough and collage play models on improving early childhood fine motor skills

The first hypothesis states that there is a significant difference in the effect between playdough and collage models on fine motor improvement in early childhood. The playdough model group was higher (good) compared to the collage play group towards early childhood fine motor improvement. These results are in line with the study (Souto et al., 2020) which states that there is a significant effect of playing playdough on fine motor skills in kindergarten. This is supported by previous research (Wardah, 2017) That said, playing with playdough has a significant effect on children's fine motor skills. Playing playdough affects improving children's fine motor skills because when playing playdough activates the strength of the palms and fingers, coordination between hands and eyes, and the flexibility of the palms of the fingers. This proves that the use of playdough can help children practice physical skills with their hands when children manipulate playdough with their fingers.

Research results by Hikmawati et al., (2022) show that playdough activities can improve children's fine motor development in children aged 4-5 years. According to (Strooband et al., 2020) Playdough is an excellent play tool for children to develop fine motor skills, concentration, and patience. In addition, with playdough children can make various shapes either by using molds or not in various ways. In addition, it can encourage children's independent attitude, so that (Nahar et al., 2020) added that fine motor development plays a role in supporting children's skills in being able to complete their tasks without much dependence on others. With guidance in playdough activities in addition to practicing finger coordination, children are also guided to be able to make shapes using molds or by imitating making shapes that have been modeled. Playing playdough can be used as an effort to help kindergarten children to develop fine motor skills. Previous research can be used as a reference and can support conducting this research because it makes a positive contribution to developing the fine motor skills of kindergarten children. The implications of playing playdough besides being able to develop fine motor skills of kindergarten children. Playing playdough can also develop the ability to recognize colors, textures, concentration, language development, and other social skills (Burnard et al., 2022). Thus playing playdough has a positive impact on

the fine motor skills of early childhood, especially in the coordination of fingers such as holding, pressing, grasping, and pinching.

This is because in playing playdough there are situations that can attract children's attention and are fun, children feel unburdened and during the process of playing playdough early childhood gets guidance repeatedly. So, the fine motor skills of early childhood can be well developed. The playdough play model to improve early childhood fine motor is expected to be a teaching material for teachers in the learning process. Playdough play models for the improvement of fine motor skills have been adapted to the stage of early childhood development.

2. The difference in the effect between children who have high and low independence on the improvement of fine motor in early childhood.

The results of the analysis showed that there was a significant difference in the effect between children who had high and low independence on fine motor improvement in early childhood. Children who have high independence are higher (good) compared to children who have low independence towards improving early childhood fine motor skills. One of the factors that affect a child's motor skills is independence (Meylia et al., 2022). This is in line with the results of previous research conducted by (Colombo-Dougovito & Block, 2019) which states that children who have high independence are better than children who have low independence in improving children's motor.

Independence is the ability or skill that children have to do everything on their own, both related to self-help activities and activities in their daily lives without depending on others (Degli Espinosa et al., 2020). Cultivating independence in individuals from an early age is very important because by having independence from an early age, children will get used to doing their own needs or activities.

3. The interaction between play models (playdough and collage) and independence (high and low) on early childhood fine motor improvement

Based on the results that have been stated in the results of this study that there is a significant interaction between play models (playdough and collage) and independence (high and low) in the improvement of fine motor in early childhood. The results showed that the playdough play model is a more effective model used for children who have high independence and the collage play model is more effectively used for children who have low independence. Playing Playdough is done by squeezing, holding, pressing, cutting, and making 3-dimensional shapes can make the child's fingers become strong and flexible so that his fine motor increases (Sutapa et al., 2021). This is supported by relevant research by Darweesh et al (2020) Which states that playing playdough or playing dough is a good way to strengthen finger muscles besides playing playdough is one of the fun games. From the results of the form of interaction, it appears that the main factors of the study in the form of two factors show a significant interaction. In the results of this study, interaction means that each cell or group has a different influence on each paired group.

Conclusions

A significant influence between play model interactions and levels of fine motor ability in this study. Among early childhood, playdough play models outperform collage play models with a high level of independence. Conversely, collage play models are better than playdough play models in improving fine motor skills in early childhood with low levels of independence. With the results of this study can consider in determining the type of play model for early childhood. However, future research may be suggested to reconfirm these findings.

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