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THE EFFECT OF PLAYDOUGH MEDIA PLAY ON EARLY CHILDHOOD DEVELOPMENT: FINE MOTOR AND COGNITIVE

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Abstract. Efforts to improve children's fine motor skills are an indispensable effort in growing and developing early childhood, one of which is using the media of playdough games. This study aims to find out (1) whether there is an effect of playdough media on the fine motor development of group B children at Pembina Sekayu State Kindergarten, (2) whether there is an effect of playdough media on the cognitive development of group B children at Pembina Sekayu State Kindergarten. This study is a quasi-experimental research with a nonequivalent control group design, the population of this study is all children aged 5-6 years at Pembina Sekayu State Kindergarten, with a sample of 60 children. The instrument used was in the form of observation techniques for the fine motor and cognitive development of children. The data analysis technique used independent sample t-test analysis with a significance level of 0.05. The results of the study showed that: (1) there was a significant influence of playdough media on the fine motor development of group B children at Pembina Sekayu State Kindergarten where the paired sample t-test results were obtained on average of 46.77 with a Sig value of $0.000 < 0.05$. (2) there was a significant influence of playdough media on the cognitive development of group B children at Pembina Sekayu State Kindergarten where the paired sample t-test results were obtained on average of 52.93 with a Sig value of $0.000 < 0.05$. So based on the study, it can be concluded that there is a very significant influence on playdough media games on fine motor and cognitive development in early childhood.

Keywords: Playdough Media, Development, Fine Motor, Cognitive, Early Childhood.

I. INTRODUCTION

Early Childhood Education is education given to early childhood ages 0-6 years which is carried out through the provision of various stimuli to help growth and development both physically and spiritually so that they have readiness to enter the next level of education and are also said to be a group of children who are unique in the process of development and growth, which means that they have fine and rough motor coordination of development patterns and development, cognitive intelligence, intelligence, attitudes, religion and social emotional behaviors, language and communication, especially in accordance with the level of development and growth of children (Desri Chichi Wahyuni, 2021).

According to Law No. 20 of 2003 concerning the National Education System, Article 1 Number 14 states that Early Childhood Education is a coaching effort aimed at children aged 0-6 years which is carried out through the provision of educational stimuli to help physical and spiritual growth so that children have readiness to enter further education (Rosinda BR Hotang, 2020). In PAUD

institutions, there are several activities that can develop all aspects of child development, including: 1) Kindergarten (Kindergarten), which is a form of PAUD unit that organizes programs for children aged 4-6 years, 2) KB (Play Group), which is a program for children aged 2-4 years, 3) TPA (Child Care Centers), which is education and care for children aged 3 months to 6 years, SPS (Homogeneous Early Childhood Unit) is an early childhood service in the community, such as a yandu post, PBK (Family-Based Early Childhood Education) is a service that organizes parental education programs (Yuliani Nurani, 2019).

Growth and development experience a rapid increase at an early age, namely from 0-6 years old, therefore children need stimulation of physical activities according to their respective abilities, both physical activities related to gross motor movements and fine motor movements (Anggita, 2020). According to (Song et al., 2022) explained that motor skills are the ability to control physical movements through coordinated activities of the nerve centers, nerve veins, brain and muscles derived from the development of reflexes and activities that exist since birth. According to (Anggita, 2020) explained that motor is everything that has to do with body

movements in which there are three elements that can be determined by muscles, nerves and brain. The three elements of muscles, nerves, and brains are related to each other, helping each other and complementing each other to achieve good motor development results (Kartini et al., 2023).

Cognitive development is the ability of human thinking including attention, memory, reasoning, imagination, creativity, and language (Klupp, Möhring, Lemola, & Grob, 2021). Cognitive development describes how a child's mind develops and functions so that it can think (Marinda, 2020). To develop and improve the mindset, children need to get stimuli and be given science to optimize the development and development of their functions (Iandolo et al., 2024). Piaget said that knowledge can be obtained through exploration, manipulation, and construction elaboratively. Therefore, cognitive development is related to the child's ability to receive, manage, and understand everything (Khoiriyati & Saripah, 2018).

According to (Asakawa & Sugimura, 2022) children's cognitive development is obtained from a sociocultural perspective, that culture plays an important role in it. According to him, human cognition, even though a person is in isolation, is still sociocultural because it is influenced by beliefs, values and intellectual adaptation equipment given to individuals by their culture. Cognitive development arises from the context of cooperation or collaboration or dialogue between more expert people by exemplifying activities and delivering lessons orally. Learning is utilized with the guided participation of teachers or more expert people (Kusuma, Sukmono, & Tanto, 2022).

Playdough media is a fun constructive game so that children do not easily get bored because in this game what is important is the process and the child's fun in doing the activity (Komaria, 2018). With the learning of playdough media, it is hoped that children will be able to achieve the level of developmental achievement set forth in the Regulation of the Minister of National Education of Indonesia No. 137 of 2014 concerning Early Childhood Education Standards, which consists of: (1) Children can imitate and make various shapes using playdough, (2) Coordinate eyes and hands to perform complex movements, (3) Perform manipulative movements to produce a shape with various media, and (4) Able to express themselves by making art through various media.

Based on the Fine Motor Development Indicators of children aged 5-6 years, children should be able to: 1) children can imitate various shapes using playdough, 2) coordinate eyes and hands to perform complex movements, 3) perform manipulative movements to produce a shape with various media, 4) be able to develop their cognition by expressing themselves through art with various media, 5) imitate making vertical lines, flat, oblique, curved, and circular, 6) meronce 2 patterns with various beaded media, straws, paper, leaves, etc., 7) hold the pencil correctly, 8) color simple drawing shapes, 9) coloring three-dimensional objects with various media, and 10) creating various shapes that use playdough using playdough media has an important place in the aspect of children's fine motor and cognitive

development because in their activities each child will use their imagination to make shapes and choose different colors according to their thoughts (Yuningsih, 2018).

The creation of playdough media can stimulate children to choose and use many kinds of colors and shapes according to their imagination (Berencsi et al., 2022). The work of children who have been made by forming this playdough will provide an opportunity for children to make a media that they make by themselves (Khodijah, 2020). Based on the results of observations at the Sekayu State Kindergarten, Balai Agung Village, Musi Banyuasin Regency, especially in group B, researchers found several problems that the learning activities carried out were less creative in using learning media, teachers sometimes only carried out learning activities using theme books and the lack of activities that could stimulate fine motor development such as when children held pensions, Sticking paper children are not yet independent in doing so, they still need the help of adults and children's cognition is still not fully stimulated, such as in learning number literacy, compiling a pattern still needs guidance. and the learning media is less varied.

Children's fine motor and cognitive abilities that are not optimal are also caused by learning media that have been used often and are no longer attractive to children (Azizah, 2022). Lack of strategy helps stimulate the improvement of children's fine motor skills so that children often have problems in carrying out school tasks (Yuningsih, 2018). This can be seen in the media used by teachers to improve fine motor and cognitive abilities, namely using children's worksheets such as writing so that children feel bored and unmotivated to do learning activities in class. Learning activities are not arranged through play so that children feel burdened with the tasks given by the teacher. Education must support the improvement of children's fine motor and cognitive abilities through appropriate instructional programs to improve fine motor and cognitive abilities. Teachers at Pembina Sekayu State Kindergarten have not been able to use learning media variants because the availability of learning media is less varied and teachers often teach using theme books.

Early childhood is in a vulnerable and labile period, so children need to get positive and comprehensive stimulation (Malone, Pritchard, & Hulme, 2022). The provision of stimulation through early childhood education needs to be provided comprehensively, in another aspect, due to the fact that in the field there are still many individuals with problems with their fine motor and cognitive abilities as well as independence in early childhood such as not being able to button their clothes independently, writing, drawing, still being guided by teachers (Krombolz, 2023). This often causes problems and often makes the child get obstacles when completing his tasks.

The problems in the field are found that there are still children who have not developed fine motor and cognitive, this can be seen when: (1) Children's fine motor and cognitive abilities are not developed optimally due to the lack of varied learning media; (2) Lack of media and methods used in improving fine motor and cognitive; (3)

Learning activities that are carried out are less creative in using learning media, teachers sometimes only carry out learning activities using theme books; (4) Children do not know how to make and know playdough media; (5) Lack of facilities and infrastructure that support the growth and development of children's physical-motor and cognitive development; (6) There are still many individuals with problems with their fine motor and cognitive abilities as well as independence in early childhood such as not being able to button their clothes independently, writing, drawing, still being guided by teachers. This often causes problems and often makes the child get obstacles when completing his tasks; (7) In holding pens, coloring, sticking pictures, forming patterns, matching shapes. Children's fine motor and cognitive abilities that are not optimal are also caused by learning media that have been used often and are no longer interesting for children.

The importance of developing children's fine motor and cognitive abilities for children's success in the future requires efforts to improve fine motor and cognitive skills from an early age (Faber et al., 2024). One of the learning media that can be applied in improving children's fine motor skills is playdough media. One of the strategies chosen to develop children's fine motor and cognitive skills in this study is to invite children to play using Playdough Media. This media will certainly be able to train children's fine and cognitive motor skills because with playdough media children will do activities that train small muscles such as squeezing, grasping, shaping, so that their fine motor skills can develop perfectly and also children can train their cognitive activities by choosing colors, forming patterns, forming geometry, forming numbers, shaping animals, shaping plants and forming transportation tools from playdough media so that their cognition can develop perfectly.

The results carried out by the researcher with the theoretical study obtained to show that the playdough media can improve children's fine motor and cognitive skills. Therefore, children's fine motor and cognitive skills that are still low can be stimulated with palaydough media. With the media of playdough, children can freely get space to explore all kinds of forms so that it can be an interesting activity for early childhood.

1. Data Description

Table 2. Pre-test Results of Fine Motor and Cognitive Development

		Statistics			
		Pre Test Fine Motor Experiment	Pre Test Fine Motor Control	Pre Test Cognitive Experiment	Pre Test Cognitive Control
N	Valid	30	30	30	30
	Missing	0	0	0	0
Mean		25.97	24.63	31.90	28.97
Median		25.00	24.00	30.00	27.00
Mode		20 ^a	18 ^a	23	20
Std. Deviation		6.105	6.344	10.810	8.168
Minimum		17	17	18	19

II. METHODS

This type of research is a quasi-experimental research with a quantitative approach. This design uses a quasi-experimental design with a pre-test - post test control group design in this study there is a pre-test and a post test will see accurate results, because it can simulate the situation before and after being treated. This design can be described as follows:

Tabel 1. Research Design

O₁	X	O₂
O₃	-	O₄

Information:

O₁ : Pre-test of the experimental class

O₂ : Post test of the experimental class

O₃ : Pre-test control class

O₄ : Post test control class

X : Treatment in the experimental class using playdough media

- : Not given the same treatment as the experimental class

This sampling method uses total sampling, so that the number of samples in this study is 60 people divided into 30 samples of the B1 class group and 30 samples of the B2 class group. The data collection technique in this study uses observation, pre-test and post-test research procedures, and the documentation and instruments used in this study use measuring tools to measure fine motor development and cognitive development. Furthermore, the data analysis technique in this study uses prerequisite tests and hypothesis tests with the help of SPSS version 26.

III. FINDINGS AND DISCUSSION

This research was carried out at Pembina Sekayu State Kindergarten, namely in classes B1 and B2 which amounted to 60 students. The experimental class in this study is B1 with 30 students while B2 is the control class with 30 students. This study intends to find out whether there is an influence of playdough media on children's motor and cognitive development. The following results of the research description are found in the table below.

Maximum	45	45	60	50
a. Multiple modes exist. The smallest value is shown				

In table 2. Above the results of the pre-test of fine motor and cognitive development, it is known that in the experimental group, the average score (mean = M) of fine motor development before being given treatment is 25.97 and cognitive development is 31.90. In the control group, the mean score (mean = M) fine motor before being given treatment was 24.63 and cognitive development 28.97

Table 3. Post Test Results of Fine Motor and Cognitive Development

		Statistics			
		Post Test Fine Motor Experiment	Post Test Fine Motor Control	Post Test Cognitive Experiment	Post Test Cognitive Control
N	Valid	30	30	30	30
	Missing	0	0	0	0
Mean		44.63	38.00	52.93	46.77
Median		45.00	35.00	54.50	49.00
Mode		39 ^a	30 ^a	60	54
Std. Deviation		9.338	11.145	6.528	8.866
Minimum		25	19	39	29
Maximum		60	57	60	60

a. Multiple modes exist. The smallest value is shown

In table 3. Above the results of the post test of fine motor and cognitive development, it is known that in the experimental group, the average score (mean = M) of fine motor development after being treated was 44.63 and cognitive development 52.93. In the control group, the average score (mean = M) of fine motor development of children after being given treatment was 38.00 and cognitive development 46.77.

2. Prerequisite Test

a. Normality Test

The data normality test in this study used the Kolmogorov-Smirnov formula, with processing using SPSS 25. The results are presented in the table as follows.

Table 4. Normality Test

	Tests of Normality					
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pre Test Fine Motor Control	.114	30	.200*	.905	30	.011
Post Test Fine Motor Control	.127	30	.200*	.958	30	.274
Pre Fine Motor Test Experiment	.136	30	.163	.896	30	.007
Post Test Fine Motor Experiment	.139	30	.141	.947	30	.137
Pre Cognitive Control Test	.128	30	.200*	.911	30	.015
Post Test Cognitive Control	.133	30	.187	.955	30	.230
Pre Cognitive Test Experiment	.136	30	.161	.913	30	.018
Post Test Cognitive Experiment	.140	30	.141	.898	30	.008

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The data normality test using the Kolmogorof-Sminov formula above can be concluded that the significance level is above 0.05. So it can be concluded that the data presented is normally distributed.

b. Homogeneity Test

The data homogeneity test in this study used the Levene Test, with processing using SPSS 25. The results are presented in the table as follows.

Table 5. Homogeneity Test

		Test of Homogeneity of Variances			
		Levene	df1	df2	Sig.
		Statistic			
Learning	Based on Mean	3.983	3	116	.010
Outcome s	Based on Median	2.685	3	116	.050
	Based on Median and with adjusted df	2.685	3	99.36 2	.051
	Based on trimmed mean	3.986	3	116	.010

The data homogeneity test using the Levene test formula above is known that the data of the four indicators, namely the pretest of fine motor development of the control class, the posttest of fine motor development of the control class, the cognitive development of the experimental class, the posttest of cognitive development of the experimental class has a significance of > 0.05 so that the two data have the same group variance or homogeneous.

c. Hypothesis Test

1) There is a Significant Effect of Paired Sample t-test on Fine Motor Development

Table 6. Paired Samples Fine Motor Test Control Grade

Class	T _{count}	Sig (2- tailed)
Pretest (Fine Motor Control Class)	-9.377	.000
Posttest (Fine Motor Control Class)		

The results of the Paired Samples Fine Motor Test in the control class showed a sig. 0.000 (<0.05). So that the pretest and posttest scores of the control class have a significant influence.

Table 7. Paired Samples Fine Motor Test Experimental Class

Class	T _{count}	Sig (2- tailed)
Pretest (Fine Motor Apparatus of Experimental Class)	-5.568	.000
Posttest (Experimental Class Fine Motor)		

The results of the Paired Samples Fine Motor Test in the experimental class showed a sig. 0.000 (<0.05). So that the pretest and posttest scores of the control class have a significant influence.

2) There is a Significant Effect of Paired Sample t-test on Cognitive Development

Table 8. Paired Samples Test Cognitive Development Control Class

Class	T _{count}	Sig (2- tailed)
Pretest (Cognitive Control Class)	-7.576	.000
Posttest (Cognitive, Controlled Class)		

The results of the Paired Samples Test for Cognitive Development of the Control Class showed a sig. 0.000 (<0.05). So that the pretest and posttest scores of the control class have a significant influence.

Table 9. Paired Samples Test Cognitive Development Experimental Class

Class	T _{count}	Sig (2- tailed)
Pretest (Cognitive Experimental Class)	-10.367	.000
Posttest (Cognitive Experimental Class)		

The results of the Paired Samples Test for Cognitive Development of the Experimental Class showed a sig. 0.000 (<0.05). So that the pretest and posttest scores of the control class have a significant influence.

d. Independent Sample Test

Table 10. Independent Samples Fine Motor Development Test Control And Experiment Class

Class	T _{count}	Sig (2- tailed)
Independent Sample Test Fine Motor Development Control And Experiment Class	2.499	.000

In the table above, the Sig. (2-tailed) value shows 0.000 (<0.05). So it can be concluded that there is a significant influence of fine motor development in the experimental class than in the control class.

Table 11. Independent Samples Test Cognitive Development Control Class and Experiment

Class	T _{count}	Sig (2- tailed)
Independent Sample Test for Cognitive Development of Control and Experimental Class	-3.068	.003

In the table above, the Sig. (2-tailed) value shows 0.003 (<0.05). So it can be concluded that there is a significant influence of cognitive development on the average score of the control class and the experimental class.

Discussion

According to (Brennan Kearns et al., 2024) that children experience four different stages of development, namely the sensorimotor stage children learn about their world through the use of their senses and emphasize the relationship between sensory and motor experiences in learning. Playing with playdough media allows children to experience various textures, strengthens children's sensory skills, and in the process can hone children's fine motor skills. According to (Gashaj & Trninic, 2023) it is stated that children's learning is influenced by their social interactions and social environment. Playing with playdough in a group context or with adult guidance can broaden their understanding of fine motor abilities and help them develop new skills through observation and interaction with others.

In line with the above theory, relevant to the research researched by (Bowler et al., 2024) states that fine motor development takes place sequentially and occurs naturally along with children's growth. The importance of sensory stimulation in children's fine motor development, using playdough media can provide a rich sensory experience through touch, smell, and color. Kids can feel the texture of playdough, roll, twist, and shape it to their liking so kids can improve their fine motor skills. According to (Nguyen et al., 2017) explained that motor skills are the ability to control physical movements through coordinated activities of the nerve centers, nerve veins, brain and muscles derived from the development of reflection and activities that exist since birth. Based on the results of data analysis and testing and referring to several previous studies that used playdough media as a treat to improve fine motor skills. The results obtained from the post test score are proven that the use of playdough media has an effect on improving children's fine motor and cognitive development. This research is in line with the research that has been conducted by Komaria, with the title "The effect of playdough play on fine motor development of children aged 5-6 years in Kartika Fajar Baru kindergarten, Jati Agung District, South Lampung Regency". On August 1, 2018. The results of normality and homogeneity of the experimental group and the control

group were sig. (2tailed) greater than the significance level of 0.05. Based on the results of the t-test, the magnitude of the t-value after the analysis test was -4,043. Where in the t value there is a minus sign (-) which is a sign that there is a difference between the two groups. Judging from the value of Sig. (2 tailed) of 0.000 according to the basis of decision-making, if the significance value < 0.005 (5%), then Ho is rejected and Ha is accepted. This means that playdough has an effect on children's fine motor development (Komaria, 2018).

According to (Kuo et al., 2022) explaining the pre-operational stage of 2-7 years at this stage, children begin to use symbols in their thinking, such as words and pictures. They began to use imagination and understand abstract concepts such as time and numbers, although still in a very limited form. However, they have not fully understood the principles of logic. In stimulating the use of playdough, children can experience concepts such as size, shape, volume, and spatial relationships through direct imagination with the material. Jerome Bruner highlights the importance of education in shaping children's thinking. According to (Martzog & Suggate, 2022) proposes that learning should be adapted to the child's stage of cognitive development and use a more active and interactive approach. In this approach, the use of playdough media can be a wonderful tool for stimulating children's interaction because playdough media can engage children sensorily, allowing them to perceive textures and shapes directly.

The Montessori approach emphasizes the importance of a well-prepared environment and appropriate materials to facilitate children's learning. In this approach, the use of media such as playdough can allow children to explore mathematical concepts, science through fun activities children are given the freedom to explore and experiment with playdough in a structured and supportive environment. Based on the results of data analysis and testing and referring to several previous studies that used playdough media as a treat to improve cognitive development. The results of the post-test score are proven that the use of playdough media has an influence on improving children's

cognitive development. This research is in line with the research that has been carried out by Research conducted by Reski Putri Amalia, with the title "The Effect of Playdough Play on the Cognitive Ability of Children Aged 5-6 Years in Wildanun Kindergarten", in 2023. This research is quantitative with a type of quasi-experimental design or pseudo-experimental research. Pretest and Posttest data results. The criteria for the difference are if the value of sig. (2-tailed) < 0.05 , and if sig. (2-tailed) > 0.05 , there will be no difference after being treated. The following are the results of the Wilcoxon test of initial reading ability in the experimental group: In the Wilcoxon test, the cognitive ability for the experimental group showed that the Zhitung was 2, 41 and Ztabel was 0.4929. So H1 is accepted and Ho is rejected, meaning that there is an increase in cognitive development using Playdough play activities (Amalia & Ilyas, 2021).

One of the skills that needs to be developed in early childhood education institutions, especially in kindergarten, is motor and cognitive skills (Suggate, Karle, Kipfelsberger, & Stoeger, 2023). Fine motor development is related to the child's ability to use the limbs, while cognitive is related to the processing of thinking (Nonnis & Bryan-Kinns, 2021). Motor and cognitive processes involve a system of movement patterns that are coordinated by the brain, nerves, muscles, and skeleton with complex mental processes, referred to as the process of motion creation. These four elements cannot work individually, but are always coordinated. If one of the elements is disturbed, the movement carried out can be disturbed. The movements that children make are consciously influenced by stimuli from the verbal or verbal information environment, pictures, and other tools that the child can respond to (Berencsi et al., 2022).

The government regulation on Early Childhood in Permendikbud Year 2014 No. 137 Article 1 Paragraph 2 states that the Standard for the Level of Early Childhood Development Achievement is called STPPA, which is a standard for the ability achieved by early childhood in all aspects of growth and development covering 6 aspects, namely: 1) religious and moral values, 2) physical-motor, 3) cognitive, 4) language, 5) social-emotional, 6) art (Permendikbud, No 137 of 2014). In connection with the achievement of children's physical-motor and cognitive development, namely fine motor and children's cognition which must be improved in children aged 5-6 years so that the coordination of children's eyes and hands is better, because children aged 5-6 years can already use the ability to train themselves with the help of adults, children can, grasp, shape, make patterns using playdough media (Nurkamelia, 2019).

IV. CONCLUSION

Based on the results of the above research, it can be concluded that Playdough media is a toy dough or toy plasticine which is a modern form of clay toys (flour). Playdough is a toy dough made of flour as a learning aid that is easy to form and useful for stimulating and training the

coordination of fingers and eyes in fine motor skills in early childhood. With a playdough medium that is soft and safe for children to use by kneading, and elastic to make a shape so that it invites them to be able to form a creative and innovative mindset.

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