

Improving of FineMotor Skills Through Plasticine Playing and Clay in Early Childhood

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Abstract

Background: Mastery of fine motor skills is indispensable in daily life. **The purpose** of this study was to examine the improvement of fine motor skills after playing plasticine and clay. This study is an experiment with a sample of 40 children divided into 2 groups. One group got the treatment of playing plasticine and the other got the treatment of playing clay. Each group was treated for two hours of play each week at a frequency of three times a week. The present research was accomplished in 2 months. Instruments used for fine motor skills were paper cutting precision, coloring patterned images, bolding letters, and skills to make objects using plasticine and clay. The data is analyzed using a *t*-test with a significance level of 5%. **The results** showed that there was an increase in fine motor skills in both groups of playing plasticine and clay with $P < 0.05$.

Keywords: *fine motor, plasticine, clay*

1. Introduction

All human life is focused on education, because education determine the future generations. Education has an important role in childhood, because it is the right time for development [1]. Indeed, education in early childhood provides experiences in dynamic development and trials to adapt to dynamic life movements. Early childhood education is an effort by educators to develop the children through a variety of integrated stimuli so that they can develop optimally. Motor development in children is one that need to be stimulated. Motor development is related to the ability to use the limbs to perform motions involving nervous, muscle, and skeletal systems [2]. Motor development is generally divided into gross and fine motor skills. The former involves the ability of nerves to move large muscles and the later is the ability to coordinate several elements of motion into a series of

motions [3]. Fine motor related to the ability to coordinate between eyes with fingers, eyes with feet, and simultaneous coordination between eyes, hands, and feet.

Efforts to develop or stimulate motor skills in early childhood can be done in various ways. One of them is by playing plasticine and clay. The facts in the field show that there are still many teachers and parents prioritizing children's academics, reading and writing skills, and mathematics and consider fine motor skills as not so urgent to develop. In terms of mastery of fine motor skills, it is very necessary to support activities in daily life, in connection with that, the development of motor skills is one aspect that must be optimized. Children whose motor skills are poorly developed will feel unsecured, not confident and there will be a negative impact on themselves being inactive children lazy to move which will eventually lead to obesity [4]. Media to implement the ideal active actions in schools are through physical education in order to have a clear direction and purpose [5].

Children's development takes place thoroughly, therefore, aspects of development need to be stimulated appropriately so that the child grow and develop optimally [1]. Children who are still in their in-growth period if they lack stimulation will experience obstacles in growth and development. There are many ways to stimulate the development, among them are by playing plasticine and clay. Playing plasticine and playing clay is very fun and is very important to stimulate growth and development. The pleasant atmosphere makes children feel happy to repeat the same activity again and again so that it can be used as a medium to train the muscles of their fingers. Frequently trained muscles will gain flexibility, skills, agility, quick reaction, and stronger contractions. The present research is aimed to determine whether playing plasticine and clay can improve the fine motor skills of early childhood, following the Koralek [6]'s opinion stating that manipulating and using tools with playdough and clay allows preschoolers improving motor skills.

2. Literature Reviews

2.1. Fine Motor Skills

Motor development is the key to achieve self-control which increases the basic motion, namely locomotor, nonlocomotor and manipulative motions [7]. The locomotor movement is often interpreted by moving, nonlocomotory movements are performed without moving, and manipulative motions are movements that manipulate the object. To train to be skilled, there must be the principles of continuous repetition from the easy to the difficult, and from the part to the whole. This principle emphasizes that a child's developmental abilities have the progressive gradual nature. Kurtz [8] argues that for most children, the development of motor skills occurs throughout childhood, and follows certain predictable steps or stages, also known as developmental milestones. Brewer [1] affirms that a developmentally appropriate program of physical education is based on three principles (1) motor development is sequential and age-related, (2) children progress through similar sequences of motor development, and (3) the relates at which children progress of motor development varies.

The movement begins with a single to broken movements, from a simple to complex movements, from easy to difficult, from the part to the whole requiring coordination between components. Fine motor will not be separated from the three elements that are the science of motion, performance, dan body movement. In accordance with Esther Thelen [9]'s theory, in order to develop fine motor skills there should be motivation to react and paying attention to the perception. The behavior of human motion is divided into three parts namely motion theory, motion learning, and motion development. Fine motor is a very important factor for humans, because with fine motor skills people can achieve something that is expected. Fine motor is a coordinated control of physical movement between nerves, muscles and bones. Nerves function to innervate muscles and muscles function to move bones, so the bone is said to be the passive means of motion. Fine motor skills are

those manipulative skill that involve small movement and smalls muscles in parts of the body, such as picking up, feeding themselves, threading, drawing, cutting, and dressing [10].

Fine motor skills develop slightly later than gross motor skills and need patience and practice to develop. Fine motor requires good coordination to move and control the muscles of the fingers and limbs [10]. Fine motor is a person's ability to manipulate objects using the muscles of his finger and it is the ability of nerves to coordinate movements involving small muscles whose development requires precision, patience and repetitive training. Fine motor development is in line with the maturity of the nervous and muscle systems so that each movement requires complex interaction of various parts of the body controlled by the nervous system. Fine motor development follows the principle of maturity of the nervous and muscle systems, meaning that its development will not occur before the nerves and muscles of the child get mature. Yusof. et al. [11] mentioned that mastery of motor skills leads to improved proficiency in complex skills, which in turn enhances participation of children in physical activities. Vanetsanou & Kambas [7] argued that the amount of time that children spend at preschool settings is determinant for children's motor development. Preschool centres with adequate equipment and appropriate care provide an obvious appropriate development of children's motor abilities. Apart from schooling, the society in which a child lives from a specific cultural context that favors certain aspects of motor development. Fine motor is the basis for achieving other skills required in daily life, such as writing, buttoning clothes, and even training. This is in accordance with Payne & Isaacs [12] stating that fine movements are integral to motor development in general as well as to other areas of human development, like academics and social development. Fine motor skills like printing or writing legibly are important for transmitting written ideas. Fine motor development in early childhood needs to be optimized because it is beneficial to develop the next skill requiring coordination in every movement. Kaifer [13] uttered that fine motor skills refer to the small muscles in the hands and fingers that are responsible for tasks such as picking objects up and grasping a pencil. Children use fine motor skills in school in tasks such as cutting and pasting, using manipulatives in mathematics, or clapping their hands to learn syllables.

2.2 Playing with Plasticine and Clay

Play is a necessity for children since through play they can learn to control their movements and coordinate motions, so as to develop the fine motor skills. Faigenbaum *et al.* [14] affirmed that with qualified intruction and deliberate practice, children can improve their motor skill performance and enhance their muscle strength, which are the building blocks for future participation in games, sports, and fitness activities. Playing plasticine and clay is an activity that promotes flexible fingers to design patterns that will be shaped according to the power of imagination. Swartz [15] mentioned that playdough is a staple play material in the early childhood classroom. Playdough provides enjoyable and satisfying experiences for young children, but it is not merely a "fun" activity. It provides valuable hands on, active-learning experiences, and supports children's growth and learning in many domains. In addition, playing plasticine and clay is able to sharpen the imagination, stimulate the five senses, and can develop fine motor skills. The flexibility of plasticine and clay can train the child in regulating the muscle strength of the finger to press gently and carefully on the materials. Playing is actually not a goal, but playing is a medium to transform values that exist in that play. Sensomotor play is the simplest form of play characterized by repetitive muscle movement, adding flexibility, strength, and agility of the muscles. Cohen *et al.* [16] argue that participation in physical activity is vital for enhancing children's physical, social, cognitive, and psychological development. Higher levels of physical activity in children are associated with improved fitness (both cardio-respiratory fitness and muscular strength), enhanced bone health, and reduced body fat. Indeed, Pahlevian & Ahmadizadeh

[17] found that motor skills play an important role in children's learning and improve the growth of other important learning skills such educational and social ones. Fallah, Nourbakhsh & Mcloone [18] stated that physical movement is one of the most important aspects of human life, and motor skills allow children gain greater control over their living environment. Madrona [2] uttered that motor game is a positive practice which improves the acquisition of motor skills and the development of social relationships, as well as the promoting emotional, creativity and imagination skills, and enhancing children's self-esteem.

Carlson [19] argued that to maintain its appropriateness, teachers should consider the child's culture, past experience with touching, and the individual comfort level with touching. There are several ways to add positive touch to the early childhood classrooms. One is through finger paints, playdough, glue, and collage materials lend themselves naturally to touch. Playing plasticine and clay in addition to being able to stimulate fine motor skills, it can also be used to develop compound skills. Each child has a wide range of intelligence potentials that are often known as compound intelligence, one of which is kinetic intelligence. Kinetic intelligence is the ability to think through motion [20]. Jacobs & Crowley [21] stated that setting up interest areas should be done in which children have many opportunities to practice their fine motor skill. This includes puzzles, manipulative math, magnifying glasses, small blocks, and construction toys. When children squeeze and mold playdough and other materials, they are also working to develop their small muscles which they will use later for holding pencils and pens, turning pages in a book, or pressing the keys on a computer.

3. Methods

This an experimental study with a sample of 40 children divided into two groups. The first group got the treatment of playing plasticine and the second one got the treatment of playing clay. Each group was treated for two hours of play each week with the frequency of three times a week and performed for 2 months. Instruments used to obtain the data of fine motor were the precision of cutting paper, colouring patterned images, bolding letters, and the skill of making objects similar to the original using plasticine and clay materials. Data were analyzed using the *t*-test to measure the acceptance level with the significance level of 5%.

4. Results

The objective of the present research was to determine that playing plasticine and clay can improve the fine motor of early childhood. Before the hypothesis test, it is necessary to perform homogeneity and normality tests.

The Homogeneity Test
Table 1 The Homogeneity Test of Variances

	Levene Statistic	df1	df2	Sig.
Cutting	.161	1	38	.691
Coloring	.011	1	38	.915
Bolding letters	.814	1	38	.373
Making Objects	.052	1	38	.821

The variables of cutting, coloring images, bolding letters, and creating objects were homogeneous based on the data presented in Table 1.

The Normality Test

Table 2 The One-Sample Kolmogorov-Smirnov Test

		Cutting	Coloring	Bolding Letters	Creating Objects
N		40	40	40	40
Normal Parameters ^{a,b}	Mean	5.28	5.43	5.38	5.00
	Std. Deviation	2.882	2.890	3.184	2.582
Most Extreme Differences	Absolute	.185	.189	.222	.156
	Positive	.185	.189	.222	.156
	Negative	-.175	-.189	-.170	-.156
Kolmogorov-Smirnov Z		1.170	1.195	1.405	.985
Asymp. Sig. (2-tailed)		.129	.115	.039	.287

The variables of cutting, coloring images, bolding letters, and creating objects were all normal as seen in Table 2.

The result of testing the first hypothesis stating there was an increase in fine motor skills between before and after playing plasticine was shown in Table 3. There was a difference in the skill of cutting, coloring, bolding letters, and creating objects similar to the original with the significance of $0.000 < 0.05$. It determines that playing plasticine can improve the fine motor skills of early childhood.

Table 3 Results of the Independent Sample Test

		F	Sig.	T	Df	Sig. (2-tailed)
Cutting	Equal variances assumed	.161	.691	-16.974	38	.000
	Equal variances not assumed			-16.974	37.546	.000
Colouring	Equal variances assumed	.011	.915	-16.583	38	.000
	Equal variances not assumed			-16.583	37.606	.000
Bolding letters	Equal variances assumed	.814	.373	-18.037	38	.000

Creating Objects	Equal variances not assumed			-18.037	36.710	.000
	Equal variances assumed	.052	.821	-14.652	38	.000
	Equal variances not assumed			-14.652	37.901	.000

The result of testing the second hypothesis that there was an increase in fine motor skills before and after playing clay will be presented below, however, it is necessary to perform homogeneity and normality tests.

The Homogeneity Test

Table 4 The Homogeneity Test of Variances

	Levene Statistic	df1	df2	Sig.
Cutting	2.928	1	38	.095
Coloring	.000	1	38	1.000
Bolding letters	1.003	1	38	.323
Creating Objects	.090	1	38	.766

The variables of cutting, coloring images, bolding letters, and creating objects were all seen as homogeneous.

The Normality Test

Table 5 The One-Sample Kolmogorov-Smirnov Test

	Cutting	Coloring	Bolding letters	Creating Objects	
N	40	40	40	40	
Normal Parameters ^{a,b}	Mean	5.23	5.50	5.40	5.43
	Std. Deviation	2.939	2.837	2.925	2.899
Most Extreme Differences	Absolute	.250	.211	.269	.182
	Positive	.250	.211	.269	.174
	Negative	-.152	-.211	-.213	-.182
Kolmogorov-Smirnov Z	1.584	1.334	1.702	1.148	
Asymp. Sig. (2-tailed)	.013	.057	.006	.143	

The variables of cutting, coloring images, bolding letters, and creating objects were all normal as depicted in Table 5.

The result of testing the second hypothesis stating there was an increase in fine motor skills between before and after playing clay was shown in Table 6. There was a difference in the skill of cutting, coloring, bolding letters, and creating objects similar to the original with the significance of $P < 0.05$.

The result of testing the second hypothesis stating there was an increase in fine motor skills between before and after playing clay was shown in Table 6. There was a difference in the skill of cutting, coloring, bolding letters, and creating objects similar to the original with the significance of $P < 0.05$.

Table 6. The Independent Sample Test

		F	Sig.	t	df	Sig. (2-tailed)
Cutting	Equal variances assumed	2.928	.095	-16.809	38	.000
	Equal variances not assumed			-16.809	31.617	.000
Colouring	Equal variances assumed	.000	1.000	-17.958	38	.000
	Equal variances not assumed			-17.958	38.000	.000
Bolding letters	Equal variances assumed	1.003	.323	-24.410	38	.000
	Equal variances not assumed			-24.410	34.470	.000
Creating Objects	Equal variances assumed	.090	.766	-16.179	38	.000
	Equal variances not assumed			-16.179	37.916	.000

5. Discussion

Fine motor skills need to be stimulated by practicing fingers using plasticine and clay. Fine motor skills of cutting, coloring patterned images, bolding letters, and creating objects resembling the original object have not developed properly. Therefore, it is necessary for children to be trained to develop the skills optimally. Through the activity of playing plasticine and clay by which a child trains squeezing, pressing, cutting, and forming objects according to his imagination will cause the fingers to stretch. Fine motor activity is an activity related to the proper, flexible, and efficient movement of the fingers in performing it. Fine motor skills are basic skills that are indispensable in daily life and have a positive impact on one's later progress. Associated with fine motor enhancement through playing plasticine and clay, it occurs due to flexibility, and efficiency of the fingers increased.

The improvement of children's fine motor skills is supported by the use of proper play stimulation media namely with plasticine and clay, as stated by Venetsanou and Kambas [7] that children whose time is spent by playing playdough have very significant motor development, especially if supported by the appropriate methods and equipment. Play is a necessity for children so it is difficult to distinguish between work and learning. Play is a child activity done throughout the day. Through play, the child can develop coordination between the eyes, hands, and objects of tools. Upton [22] mentions that play allows the child to develop his fine motor skills, so that his hands are more flexible to draw, colour, and create things. Play can increase the stimulation rate of fine motor development of children, as Macintyre [23] affirms that play child centered learning should be an activity based on the children's maturational stage and natural desires and to encourage development (remembering this has four fields, i.e. social, emotional, motor and intellectual). Play strongly supports growth and development, and facilitates to improve knowledge and motor skills.

The development of fine motor skills needs stimulation requiring the classification treatment of imitation, manipulation, precision, articulation, and maturationalization. Those five categories are the basis

for fine motor development stimulation in early childhood. Motor development has several important factors that influence each other such as learning process, individual opportunities, situational factors, and models of stimulation. Play at present days is still the most appropriate method to stimulate the development of children. Through playing naturally, the child becomes happy so that it is able to develop organic, neuromuscular, social and emotional interperative systems. Lopez, Santos & Pereira [3] state that children's motor skill development incorporates many body systems, including sensory, musculoskeletal, cardiorespiratory, and neurological systems. Accordingly, Semoglou, alevriadou & Tsapakidou [24] mention that early childhood education emphasizes the significance of fine motor tasks and the use of learning aids, and Spanaki [25] argues that the fine motor intervention program had a positive effect upon the graphomotor skills of kindergarten and early elementary school children. Various activities will be very beneficial for children who experience delays, this is strengthened by the results of the study by Robinson, et al. [26] confirming that a mastery climate is an innovative and exceptional pedagogy for teaching children motor skills and encouraging physical activity.

Playing with plasticine and clay is a physical activity that can stimulate the development of neuro muscular, organic, aesthetic and motor plan. The development of neuro muscular involves the work of nerves and muscles in which each activity needs definitely muscle work. Muscles can work because of the nerves that invade them, without nerves controlling it, movement will not occur. Organic development is related to the development of the functional system of the body which includes the development of strength, endurance, agility, flexibility, and speed that will increase with frequent physical activity. The development of this organic element is very decisive in the quality of the skills, without the presence elements of adequate physical ability then the skills will not be good. Aesthetic development displays the beauty of motion, flexibility or what is often referred to as the art of motion. The beauty of the movement is not only enjoyed by selves but also can be enjoyed by others. Aesthetic movement is realized when a person has already the coordination of nerve and muscle work and has good joint flexibility. The development of motor plan is the ability to develop techniques, tactics and strategies in playing plasticine as well as playing clay. Mastery of basic techniques greatly helps the mastery of the next motions. Lack of mastery of basic techniques makes it difficult in motion mastery.

Playing is the best way to stimulate a child's delicate motor development because the child's world is the world of play. Playing and practicing are not two opposite things. Practicing and playing are the most effective way of developing motor skills, even the muscles will be more effective when trained by doing something in activity. Playing can develop multilateral capabilities so that it greatly helps the laying of basic competencies after adulthood. Playing has the meaning of doing fun activities to be able to gain satisfaction of defeating yourself and others.

6. Conclusion

Playing with plasticine and playing with clay can both be used to stimulate the fine motor development of early childhood. This was depicted in the results of the present research. Both groups had an increase in their fine motor skills after treatment. Before the treatment, the average fine motor skills were low, this can be seen from the precision in cutting, coloring patterned images, thickening letters and making object similarities very low and even almost impossible and after being treated in the form of playing with plasticine and playing with clay there was a significant improvement. When compared between playing with plasticine and playing with clay, the results show no significant difference in both treatments in improving the fine motor skills of early childhood.

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