



Improving Fine Motor Skills of Children Using Eggshell Collage Media

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Fine motor skills are needed by children when entering elementary school. The skills help them to be active in class. However, many children do not have fine motor skills, so they have difficulty participating in classroom activities. This is presumably due to the lack of stimulation at home or in early childhood education institutions. This study investigated the effectiveness of improving fine motor skills for children aged 5-6 years using eggshell collage media. The study used a quasi-experimental approach with a pre-test and post-test design. The participants of this study were 15 children aged 5-6 years at early childhood education institutions selected using a purposive sampling technique. Data analysis used paired sample t-test. The results showed that before the action (pre-test), the researchers categorized children's fine motor skills as they started the growing phase; after the action (post-test), fine motor skills were categorized as developed as the expected phase, and there was an influence of eggshell collage media. With a Significant $0.000 < 0.05$, it is recommended that parents and teachers implement eggshell collage media to improve the children's fine motor skills.

Keywords: eggshell collage, media, fine motor skills, children, elementary school

INTRODUCTION

Motor skills in children are divided into two types; fine and gross. Children's development of motor skills must occur optimally, both gross and fine motor skills

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(Chalkiadaki, 2018; Haenilah et al., 2021). One of the aspects of growth and development in children is basically in terms of physical aspects (gross motor and fine motor). One skill that supports children in adjusting to academic tasks while attending the elementary school level is the mastery of fine motor skills (Souto et al., 2020). This is because children in elementary school will be taught many skills, such as writing skills (McGlashan et al., 2017). Because mastering fine motor abilities are so important, children must be stimulated early through varied exercises and play activities (Shonia et al., 2020).

Ungerleider et al. (2002) claim that learning sequential finger movements produces a slowly evolving reorganization within the primary motor cortex for weeks, followed by more dynamic, rapid changes in the cerebellum, striatum, and other motor-related cortical areas for days. There is also a brief overview of the neurophysiological and psychophysical evidence for motor skill consolidation, as well as a working hypothesis for their brain foundation in motor sequence learning. Adapted motor skills training during the compulsory school years is a feasible way to improve both motor skills and school performance and the proportion of children who qualify for upper secondary school (Ericsson & Karlsson, 2014; Martínez-Valdivia et al., 2021). This is because children cannot determine which are bad and good for them during the growth and development phase; therefore, a sound stimulus is needed from the start (Ismaniar, 2020).

Regarding authorship and control over judgment in the early years, children and families are traversing rugged terrain, where the environment promotes youngsters to create a child-led creative pedagogy; however, they do not simultaneously provide fantastic experiences (Blaisdell et al., 2021; Handrianto et al., 2021). It is a period in which youngsters fall behind to speed up their growth and development and execute control tasks (Carlsen & Clark, 2022). The activation stress located in the trunk area of the brain is also responsible for the fundamental organ function of settings. Activation stress is a reaction to stimulus changes and occurs without conscious consideration (Kesäläinen et al., 2022). Children's growth and development will be good if there is a stimulus to them that is given from an early age. Building and maintaining social connections is a fun and fundamental thing in children's daily life to build their relationships and social networks (Bateman & Church, 2017; Loukatari et al., 2019).

Idsøe et al. (2021) claim that children need fine motor development to create a learning environment that maximizes growth opportunities. Fine motor development for children is an activity in controlling coordination that involves small muscle groups to be used when cutting, catching balls, drawing, throwing, and grasping (Primayana, 2020). This fine motor development involves the child's hand-arm coordination, foresight, accuracy, and dexterity, which are related to their five-sense development.

The five senses are the most important for entering knowledge into the child's brain. Therefore, the five senses are essential in developing various potentials in early childhood. So that all five senses in children should be allowed to become the primary tool in learning through games that use the senses of seeing, hearing, smelling, and

touching (Arwin et al., 2022). Children exhibit entrepreneurial behaviour in social interactions with multiple or group activities (Uslu, 2020; Agustin et al., 2021).

However, based on the observations made by researchers at the Early Childhood Education Institution named Pendidikan Anak Usia Dini (PAUD) Mekar Sari Air Tawar Barat Padang with 17 students on August 9, 2021. The low level of motor development of children at PAUD Mekar Sari is caused by many factors, including inadequate facilities, teachers that are not creative, and uninteresting media that can make children bored with learning.

The presence of learning media is one of the most important reasons children's motor skills do not develop as quickly as they should. This is because children aged 5–6 are still at the stage of concrete pre-operational development (Ismaniar, 2020). One of the characteristics of children at this age is that they think at a symbolic level and are not yet able to use cognitive operations. It can be interpreted further; children cannot use logic, change, combine, or separate ideas or thoughts. So, the existence of learning media that attracts their attention will be able to generate motivation to learn and avoid boredom (Nengsih et al., 2022). Because of that, researchers provide a solution by creating a new learning media in the form of eggshells.

Previous researchers have carried out efforts to stimulate children's fine motor skills. However, the media supply is frequently rather costly, for example, utilizing computer media (Shonia et al., 2020) and tablet media (Souto et al., 2020). As a result, the magnitude of expenditures involved leads stimulation to be carried out only by specific groups, economically capable families. On the other hand, eggshell is a medium that is very easy to obtain by everyone; the price is low, children like it, and eggs also contain high nutrition. So, the use of eggshell media for collage games for early childhood becomes very effective, efficient, and environmentally friendly. This is why researchers are interested in researching the improvement of children's fine motor skills using eggshell collage media.

Fine Motor Skills of Children

Every child is born with different intelligence potentials that will grow well if the environment helps them. These various intelligence potentials are often known as "multiple intelligences." Howard Gardner in Ismaniar (2020). One of the intelligence potentials that children have is the potential for motor intelligence. The potential for motor intelligence can be seen from the physical aspects of the child; if the child is physically healthy, then the child's motor intelligence can be well developed, as shown by motor skills and intelligence in various daily activities.

Motor intelligence includes both fine and gross motor skills; both bits of intelligence is very useful for children's growth and health. Related to fine motor skills, Sumartini (2011) explains that fine motor development is a child's ability to use small muscles or certain parts of the body. Its development is influenced by the opportunities each child has to learn and practice. Mosby conveyed the same thing that motor skills are a combination of fine motor skills such as accuracy, dexterity, visual-motor integration, and upper arm coordination and gross motor skills, including general body movements

such as jumping, running, balancing, strength and coordination (Lucas et al., 2016). Children's skills shown from dexterity, accuracy, integration of hand movements, foresight, and upper arm coordination are fine motor skills. Abessa et al. (2016) also emphasized that fine motor is the movement of hand-eye coordination and manipulation of small objects. Based on these various references, it can be concluded that fine motor skills are the ability to coordinate the eyes and hands in manipulating small objects. So, eye and hand coordination in fine motor skills is limited to the movements made by the fingers and wrists.

Furthermore, fine motor is part of sensorimotor activities involving hand-eye coordination in performing sequential, precise, fast, imitative, and tracing-like movements. Another view comes from Robert & Brett, quoted in "Convergent validity of two motor skill tests used to assess school-age children," stating that fine motor skills are abilities that include hand manipulation and grasping objects and involve the use of small hand muscles to control movements (Lane & Brown, 2015). Fine motor activity is a limited movement that involves the use of small muscles. The purpose of using small muscles is to control the various kinds of motion manipulated by the body parts of the hands.

Early childhood learning media

Learning processes and activities in early childhood have different characteristics than those in adulthood. Methods, approaches, or learning strategies that have been effectively used in adults are not necessarily effective in early childhood (Omiyefa, 2021). This is partly due to the stages of developing children's thinking skills, which are still at the pre-operational concrete stage (Kumas, 2021; Hizriani et al., 2022). It was explained that at this stage of the development of concrete pre-operational abilities, children have limited thinking and cannot grasp the knowledge, information, or abilities being taught if certain symbols or forms do not assist them. This condition causes the need for certain objects or media that educators can use as intermediaries to stimulate children.

The existence of media that is creatively made by educators and varied in color and shape will stimulate children to be interested and want to persist in learning activities designed by educators (Koçyigit et al., 2020; Barakat, 2022). The child's interest in learning will certainly make the stimulation goals carried out well achieved. In addition, certain things must be considered in choosing media to stimulate children: (1) It is better to pay attention to the safety of the media for children and not have it be harmful to their health; (2) Media should be easy to obtain (not difficult to find), preferably those in the environment; and (3) It is economically accessible for all people to obtain. By paying attention to this, it can be ensured that children's fine motor skills can be stimulated optimally.

Eggshell Collage Media

Egg shells are waste produced after people take their contents for food or medical and other needs. In Indonesia, eggs are a type of food that the public prefers, in addition to their high nutritional content and relatively inexpensive prices. Almost all levels of

society use eggs daily, so getting eggshells is very easy (Astawa & Astuti, 2020). The research team noticed that eggshells have several advantages when learning media in early childhood, especially for developing children's fine motor skills. First, egg shells have a texture that is neither too rough nor too smooth so that it does not harm a child's fingers when they hold them. Second, eggshells are easy to divide into small parts but do not break easily, so they can train children's fine motor skills when they make collages. Third, egg shells, when used for collage material, can last a long time, thus giving children a feeling of satisfaction and pleasure when they see their work. Fourth, egg shells are easy to get because they are one of the ingredients everyone likes.

As stated early, media plays significant role in early childhood education because children can learn, develop and improve their motor skills by using it. The objective of this study is to investigate the effectiveness of using eggshell collage media in the development of fine motor skills in children aged 5-6 years.

METHOD

Research Design

In this study, researchers used a quantitative approach to the quasi-experimental method of Pre-test post-test one-group design (Creswell, 2012). The observation was conducted twice before and after the experiment in a group was carried out.

Participants

In this study, the researchers utilized a purposive sampling technique, and as many as 15 samples were selected. The reason for using this technique is that the research objective was to determine the effectiveness of the learning medium in improving children's fine motor skills, so the children who were sampled experienced problems in fine motor development. Based on an initial study at the Mekar Sari early childhood education institution, there were 42 students, but those selected were children who experienced delays in fine motor development. These 15 samples were composed of 5 to 6 years old. The following table 1 has detailed information about the participants:

Table 1
Participants

No.	Gender	Age	Number
1.	Male	5-6 years	Six child
2.	Female	5-6 years	Nine child
TOTAL			15 child

Source: Researcher's Observation

Measurements

Techniques and data collection are rubrics, namely evaluations used by researchers to ensure quality ability child age early. The rubric reveals 15 questions prepared based on the following steps; define a variable, define a sub-variable, determine research indicators, and determine statements by predetermined indicators. The researcher used expert judgment services from early childhood education experts to ensure the

instrument's validity. Two experts were involved in the expert judgment: experts in early childhood education and experts in physical-motor development. From the two experts, it was found that the recommendations for the instruments that were made were stated to be valid and feasible to use.

Ethical Approval

Before participating in the study, all individuals gave informed permission under their parents' consideration. The study followed the Helsinki Declaration, and the Health Research Ethics Committee approved the protocol at Universitas Negeri Padang in West Sumatra Province, Indonesia.

Research of Hypothesis

The hypothesis put forward in this study is; "There is a significant difference between children's fine motor skills before and after using Eggshell Collage Media".

Data Analysis

Collected studies with cognitive outcomes prefer to use quantitative and quasi-experimental approaches (Lai et al., 2018). This quantitative research data can be in the form of numbers and then analyzed with statistics. Data analysis techniques used In this study, researchers used qualitative and quantitative analysis. The researchers obtained the data analysis technique by distributing the results of the rubric sheet. Calculate the success of the data using the formula according to (Lai et al., 2018) below:

$$P = \frac{F}{N} \times 100\%$$

Information:

P = Yield Percentage

F = Total score of children

N = Total number of children

100 = Fixed number

Furthermore, it was converted on a value scale with a range of 0-100 to assess the implementation of the author's activities. The conversion can be observed through the following table:

Table 2

Conversion score

Value Interval	Information
1% - 33%	Undeveloped
33% - 67%	Start Growing
67% - 100%	Developed as Expected

Source: (Lai et al., 2018)

After the intervention, the researchers analyzed the data obtained to determine the magnitude of the difference in fine motor skills in children. The data obtained can be used as a basis for testing the t-test. The t-test was used to examine the difference in fine motor abilities of children before and after being provided with the eggshell collage

learning tool, which was initially checked for normality using the Shapiro-Wilk test because the sample size was less than 30 persons. The data distribution proved normal in both groups because the sig value was > 0.05. In order to evaluate the hypothesis, a paired sample t-test was conducted using a computerized SPSS version 24.0 program under the following conditions:

If the value of sig < 0.05, it means that Ha is accepted

If the value of sig > 0.05, it means that Ha is rejected.

FINDINGS

The research data describes the fine motor skills of children aged 5-6 years before being given action (pre-test) through eggshell collage learning media. The data obtained are described through a frequency distribution. For more details, it can be observed through the following description:

The researchers observed the description of the results of the level of fine motor skills in children before they had been given intervention (pre-test) using eggshell collage learning media. The results are shown in the following table:

Table 3
Statistics of fine motor skills before given action (pre-test)

N		Mean	Std. Error of Mean	Median	Mode	SD	Variance	Range	Min	Max	Sum
Valid	Missing										
15	0	15.87	.487	16.00	18	1.885	3.552	6	12	18	238

Table 3 above shows that the level of fine motor skills in children before being given action (pre-test) through eggshell collage learning media in 15 respondents obtained a mean value of 15.87, a median of 16.00, a mode 18, a standard deviation of 1.885, minimum value 12 and maximum 18. Based on these data, it is known that the distribution of data on the development of children's fine motor skills is normal. However, the scores obtained by children are still low; this is indicated by the average score of children's motor skills, which is still at 15.87, while the range of scores for children's motor skill achievement only ranges from 12 to 18. Then the mode score is at number 18. So it can be concluded that the pre-test results of children's fine motor skills are still low, and efforts are needed to improve them.

The frequency distribution of the level of fine motor skills in children before the child is given action (pre-test) through eggshell collage media can be observed in table 4 below:

Table 4
Distribution frequency level of fine motor skills on children before given action (pre-test) through eggshell collage media

Score	Category	f	%
67%- 100%	Developed As Expected	0	0
33%- 67%	Start Growing	15	100
1%- 33%	Undeveloped	0	0
Total		15	100

Based on Table 4 above, it is explained that all 15 children with the most exemplary motor skills before being given action (pre-test) through eggshell collage media are in the Start Growing category. The spread of values based on the frequency distribution can be observed through the following diagram:

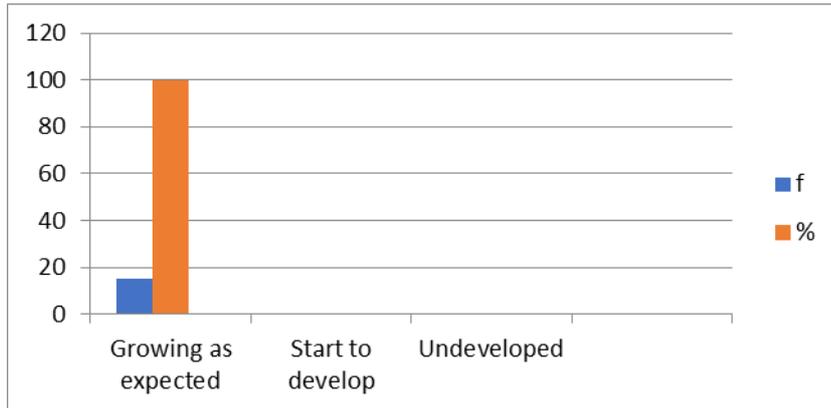


Figure 1
Ability motor fine before action

Descriptive results of the level of fine motor skills in children after being given an action (post-test) through eggshell collage media can be observed in the following table:

Table 5
Statistics ability counting on children after given action (post-test)

N		Mean	Std. Error of Mean	Median	Mode	SD	Variance	Range	Min	Max	Sum
Valid	Missing										
15	0	23.87	.696	25.00	26	2.696	7.267	8	19	27	358

Based on Table 5 above shows that the level of fine motor skills in children after had been given an intervention (post-test) through eggshell collage learning media in 15 respondents obtained a mean value of 23.87, a median of 25.00, mode 26, a standard deviation of 2.696, minimum value 19 and maximum 27. The data presented shows that the distribution of data on the development of children's fine motor skills is normal. Furthermore, the data shows that the average score for children's motor skills is high, at 23.87, while the range of scores for children's motor skills ranges from 19 to 27. Meanwhile, the mode score is 26. So it can be concluded that the post-test results of children's fine motor skills after using eggshell collage media were very high. The data in Table 5 also proves that using eggshell collage media is effective for learning activities to improve children's fine motor skills.

The frequency distribution of the level of fine motor skills in children before the child was given an intervention (pre-test) through eggshell collage media can be observed in table 6 below:

Table 6
Distribution frequency level of fine motor skills on children after given action (post-test) through eggshell collage media

Score	Category	f	%
67%- 100%	Developed As Expected	15	100
33%- 67%	Start Growing	0	0
1%- 33%	Undeveloped	0	0
Total		15	100

Based on Table 6 above, it is explained that all 15 children's fine motor skills were in the Developed As Expected category after being given an action (post-test) through eggshell collage media. The spread of the above values based on the frequency distribution can be observed through the following diagram:

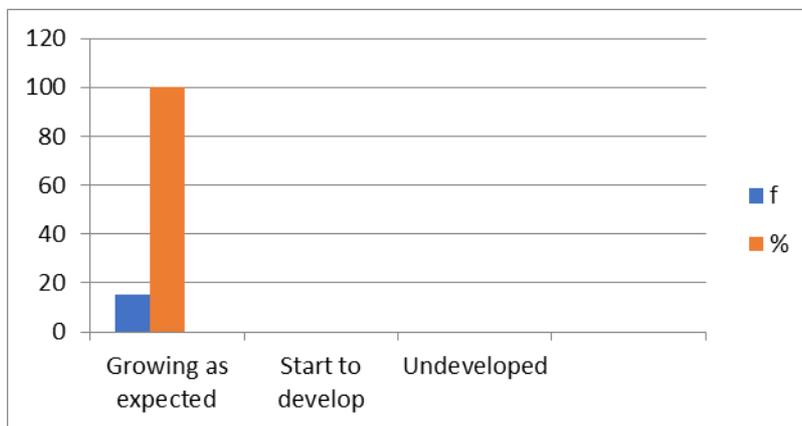


Figure 2
Ability fine motor skills after action

Test Requirements Analysis

Normality Test

The normality test aims to determine whether the data is normally distributed. Testing the normality of the distribution of learning outcomes or research data using the Shapiro-Wilk test because the sample is <30 people. The results of normality can be observed in table 7.

Table 7
Normality test

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistics	df	Sig.	Statistics	df	Sig.
Pretest	.193	15	.138	.901	15	.100
Posttest	.196	15	.124	.893	15	.074

Table 7 shows that the Asymp.Sig. (2. tailed) value for the pre-test result is 0.100, and the post-test result is 0.074. Both of these numbers are worth > 0.05 , so it can be said that the two groups of data are normally distributed.

Hypothesis Test

Furthermore, hypothesis testing determines children's fine motor skills before and after being given action (post-test) through eggshell collage media.

Table 8
Test results paired sample t-test

Pairs	Pretest - Post-Test	Paired Differences					T	df	Sig. (2- tailed)
		Mean	SD	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
1		-8,000	1,813	.468	-9.004	-6,996	-17.093	14	.000

Based on the analysis conducted using the paired sample t-test, the sig value was $0.000 < 0.05$, so it can be said that eggshell collage media statistically contributes to the fine motor skills development of children aged 5-6 years at PAUD Mekar Sari.

DISCUSSION

The research results show that the use of eggshell collage media is effective or positively influences the development of children's fine motor skills. This is the case because the media used in the stimulation process is suitable and interesting for children, and the learning process created by researchers during the research is in accordance with the child's age and developmental tasks.

Various types of research conducted by researchers in early childhood education show that the development of gross and fine motor skills requires the creativity of educators or their parents to stimulate them. One form of educator or parent creativity can be seen in selecting suitable learning media and sufficient opportunities and time to practice. The more interesting the media used and the more time or opportunities given to children to practice, the more motor skills each child will develop. On the other hand, uninteresting learning media will make children passive, disinterested, and lazy to move, so their motor skills are not stimulated properly.

The development of children's motor skills should be a concern of all educators from an early age because motor skills greatly support children's academic achievement when

carrying out school activities. The importance of the existence of learning media is very important. In supporting the development of various aspects of intelligence in early childhood, every educator needs to pay attention to the characteristics of this early childhood. Children given developmental stimulation early will experience differences from other children (Utami et al., 2018). The development of fundamental abilities like tossing a ball, jumping over an object, jumping rope, catching a ball, etc., comes gradually as one's awareness of motion and movement skills mature (Lyoka, 2007). McGlashan et al. (2017) claim that children spend most of their school day engaged in manual dexterity tasks. If children have difficulty with their manual dexterity skills, it can have a consequential effect on their academic achievement.

Seventy-eight children who are usually developing, aged between 8 and 10, were tested at their school on the Battery Pre-Intervention Movement Assessment for Children (MABC) and the wiretapping task. Twenty-eight of these children volunteered to be randomly allocated to an intervention or control group. Children in the intervention group chose two online games to play at home for four weeks, whereas children in the control group were not given these games to play (Pramono et al., 2021). The intervention and control groups were then retested on the MABC manual dexterity and tapping task. Children in the intervention group significantly improved their manual dexterity scores on the MABC compared to the control group. On average, all children learned the sequence of beats; However, there were no group differences, and the intervention did not affect the tapping task. These findings have substantial implications for adopting publicly available, simple-to-implement, enjoyable, and participatory treatments to assist youngsters in improving their manual dexterity.

Strategies that facilitate development are effectively sensitive to children's level of understanding, they adapt to the different needs and interests of children, they are contingently responsive to children's signals, they avoid high levels of restriction, and they maintain the focus of attention as needed (Burgers, 2015). Seeing the importance of playing activities for children who are still at an early age, it can be ascertained that playing activities have beneficial values for the development and growth of children. Fukkink's et al. (2017) findings show that early childhood has been implemented with much attention to structural characteristics but less attention to the quality of the process, attention to methods but less attention to professional competence development staff (Nikoçeviq-Kurti, 2023), attention to development skills language children. However, it is not enough focus on developmental domain child age early other, skills counting and development socio-emotional, and level close attention high on segregation than integration children small. The development of basic skills of throwing a ball, jumping over an object, jumping rope, catching a ball, and so on occurs gradually with increased awareness of motion and maturation of movement skills (Lyoka, 2007).

It is crucial to continue the effort of enhancement quality in PAUD to give all children a rich opportunity to develop their full potency (Lines et al., 2022). Based on the results of the present study on the pre-test in terms of fine motor skills of children using eggshell collage media, all children were in the category of starting to growing phase, and there were no children who were in the different phases. This is in line with the

development of children's motoric by Lyoka (2007). While in middle childhood (2-5 years), perceptual-motor development will be limited to laterality, hand-eye coordination, gross motor movement patterns, and shape recognition (Muthukrishnan et al., 2019). This ability increases children's participation in various forms of play involving mainly toys and family members at home and the surrounding environment.

Studies about field psychomotor and skills communication are crucial for children of both ages (Lai et al., 2018). He also stated that fine motor skills are movement tasks that employ many fine muscles or half of the body and are impacted by chances to practice and acquire, such as abilities in moving items in hand, writing, cutting, stacking blocks or other objects, cross out, and so on. Children need Settings together to maintain a positive stress level on the range and can tolerate (Kesalainen et al., 2022). The development experienced by early childhood is a process of learning to be skilled when making movements in their limbs, especially their fine motor skills. Therefore, an appropriate learning process is needed to help the growth and development of children in line with their age. Parents and teachers tend to monitor various developmental phases, with parents studying early childhood development and PAUD teachers observing comparative growth as children reach school age (Idsøe et al., 2021; Hidayat & Arini, 2022; Muhammad et al., 2023).

Based on the results of this study, the level of fine motor skills in children increased after they had been given an intervention (post-test) using eggshell collage media; this was evident in some children developing their fine motor skills. This is proven by creating exciting learning so children can easily catch and act. Children may have to acquire sufficient attention and memory capacities to learn effectively from responsive interactions that require children to distinguish between their speech and subsequent adult speech (Burgers, 2015). Ismaniar (2020) emphasized that parents are figures who take responsibility for their children's lives, especially when their children are still in their early age range. By involving the five senses, it is easy for children to imitate them because children are excellent imitators. One of the characteristics of motor development in children at an early age is being more agile and faster in moving their fingers.

Learning media has a significant role in developing fine motor skills in early childhood. Good learning media is the main focus given by teachers in early childhood. Brinkman et al. (2017) state that (health physical, social competence, language and development cognitive, and communication and knowledge general) is quality observed in class is a predictor of simple and reliable results of development children during child age early childhood in rural Indonesia. Blanchard et al. (2017) and Boateng and Sekyere (2018) found that inadequate visual online control strongly predicts performance on standard measures of movement ability, which are often used to identify developmental movement disorders. This study's visual online control task provides continuous and high-resolution measurement. It is directly comparable between adults and children, which makes it a promising task for further study.

The present results show that children who are poor at aiming and catching are also impoverished at the online control of reaching and grasping. Martzog & Suggate's (2022) current study yields evidence that more media usage relates negatively to fine motor skills development in early childhood. Acknowledging the ubiquitous role of children's fine motor skills in several fields of daily functioning and the broad range of possible activities.

Based on the discussion above, learning media are very important for stimulating early childhood. It takes the creativity of every educator to create various media that are suitable and interesting for children. Furthermore, educators must be sensitive to environmental and economic conditions when presenting learning media. Exploring the surrounding environment, which can be used as a medium to support learning, is of added value to every educator, especially in areas with middle-to-lower levels of economic ability.

CONCLUSION

The results and discussion show that eggshell collage media is a new alternative to improving children's fine motor skills, and we can use it in the classroom. Eggshell collage media improves children's fine motor skills by using actions that make them follow directions and act out the desired movements; besides, it increases their understanding of cause-and-effect relationships through repeated practice. The results of this study indicate that before being given an action (pre-test), children's fine motor skills are categorized as starting to grow; after being given the action (post-test), fine motor skills are categorized as developing as expected, and there is a significant contribution to it by eggshell collage media. So, the alternative hypothesis proposed, "There is a significant difference between children's fine motor skills before and after using eggshell collage media", is accepted. In other words, eggshell collage media is effectively used in developing fine motor skills in children. So, it is hoped that educators will use eggshell collage media to improve children's fine motor skills.

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