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The Effect of Educational Games on Fine Motor Ability For Children Aged 4-5 Years in Kindergarten

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ABSTRACT

Objective: This study aims to know the influence of educational games on the abilities of children 4–5 years old in the garden. **Method:** Design used in study This is a nonrandomized pretest-posttest control design where two groups are group experiments and group control with a quantitative approach. These research subjects are Child Group A at Al Falah Assalam Kindergarten, which has as many as 26 students as class experiments, and Children Group A at Kindergarten Al Falah Darussalam, which has as many as 26 students as class control. Deep data analysis techniques use non-parametric statistics, such as the Mann-Whitney Test. **Results:** This research showed that educational games have influenced young children aged 4-5 years. This is known from the results of the posttest carried out in the control class, where the increase was not significant, like the results of the posttest carried out in the experimental class, which previously carried out treatment activities. **Novelty**: The novelty of this research is using educational games to play in real life so that young children can touch and feel. This educational game can be used to introduce not only letters but also numbers, shapes, and colors.

INTRODUCTION

At the beginning of the age of 4-5 years, based on observations in the classroom, there were 4 out of 13 children who could hold scissors and a pencil correctly. During this period, parents do not accompany their children in fine motor development, so at this age, the children need lots of stimulation or stimuli to support their potential growth and development. Age child early is phase beginning development. The child will determine development in phases next (Al-Harbi, 2019; Courchesne et al., 2020; Drouin et al., 2020; Fegert et al., 2020; Saracho, 2023). Another characteristic is that the early childhood age is in the potential period, where matter is often said to be during the golden age (Rijkiyani, 2022). In current developments, children's aging early must optimize the stimulation of growth and development. The role of parents, teachers, and roles social influence is a fundamental matter (Hammer et al., 2021; Liu et al., 2020; Lorenz et al., 2020; Sethi & Scales, 2020; Šimunović & Babarović, 2020). Children's Education Unit is one form of education implementation based on direction growth and development.

Based on the Regulation of the Minister of Education and Culture of the Republic of Indonesia no. 07 of 2022 concerning Content Standards in Early Childhood Education, room scope early education material on development motor is child age early own power imagination and creativity through exploration and expression thoughts (Alper & Ulutaş, 2022; Kushnir, 2022; Mercan & Kandır, 2024; Ogutu, 2020; Ponticorvo et al., 2020; Richard et al., 2021) and feelings in simple action form and work that can be done generated through ability cognitive.

This research focused on developing motor smoothness through various daily activities as a form of self-development.

Development of motor finches includes smooth movements; for example, fine motor ability controls strong muscles, especially coordination, eyes, and high hands. Examples of motor fine are holding a pen/pencil, moving A stuff, writing, typing, drawing, and so on (Cahyani, 2022). Motor-acceptable children age not early either develop in a way maximum and necessary stimulation (Bondi et al., 2022; Escolano-Pérez et al., 2021; Fajzrina et al., 2022; Johnson et al., 2020), such as method hold lack of pencils Correct matter This need stimulation in various activity learning. Fine motor development has not yet developed optimally since the beginning of children aged 4–5 years. How to hold a pencil incorrectly, writing with your hand without touching the paper, and scribbles that are not thick enough are some examples of problems that occur in early childhood. The right stimulus or stimulation for the issues above is needed to improve this. Educational Games is an educational game . Children age early, using ways or methods or game media in nature educational, so develop Power creativity and cognitive and psychomotor child age early. Educational games are said to be effective if they contain principles as follows: 1) the game must be fun, 2) the Difficulty level must be customized with age, 3) Educational games must be designed in accordance with development, 4) educational games must make of materials are safe and which are not dangerous (Saputra, 2019). This research uses an educational game in the form of *Pohon Aksara*.

Pohon Aksara is made of wood with a height of about 2 cm, and on *Pohon Aksara* are fruits filled with letters and a blank section. The child will use the blank part to write the words or letters requested by the teacher. In the part where there are letters, the child will be asked to cut out the letters determined by the teacher. The procedure for use is as follows: 1) The teacher has filled in the letters or letters of the word, which have then been pasted on the leaf. 2) The child is asked to cut out the letter corresponding to the teacher's instructions and then say it. 3) The teacher asks the child to write down examples of letters or words and then asks him to stick them in the fields that have been provided.

The measurement result used in this activity is when the child understands the instructions that have been given. So, young children enjoy playing by cutting, gluing, and coloring by taking various letters that they like. Therefore, this research will be based on the following: Research Question of this research: Is there an effect between educational games and fine motor skills for children aged 4-5 years in kindergarten?

RESEARCH METHOD

This research is quantitative and uses a True Experimental Design. A nonrandomized pretest-posttest control design is used. There are two groups, namely group class experiments and group control.

Participants

The research subject taken is child Group A in the 2023/2024 Academic Year Early Childhood Education in Waru District, Regency Sidoarjo. Sample in research: 26 students from the then Al Falah Assalam Kindergarten were used as a class experiment, and 26 students from kindergarten Al Falah Darussalam later became class control. This study used a nonrandomized pretest-posttest control design technique with the sample, which was determined through quota sampling until the quota was met.

Data Collection Procedures

Before doing this research, the technique used in the study was observation. Observation is done using a structured method where sheet observation is already determined. Observation This was carried out in 2 different groups with sheet checklists carried out in class experiments and not in class control. Before making observations, the first thing to do is prepare instruments that have been validated and tested. Next, observation activities are carried out to determine young children's condition. The next stage is to conduct pretest activities to determine young children's condition before treatment. The next stage is carrying out posttest activities. This activity was carried out to find out whether the treatment had been given impacted young children. After getting the results of the pretest and post-test scores, the next stage is to analyze the data and draw conclusions about whether educational games have influenced the abilities of young children aged 4-5 years.

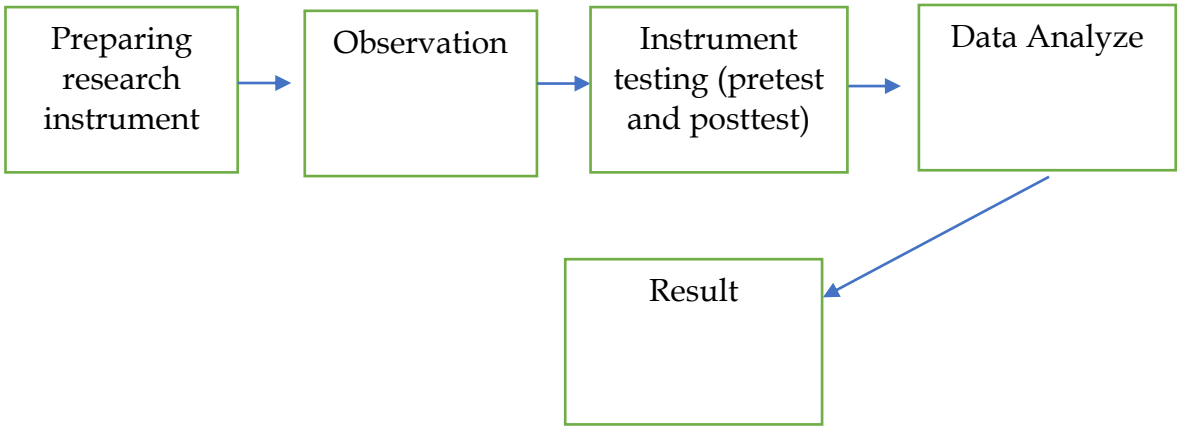

Figure 1. Research procedure.

Figure 1 explains that the first step is to prepare the research instruments so that this research can be appropriate and the data taken can be optimal. The next step is to make observations that are used to create instruments so that the instruments used for data collection are in accordance with those in the field. The third stage is conducting a pretest, providing treatment, and ending with a posttest. Researchers carry out data analysis and will obtain results from the research that has been carried out.

Instruments

The instrument used in this research is the Fine Motor Ability Observation Sheet, which is used by providing a checklist in the value column. An assessment rubric also aims to measure fine motor skills in young children. Checklist values used are numbers 1-4 where in numbers the represents 1= not yet developing, 2= starting developing, 3= developing in accordance hope, 4= developing very well. Table 1 is a sheet of instrument observation ability motor fine.

Table 1. Fine motor ability observation sheet.

Variables	Indicator	Statement Items	Evaluation			
			1	2	3	4

Fine Motor Ability	Cutting	The children cut the letter without going out of the line
	Sticking	The children stick the letter pieces onto the paper neatly.
	Coloring	The children color the letters that have been attached to the paper.

Table 2. Performance rubric of fine motor ability observation sheet.

Variable	Indicator	Rubric Description	Score
Fine Motor Skills	Cutting	The child wants to hold scissors	1
		The child wants to cut out one letter from the character tree, and it is not neat	2
		Children cut out three letters from the character tree.	3
		The child neatly cuts out three letters from the character tree	4
	Stick	The child wants to hold the glue and stick the letter pieces on the paper.	1
		The child sticks one piece of letter on the paper, and it is not neat	2
		Children stick three pieces of letters on their paper	3
		The child sticks the three letter pieces onto the paper neatly.	4
	Coloring	Children want to hold coloring tools such as crayons, colored markers, and colored pencils	1
		Children color one letter using coloring tools not neatly	2
		The child colored three letters using his play tool but still got out of line	3
		Children color four letters using coloring tools without going out of style	4

Analysis

Data analysis techniques used in research This is quantitative, using a true experimental design because it allows researchers to control all extra variables that can influence the course of the experiment. Before analyzing normality and homogeneity, the previous stage takes the average value between the experimental and control classes. This is done to get the difference in numbers between the experimental and control classes. The next stage is to process data from the experimental and control classes, where normality is tested using Kolmogorov Smirnov, with a homogeneity test using Levene Statistics. For the analysis of the hypothesis, the Mann-Whitney Test was used.

RESULTS AND DISCUSSION

Results

Table 3. Grouping results of average motor values fine.

Variable				N	Min	Max	Mean	Std Dev
Pretest	Motor	Fine	Class	26	1.33	2.00	1.74	0.27

Variable	N	Min	Max	Mean	Std Dev
Experiment *Posttest* Motor Fine Class Experiment	26	3.00	3.67	3.32	0.24
Motor *Pretest* Fine Class Control	26	1.33	2.00	1.82	0.23
Posttest Motor Fine Class Control	26	1.67	2.33	2.01	0.24

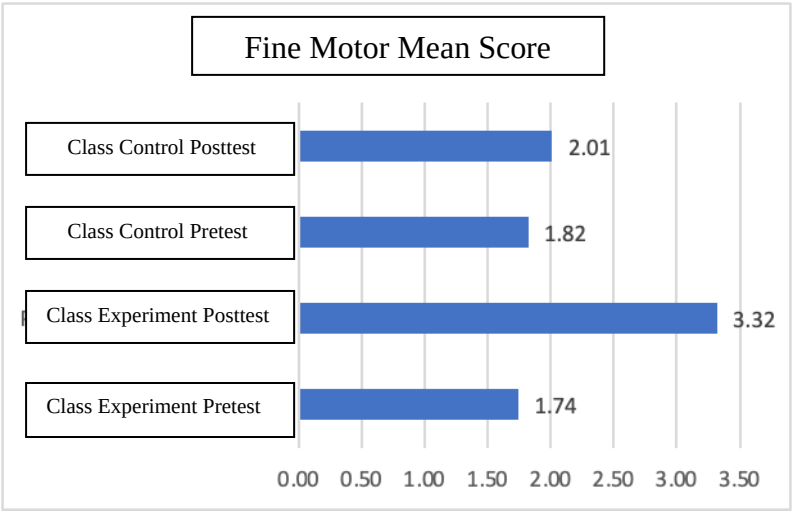

Figure 2. Comparison diagram of average ability values motor fine between-group experiment with group control.

The pretest results of the motor fine class experiment obtained a minimum average value of 1.33 and a maximum average value of 2.00 with an average value of the whole student of 1.74. The results of the post-test motor fine class experiment were that the minimum average value was 3.00, and the maximum average value was 3.67, with an average value for whole students 3.32. Then, for the results of the pretest motor fine class control obtained, the minimum average value is 1.33 and a maximum average value of 2.00, with an average value for all students of 1.82. Next, on the results of the post-test motor fine class control obtained, the minimum average value is 1.67, and the maximum average value is 2.33, with an average value of the whole student of 2.01.

Table 4. Normality test results.

	Kolmogorov-Smirnov [a]		
	Statistics	df	Sig.
Motor Pretest Fine Class Experiment	.28	26	.00
Posttest Motor Fine Class Experiment	.25	26	.00
Motor Pretest Fine Class Control	.35	26	.00
Posttest Motor Fine Class Control	.25	26	.00

a. Lilliefors Significance Correction

Table 5. Summary of data normality test results.

Variable	Sig.	Information
Motor Pretest Fine Class Experiment	0.00	Abnormal
Motor Posttest Fine Class Experiment	0.00	Abnormal
Motor Pretest Fine Class Control	0.00	Abnormal

Variable	Sig.	Information
Motor Posttest Fine Class Control	0.00	Abnormal

The normality test variable is done using the *Kolmogrov-Smirnov* test. The criteria for reception normality are: If mark significance results in a calculation bigger than α = 0.05, then its distribution is normal; otherwise, if smaller than α = 0.05, then its distribution is said to be abnormal.

Tabel 6. Test of homogenity pretest and posttest result.

Fine Motor Pretest			
Levene Statistic	df1	df2	Sig.
.86	1	50	.35
Fine Motor Posttest			
Levene Statistic	df1	df2	Sig.
.00	1	50	.97

Table 6 shows that on the results of post-test literacy of the data, the variance is not homogeneous because the significance is smaller than 0.05 ($p<0.05$). Meanwhile, for other variables, because they have a mark significance more considerable than 0.05 ($p>0.05$), the resulting variance is already homogeneous.

After getting normality and homogeneity test results, there are results in the normality test, all No distributed normally, and in the homogeneity test, there are results that some are not homogeneous, so for analysis using non-parametric tests, namely the Mann-Whitney test. Nonparametric statistics are free distribution and testing assumptions and do not include any form of distribution of population parameters (Annisak, 2024). Mann Whitney test was done to determine if educational games influence the ability of children 4-5 years old in kindergarten.

Table 7. Pretest score results in motor fine Npar test mann whitney.

Ranks				
	Group	N	Mean Rank	Sum of Ranks
Motor Pretest Fine	Experiment	26	24.54	638.00
	Control	26	28.46	740.00
	Total	52		

Table 8. Statistical results of *pretest* scores fine motor.

Test Statistics [a]

	Motor Pretest Fine
Mann-Whitney U	287.00
Wilcoxon W	638.00
Z	-1.02
Asymp, Sig, (2-tailed)	0.30

a Grouping Variable: Group

From the Mann-Whitney U test value in Table 7, it can be seen that the output is a two-tailed value on the average motor pretest score of 0.304. The resulting sig value is bigger than 0.05 ($p>0.05$), which is significant. No, There is a difference in the mean motor pretest score between the group experiment and the group control.

Table 9. Posttest score results in motor fine Npar tests Mann-Whitney test.

Ranks				
	Group	N	Mean Rank	Sum of Ranks
Posttest Motor Fine	Experiment	26	39.50	1027.00
	Control	26	13.50	351.00
	Total	52		

Table 10. Posttest score statistical results motor fine.

	Posttest Motor Fine
Mann-Whitney U	.00
Wilcoxon W	351.00
Z	-6.31
Asymp, Sig, (2-tailed)	.00
a Grouping Variable: Group	

From the Mann-Whitney U test value in Table 9, the output can be seen where the Sig—2-tailed value on the average posttest score motor fine of 0.000. Because the resulting sig value is smaller than 0.05 ($p<0.05$), it is significant that there is a difference in posttest average score motor fine between the group experiment with group control. This matter proves hypothesis the second, which reads: "There is an influence educational games on abilities motor gentle on children aged 4-5 years in Kindergarten" has proven.

Discussion

Based on the results of the testing hypothesis, it was proven that influence educational games influence tree script to ability literacy in children ages 4-5 years in kindergarten were tested Try it in Waru District, Regency Sidoarjo. Educational Games from Tree script have been made to fulfill the needs of problem motor finches. Activity Study teaches No free with the name of the device learning, one of them namely learning media (Juniarti et al., 2021). Designed game For objective education, normally called game education, created special. To guide and direct the learning process of children early by choosing lessons in a way that carefully improves the clarity of explanation concepts and offers activity development skills, games can, in a way, effectively push the development of thinking critically and ability solution problems in role and context particular (Adipat et al., 2021; Chang et al., 2020; Gunawardena & Wilson, 2021; Mao et al., 2021; Tang et al., 2020). Games created with careful potential offer opportunities for practice and development.

Implementation A game education is done based on problem motor subtle things that happen to children early so that the need is sharpened to support the flower child with good and not bad. There are obstacles in the golden age (Lasmi, 2024) and, of course, the development of the child furthermore. The role of parents in nurturing and coaching the growing flower child from early (0-5 years) or period gold is very important and strategic.

More children Like to study with element games. Through games, kids can study lots of matter Because with playing, children feel happy and able to focus longer (Behnamnia et al., 2020; Junaedah et al., 2020; Parrott & Cohen, 2020; Stucke et al., 2022). Environment learning that is diverse and rich in stimulation is essential For supporting the development of children (Hashanah, 2024). Teachers play a crucial role in achieving optimal development of one's child's age early because power educators are one

interact environment directly with the child (Erika, 2024). Researchers hope to develop this research by using various educational games. So, other educational games can be used to develop various abilities in early childhood. This ability is not only in fine motor skills but also in other abilities.

CONCLUSION

Fundamental Finding: Educational games influence motor coordination in children 4-5 years old in kindergarten. Researchers used the fine motor skills of early childhood as the basis for their research. because at the age of 4-5 years, early childhood fine motor skills are not yet well formed. So, this educational game is one answer to developing the fine motor skills of young children. The basis of this research is that educational games have influenced early childhood fine motor skills and that teachers can apply this to their students. Based on the results of the hypothesis testing above, it is proven that the educational game in the form of a character tree for children aged 4-5 years old in kindergarten tested in kindergartens in Waru Sidoarjo sub-district had a significant influence. This educational game, a *Pohon Akasara*, has been created to answer children's needs regarding fine motor skills in early childhood. **Implication:** The findings in this research have implications for early childhood educators that are of great value so that they can support the teaching process. This research uses media that educators can use according to their needs to increase their interest in learning. **Limitation:** There are many obstacles in conducting this research, including insufficient funding. The times those carry out the treatment on samples are very limited, so the results are low. **Future Research:** This research was carried out using the letters A to Z to continue research on literacy abilities. However, the researcher proposes that other researchers use other forms of images on the character tree, which can be used to develop cognitive and social-emotional abilities in early childhood development.

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