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The Effect of Playing Number Sticks to Improve Numeracy Skills in Early Childhood in PAUD Ar-Rohman

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Abstrak

Anak merupakan individu yang unik dan mempunyai kekhasan kognitif, sosial, emosional, bahasa, fisik, dan seni yang merupakan ciri-ciri yang mengalami proses perkembangan yang sangat pesat. Masa ini merupakan masa yang sangat mendasar bagi kehidupan selanjutnya. Oleh karena itu, usia nol hingga enam tahun merupakan masa emas (golden age). Tujuan penelitian ini adalah untuk mengetahui pengaruh permainan tongkat angka terhadap keterampilan berhitung pada anak usia dini dan apakah bermain tongkat angka meningkatkan keterampilan berhitung pada anak usia dini PAUD Arrohman. Penelitian di bidang ini sering kali menggunakan studi lapangan. Desain satu kelompok yang serupa dengan yang digunakan dalam studi pra-eksperimental digunakan dalam penelitian ini. Penelitian ini menggunakan teknik kuantitatif. Berdasarkan analisis statistik uji t berpasangan, penelitian ini diperoleh thitung sebesar 63,400 dan ttabel sebesar 2,096. Karena 63,400 lebih dari 2,069, dan tanda (2-tailed) adalah $0,000 < 0,005$, maka hipotesis nol (H_0) ditolak dan hipotesis alternatif (H_a) diterima. Dengan nilai R-squared sebesar 0,750 menunjukkan bahwa penggunaan tongkat bilangan (X) berpengaruh signifikan terhadap kemampuan berhitung siswa PAUD (Y). Kedua variabel penelitian diyakini memiliki keterkaitan yang signifikan. Nilai koefisien determinasi (KD) atau R-squared diperoleh sebesar 0,562. Artinya X sebagai variabel bebas memberikan kontribusi sebesar 56,2% terhadap Y sebagai variabel terikat. Sedangkan faktor lain yang tidak dimasukkan dalam penelitian menyumbang 43,8% sisanya.

Kata Kunci: *Stick Angka, Kemampuan Berhitung, Anak Usia Dini.*

Abstract

Children are unique individuals and have special cognitive, social, emotional, language, physical, and art that are characteristics undergoing a very rapid development process. This period is a very fundamental time for the next life. Therefore, the age of zero to six years is the golden age. The purpose of this study was to determine the effect of number stick games on counting skills in early childhood and whether playing number sticks improves counting skills in early childhood PAUD Arrohan. Research in this area often makes use of field studies. A one-group design similar to that utilized in pre-experimental studies was used in this study. This research employs a quantitative technique. Based on the statistical analysis of paired t-tests, this research found that the t-count was 63,400 and the t-table was 2.096. Since 63,400 is more than 2,069, and the sign (2-tailed) is $0.000 < 0.005$, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted. With an R-squared value of 0.750, this demonstrates that using number sticks (X) significantly impacts early childhood education students' counting abilities (Y). It is believed that the two study variables have a significant link. A coefficient of determination (KD) or R-squared value of 0.562 was obtained. It follows that X, the independent variable, contributes 56.2% to Y, the dependent variable. While other factors not included in the research account for the remaining 43.8%.

Keywords: Number Stick, Numeracy Skills, Early Childhood.

INTRODUCTION

Education etymologically comes from the Greek language, namely "pedagogy," which consists of the word "paes," meaning child and "agogos" meaning guidance given to children. In English, education is termed the word to educate, which means to improve morals and train intellectuals (Ishomuddin et al., 2023). Meanwhile, in the world of education, it is defined as the process of shaping an individual's or a community's perspective and conduct via formal instruction and informal learning opportunities (Setiawan et al., 2022).

In education, cognitive aspects are one of the important aspects of child development, where each individual uses their mental abilities to think about doing something (Alfiyanto, 2020). Cognitive development, according to Jean Piaget, is when children's knowledge is formed through action, and it also depends on how active the child is in relating to the surrounding environment. The four phases of cognitive development that Jean Piaget identified are as follows: sensorimotor development (ages 0–2), preoperational development (ages 2–7), concrete operation (ages 7–12), and formal operation (ages 12–15) (Magdalena et al., 2023).

Cognitive development aims to allow children to use their sensorimotor skills to explore knowledge of the surrounding environment. Some children can develop their

cognition according to their stages, some can create obstacles, and some experience problems in cognitive development (Rahmi et al., 2023). Without realizing it, the surrounding environment in children's lives is inseparable from things related to mathematics. That way, children need to be introduced to mathematical concepts (Husna & Nurhafizah, 2022). Numeracy is an activity that is done by counting, such as adding, subtracting, and compiling numbers and mathematical symbols. The ability to calculate beginning is an existing ability and must be possessed by every child to develop addition, subtraction, arranging numbers, symbols, patterns, geometry, and understanding numbers. However, the reality on the ground is that some children still have difficulty in understanding the concept of calculation. The ability to calculate early numeracy can develop cognitive abilities and characteristics in each child starting from the surrounding environment. Early numeracy learning is one of the lessons that can introduce mathematical concepts in early childhood (Nurningsih et al., 2023).

It is important to teach children early counting, which is very useful for their daily lives. Early numeracy skills are needed in early childhood because they improve children's thinking skills and their readiness to learn mathematics at a higher school level. However, *listing* ability cannot be a requirement to enter higher school levels (Lisjayanti et al., 2022; Rozali et al., 2023). This is in accordance with Government Regulation Number 17 of 2010, article 69, paragraph 5. In addition, the benefits of early numeracy learning are that children can observe objects around them, can think logically and systematically, and can also adjust to the environment because, in their daily lives, children cannot be separated from counting.

That way, early numeracy learning can benefit children's daily lives. The effect of playing number sticks to improve numeracy skills in early childhood can begin with the importance of the development of numeracy skills in early childhood as a basis for better academic achievement in the future. Media stick numbers are an introductory learning tool for children made of wood commonly used for ice cream. Furthermore, the sticks are given numbers 1-10, and to make them more interesting, the sticks are given colorful colors. Suppose children learn to recognize the concept of numbers or numbers using writing on the blackboard and not accompanied by playing. In this case, the child will feel bored quickly because the material delivered by the teacher is not interesting. Learning without playing will make it difficult for children to understand what is conveyed by the teacher. Hence, children find it difficult to remember or recognize the concepts of numbers or numbers.

RESEARCH METHODS

This type of research uses field research, which is research that is directly carried out in the field or on respondents (Sugiyono, 2019). In this case, direct learning should be conducted to determine children's ability to count before and after using the number stick game. The research design used a type of pre-experimental one-group design. The approach used in this study is quantitative. The sampling technique in this study was total sampling, so the samples taken in this study were all 24 children in PAUD Ar-Rohman, Bantunan Village, Pajar Bulan District, Lahat Regency.

RESULTS AND DISCUSSION

1. The Ability to Know Letters Before the Application of Number Stick Games in Ar-Rohman PAUD Children in Bantunan Village

Observations were made to find out the picture of counting skills in children in PAUD Ar-Rohman Bantunan Village before the use of playing number sticks. The numeracy ability of BB category children as many as 14 children (58.3%), MB as many as ten children (41.7%), BSH as many as 0 (0%) children and BSB as many as 0 children (0%). Thus, it can be concluded that PAUD Ar Rohman children, after the application of number stick games to their counting skills, are relatively low.

Table 1. Description of Pretes Before Treatment

Descriptive Statistics										
	N	Range	Minimu m	Maximu m	Sum	Mean	Std. Deviation	Variance		
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
Pretes	24	5.00	6.00	11.00	212.00	8.8333	.31083	1.52277	2.319	
Valid (listwise)	N 24									

Source: SPSS output, processed data, 2024

Based on the table above, descriptive statistical results were obtained from 24 respondents with a minimum pretest score of 6 and a maximum score of 11, so the range was 5. In practice, the greater the range, the more varied the data would be. The total score is 212, the average is 8.8333, the standard deviation is 1.52277, and the variance is 2.319. The standard deviation and variance indicate the level of data diversity.

2. Numeracy Skills After the Application of Number Stick Games in Ar-Rohman PAUD Children in Bantunan Village

To find out the picture of counting skills in children in PAUD Ar-Rohman Bantunan Village after the use of playing number sticks was also observed with the same instrument. The data on the ability to count on observation after *treatment* are as follows:

Table 2. Observation Score After Number Stick Game Application

Nu	Respond	Skor Posts	Information
1	A	22	BSB
2	B	21	BSH
3	C	23	BSB
4	D	22	BSB
5	E	24	BSB
6	F	23	BSB
7	G	22	BSB
8	H	24	BSB
9	I	23	BSB
10	J	24	BSB
11	K	23	BSB
12	L	22	BSB
13	M	20	BSH
14	N	22	BSB
15	O	23	BSB
16	P	23	BSB
17	Q	21	BSH
18	R	19	BSH
19	S	23	BSB
20	T	23	BSB
21	U	22	BSB
22	V	22	BSB
23	W	22	BSB
24	X	24	BSB
Sum		529	

Source: SPSS output, processed data, 2024

Based on the table above, it can be seen that the ability to count BB category children as many as 0 children (0%), MB as many as 0 children (0%), BSH as many as four children (45%) children and BSB as many as 20 children (54%). Thus, it can be concluded that PAUD child Ar Rohman's counting ability after the application of the number stick game is very high.

Table 3. Description of Postes After Treatment

Descriptive Statistics									
	N	Range	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
Posts	24	5.00	19.00	24.00	529.00	22.0417	.26566	1.30148	1.694
Valid (listwise)	N 24								

Source: *Output SPSS, data processed, 2024*

Based on the table above, descriptive statistical results were obtained from 24 respondents with a minimum score of 19 posts and a maximum score of 24, so the range was 5. In practice, the greater the range, the more varied the data would be. The total score is 529, the average is 22.0417, the standard deviation is 1.30148, and the variance is 1.694. The standard deviation and variance indicate the level of data diversity.

3. Test Analysis Prerequisites

a. Normality Test

If the study's population does not follow a normal distribution, then the normality test will provide an incorrect result. To find out whether the study's population follows a normal distribution, a normality test executed in SPSS 22.0 was used. The statistical K-S Test or Kolmogorov-Smirnov Test is used to check whether the distribution of population data is normal. The following is the research normalcy test hypothesis:.

- H_0 = Abnormally distributed population.
- H_A = Normal distributed population.

The normalcy test's fundamental criterion for making judgments is to compare the Sig. value to a level of 5%, or 0.05, as shown below:

If the value of Sig. > 0.05, then the population is normally distributed.

If the value of Sig. < 0.05, then the population is abnormally distributed.

The results of data normality testing with the SPSS 22.0 application are as follows:

Table 4. Normality Test

One-Sample Kolmogorov-Smirnov Test			
		Pretes	Posts
N		24	24
Normal Parameters	Mean	8.8333	22.0417
	Std. Deviation	1.52277	1.30148
Most Differences	Extreme Absolute	.166	.196
	Positive	.166	.138
	Negative	-.153	-.196
Kolmogorov-Smirnov Z		.814	.958
Asymp. Sig. (2-tailed)		.521	.318
a. Test distribution is Normal.			

Source: SPSS output, processed data, 2024

Based on data processing with SPSS Version 22.0 above, the sign value for pretest data is 0.521, which means the sign value is greater than the α value ($0.521 > 0.05$). Then, for the test post data, a sign value of 0.318 is obtained, which is greater than the α value ($0.318 > 0.05$). Based on the sign value of both variables, it can be stated that H_a is accepted, which means that the data comes from a normally distributed population.

b. Homogeneity Test

The homogeneity test is part of the classical assumptions in comparative analysis. This homogeneous test is used to find out whether the score variance measured in the sample has the same variance or not.

- H_0 = Sample data derived from a homogeneous population

- H_1 = Sample data comes from heterogeneous populations

The linearity test's primary criterion for drawing conclusions is a comparison of the significance value (Sig.) with a level of 5%, or 0.05, as shown below:

If the value of Sig. > 0.05 , then the data is homogeneous

If the value of Sig. < 0.05 , then the data are heterogeneous

This is the data set that came out of the homogeneity test that was computed using SPSS 22:

Table 5. Homogeneity Test

Test of Homogeneity of Variances			
Posts			
Levene			
Statistic	df1	df2	Sig.
1.143	5	18	.374

Based on the table above, the sign is 0.374, meaning that in this case, the sign is greater than α ($0.374 > 0.05$), so we can know that the pretest with posts has data derived from homogeneous populations.

c. Linearity Test

Both linear regression and correlation analysis rely on the linearity test as one of its fundamental assumptions. The purpose of this linearity test is to determine whether the connection between two variables is linear. Finding out whether our data fits a straight line is what the linearity test is all about. If you know the value of the independent variable, you may use regression linearity tests to estimate the size of the dependent variable, assess the strength of the link, and even predict the direction of the relationship. A positive or negative linear connection between an independent and dependent variable is possible. The term "surrender relationship" may describe a healthy partnership as well. When two variables are positively related, an increase in one causes a corresponding rise in the other. Negative or non-unidirectional interactions work in the opposite way. Following is the study linearity test hypothesis.

- H0 = Non-linear patterned regression model.
- H1 = Linear-patterned regression model.

The linearity test's primary criterion for drawing conclusions is a comparison of the significance value (Sig.) with a level of 5%, or 0.05, as shown below:

The existence of a substantially linear connection between X and Y is indicated by a Sig. value greater than 0.05.

There is no significant link between variables X and Y if the significance value is less than 0.05.

The following are the findings of the linearity test that were computed using the SPSS 22 application:

		Sum of Squares	df	Mean Square	F	Sig.	
Postes	Between (Combined)	26.194	5	5.239	7.388	.001	
*	n	Linearity	21.888	1	21.888	30.866	.000
Pretes	Groups	Deviation from Linearity	4.306	4	1.077	1.518	.239
	Within Groups	12.764	18	.709			
	Total	38.958	23				

Source: SPSS output, processed data, 2024

Based on the table above, the sign is 0.239, meaning that in this case, the sign is greater than α ($0.239 > 0.05$), so we can know that the pretest and postes have a linear relationship or linear pattern.

4. Hypoplant Test

The t-test is used to determine whether playing the number stick has a significant effect on counting ability. The test used a significance level of 0.05 and 2 sides. The test steps are as follows:

a. Hypothesis Formulation

Ha: There is an influence of number stick games on the ability of students to count in PAUD Ar-Rohman, Bantunan Village, Pajar Bulan District, and Lahat Regency.

Ho: there is no effect of number stick games on counting skills in students of Ar-rohman PAUD year, Bantunan Village, Pajar Bulan District, Lahat Regency.

b. Criteria Setting

The magnitude of the table t value for a significant level of 5% $df = 32$ ($df = N - 1$ for $N = 24$) is 2.069 or by looking at the significance value with the $<$ sign criterion 0.05

c. Perform a test analysis using SPSS 22.0

d. Decision-making

Acceptance of Ha and rejection of Ho are contingent upon the t-count being larger than the t-table value. After comparing the calculated t-value of 4.778 with the t-table value of 24 (a significance level of 2.069 at the 5% level), we find that Ha is accepted and Ho is rejected. To rephrase, while testing both variables, it is necessary to reject the null hypothesis (Ho) and accept the alternative hypothesis (Ha).

Table 7. Paired t-test results

Paired Samples Test							
Paired Differences							
	Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference		t	Sig. (2-tailed)
				Lower	Upper		
Pair 1 Pretes							
- Postes	-1.32083E1	1.02062	.20833	-13.63930	-12.77736	63.400	.000

Source: SPSS output, processed data, 2024

In the Paired Samples Test table above, it can be seen that t count is obtained at 63.400 and t table 2.096 (63.400 > 2.069) with sign (2-tailed) 0.000 < 0.005, then H0 rejected Ha accepted. This shows that the number stick game has a significant effect on children's numeracy skills in Ar-rohman PAUD Bantunan Village, Pajar Bulan District, Lahat Regency.

e. Coefficient of Determination

The coefficient of determination was used to determine how much influence the media playing number sticks had on the ability to count in Ar-rohman PAUD children, Bantunan Village, Pajar Bulan District, Lahat Regency. The coefficient of determination can be seen in the table as follows:

Table 8. Coefficient of Determination

Model Summary				
Model	R	R Square	Adjusted Square	R Std. Error of the Estimate
1	.750 ^a	.562	.542	.88087

a. Predictors: (Constant), Pretes

Source: SPSS output, processed data, 2024

According to the preceding table, the coefficient is represented by the value of R. The correlation value in the preceding table is 0.750. The relationship between the two study variables in the strong category can be inferred from this value. The coefficient of determination (KD), or R Square, is another value in the preceding table that indicates how successfully the regression model created by the interaction of independent and dependent variables is obtained. The obtained KD value is 0.562. Therefore, it may be concluded that variable Y is influenced by independent variable X by 56.2%. The influence

of additional variables not included in the study accounts for the remaining 43.8%.

Discussion

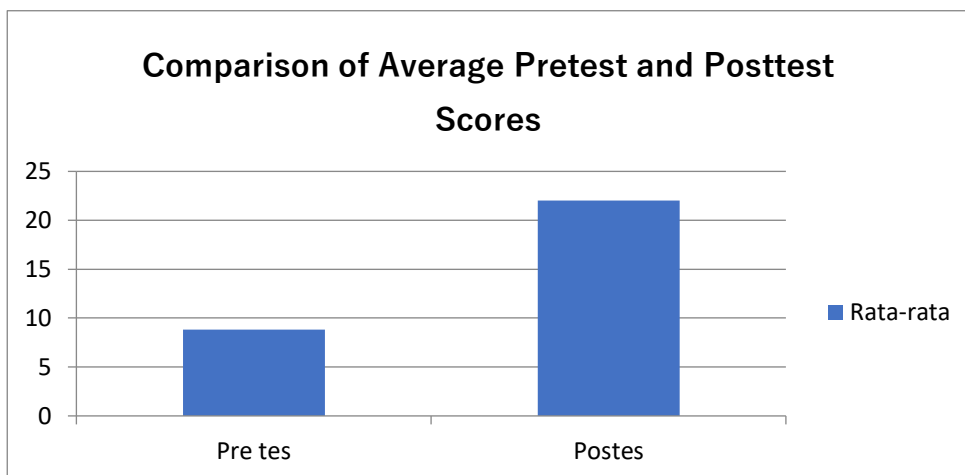


Figure 1. Comparison Graph of Average Pretes and Postes Scores

After descriptive analysis of the pretest and posttest, inferential analysis was carried out by performing paired t-tests. From the results of the significant test, a significance value of 0.000 was obtained. The significance value < 0.05 ($0.000 < 0.05$), then H_a is accepted, and H_0 is rejected. So, it can be concluded that playing number sticks significantly influences the numeracy ability of PAUD Ar-Rohman, Bantunan Village, Pajar Bulan District, and Lahat Regency.

Number stick games are a form of game-based learning media that delivers learning material in early childhood. The use of number stick games is expected to make it easier to help children understand the concept of counting and be more motivated to learn to count early (Apriyansyah, 2018). It is anticipated that playing with number sticks will allow kids and students the chance to learn and have fun while exploring, discovering, and expressing emotions. Furthermore, play activities assist kids learn about who they are, who they live with, and what's around them (Sagita, 2020).

Irawati asserts that counting is also the most crucial skill for kids to learn, especially when counting exercises incorporate more engaging media or games that can pique kids' interest in the process (Rachmawati, 2022). Based on the explanation of data, it can be concluded that the use of number sticks through the playing method is in order to attract children to learn to count and foster a sense of pleasure in children so that children do not realize that they are learning. Number sticks are teaching activities in the form of games. Games are chosen as a learning method so that children are always active in following the process of learning activities in class.

CONCLUSION

T count findings were determined by 63.400 and t table 2.096, indicating that t count

> t table (63.400 > 2.069) and with sign (2-tailed) 0.000 < 0.005, meaning that H₀ was rejected and H_a was approved based on the statistical analysis of paired t-tests. With a R correlation value of 0.750, this demonstrates that playing number sticks (X) significantly affects children's counting skills (Y) in early childhood education. The interpretation is that there is a substantial association between the two research variables. The coefficient of determination (KD), often known as R Square, has a value of 0.562. Therefore, it may be concluded that variable Y is influenced by independent variable X by 56.2%. The influence of additional variables not included in the study accounts for the remaining 43.8%.

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