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Research Article

Early numeracy skills in early childhood: the effect of numbered heads together cooperative learning methods

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ABSTRACT

This study aims to determine the effect of the cooperative learning method with the Numbered Heads Together type on numeracy skills in early childhood. This study used the pre-experimental method with a one group pretest-posttest design. The research sample for children aged 5-6 years was 16 children. Data collection was in the form of a checklist of child development data with value categories from not yet developed to very well developed. Data analysis used the t-test by fulfilling normality and homogeneity first. The results showed that the t-count value is greater than the t-table value ($t_{count} > t_{table}$). So, it can be concluded that the cooperative learning method with the Numbered Heads Together type has an influence on the development of early childhood numeracy skills. Thus, the teacher can apply various types of cooperative learning methods in the classroom to improve other aspects of development.

Keywords: early childhood; numeracy skills; cooperative learning model; numbered heads together

1. INTRODUCTION

One of the areas in the development of early Childhood that can be stimulated is the cognitive field. Cognitive is a very important tool in human life. This is because cognitive is an individual thought process in solving a problem quickly, precisely, and trains children to think in logical and systematic ways through understanding communication about numbers, numbers and number symbols (Basri, 2018: 2). One aspect that is stimulated in children's cognitive abilities is counting. Counting is the basis of several sciences that are used in every human life whose activities cannot be separated from the role of mathematics in it, from addition, subtraction, division to multiplication which cannot be separated in everyday life (Fajriah et al, 2017: 182). Early Numeracy for early childhood is the basis for the development of mathematical abilities that must be developed from an early age (Farihah, 2017: 3). Referring to Permendikbud year 137 of 2014, children's numeracy skills that must be developed include: counting or mentioning number symbols from 1 to 10, using number symbols to count, and matching numbers with number symbols which can be done in the form of games that attract children's interest in learning activities such as playing puzzles, number cards, number clocks, playing patterns, and so on so as to improve children's numeracy skills (Oktriyani, 2017: 82-96).

The results of study conducted by Febiola (2020: 2) state that children who have numeracy skills will be able to build a fun learning process so that children will have the readiness and provision of numeracy skills to be taken to a higher level. This is also in line with research conducted by Nurjanah (2018: 105-119) which states that children who have numeracy skills will be able to think logically and mathematically, even in a very simple way. This is reinforced by Khadijah's research (2016) which found the benefits of mastering numeracy from an early age will affect logical and systematic thinking so that children have provisions to face the next life and mentally prepare children to attend higher education.

The various study results above, it is significantly proven that children with good numeracy skills can improve various aspects of child development and children's math skills in the future. But in reality the results of children's mathematics learning in Indonesia have not achieved maximum results. The results of the 2018 Program for International Student Assessment (PISA) show that in the field of mathematics, Indonesia is ranked 72 out of 79 countries (Deny: 2019). In addition, the results of the 2015 Trend in International Mathematics and Science Study (TIMSS), which measures students' abilities in mathematics and science, show that Indonesia is ranked 45 out of 50 countries (Hooper, et al: 2015). This shows that Indonesian children's math abilities are still weak, so it is necessary to know the causes of these weak abilities.

Similar results can also be seen from an early age how interested children are in learning to count in the PAUD Unit. The results of observations at Baso Kindergarten, researchers found several problems related to children's initial numeracy skills. First, children's numeracy skills are still low, especially in recognizing the concept of numbers, counting is not according to the order of the numbers, there are still many children who cannot match numbers with many objects. Second, the lack of children's participation in learning to count, children are more silent when the teacher explains learning activities.

Third, the media used for counting has not varied, only in the form of the fingers or the child himself. The four methods used by the teacher in developing children's numeracy skills are monotonous so that children often write worksheets, thus making children bored to learn. Fifth, the existing educational game tools have not been utilized optimally in learning arithmetic.

Strengthening the preliminary study above, Lailatus (2016: 5) describes problems in children's numeracy skills in kindergarten, namely children are less interested in the media used by the teacher. Second, children are still confused in counting. Third, the use of methods that can improve numeracy skills is still lacking in institutions. Fourth, teachers are less varied in teaching. In line with this opinion, Diansari (2017: 2-4) explains in detail various problems with numeracy skills in children in kindergarten. First, children cannot count correctly, and do not understand the basic concepts of mathematics, especially the symbols of addition and subtraction. Second, children still have difficulty remembering numbers; Third, the child's numeracy skills are still low, causing children to have difficulty counting.

Based on the explanation above, it is clear that the numeracy skills of children in Kindergarten are not running as they should. Learning to count should be taught with various interesting methods and media that can attract the child's heart or attention to foster children's enthusiasm or enthusiasm for learning. Now it is only based on monotonous methods and media.In response to the problems above, appropriate steps are needed to overcome problems that often occur. One of the steps that can be taken is the use of cooperative learning methods with Numbered Heads Together (NHT) in the implementation of learning to count in children in Kindergarten. The results of study conducted by Diastanti (2014), regarding the cooperative learning method with Numbered Heads Together (NHT) can improve early numeracy skills in children and can also improve learning outcomes in children. Because in this cooperative learning method children become more active in learning. Similar results were also found by Desy (2014), indicating that there was an increase in the average score of the ability to recognize number symbols in children after applying the Numbered Heads Together (NHT) learning method assisted by number card media. In addition, the results of research by Santiana (2014), show that there are significant differences in mathematics learning outcomes between groups of students who take part in cooperative learning methods with the Numbered Heads Together (NHT) type and groups of students who take part in learning with conventional learning models in students fifth grade elementary school.

The results of research by Andasari (2015), children learn through the Numbered Heads Together learning method activities can improve children's cognitive abilities, because this learning is classified as effective, fun, child-centered learning, improves children's thinking power and involves more children studying the material covered in a lesson and check their understanding of the lesson. This NHT learning method can be used for improvement and variation of learning activities to improve cognitive abilities. Then the results of research by Tulak (2015), showed that there was an increase in mathematics learning achievement in the NHT group with beads teaching aids which was higher than the group that was not taught conventionally.

The results of the same study also by Saefularif (2016), showed that the experimental group had z-count > z-table. This means that teachers can use cooperative methods, especially with the NHT method to improve problem solving skills for students. In line with the results of Umamah's research (2020), it was concluded that increasing the ability to count in tiered division (porogapit) in the material of changing the shape of fractions with a cooperative learning model using the Numbered Heads Together (NHT) technique can increase. Based on the several previous studies, it has been shown that cooperative learning with the numbered gear together type has a positive impact on students' cognitive development and is related to children's achievement in further education. However, it is not yet known the impact of applying the numbered head together technique in improving initial numeracy skills in children aged 5-6 years. For this reason, this study aims to determine the effect of cooperative learning methods with the Numbered Heads Together (NHT) type on early numeracy skill in early childhood.

2. RESEARCH METHOD

The type of study used in this study was pre-experimental with the type of one group pretest-posttest design. The experiment is intended to determine the purity of the effect of X cooperative learning method Numbered Heads Together (NHT) technique on Y (early numeracy skills). How big is the purity of X's influence on Y depending on controlling and manipulating the activities to be carried out.

The pre-experimental model is as follows:

Table 1. Research Design

Pretest O_1	→	*Treatment* X	→	*Posttest* O_2
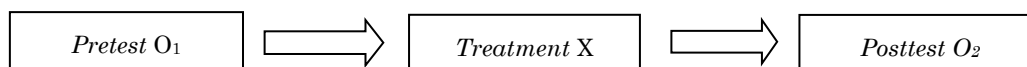
In this study only used one group of subjects, so it did not require a control group. The one group pretest-posttest design study was carried out in three stages: 1) carrying out the pretest to measure the respondent's initial condition before being given treatment (O1). 2) giving treatment (X), 3) conducting a posttest to find out the condition of the variables after being given treatment (O2). The background or place that will be used as a location in this study is in the Baso Kindergarten, Agam Regency, with the sampling technique using purposive sampling with a total sample of 16 children aged 5-6 years.

The data collection technique used observation sheets in the form of child development checklists referring to Permendikbud no 137 of 2014 which consisted of aspects 1) mentioning number symbols, 2) using number symbols for counting, 3) matching numbers with number symbols. Data analysis was carried out by comparing the pretest and posttest averages of the experimental group using the t-test, by fulfilling the prerequisite analysis test first, namely the data were normally distributed and homogeneous.

3. RESULTS AND DISCUSSION

3.1 Results

The data described in this study consisted of: "The effect of the Cooperative Learning Method with the Numbered Heads Together (NHT) type (X) as the independent variable and the dependent variable on Early Numeracy Skill (Y)", by experimenting 4 times. The population in this study were early childhood at Kindergarten Baso, Agam Regency, totaling 65 people. The sample consisted of 16 children.

Table 1. Classification of Early Numeracy Skill Scores in Children at Kindergarten Baso, Agam Regency

No.	Interval	Category	Pretest	
			F	%
1	13-16	Very Well Developed	0	0
2	10-12	Growing As Expected	0	0
3	7-9	Start Growing	4	25
4	4-6	Undeveloped	12	75
		Total	16	100

Based on the table above, it can be seen from the pretest data that none of the children were in the very well developed category and were developing as expected, 4 children were starting to develop with a percentage of 25% and 12 children had not yet developed with a percentage of 75%.

Data of Pretest
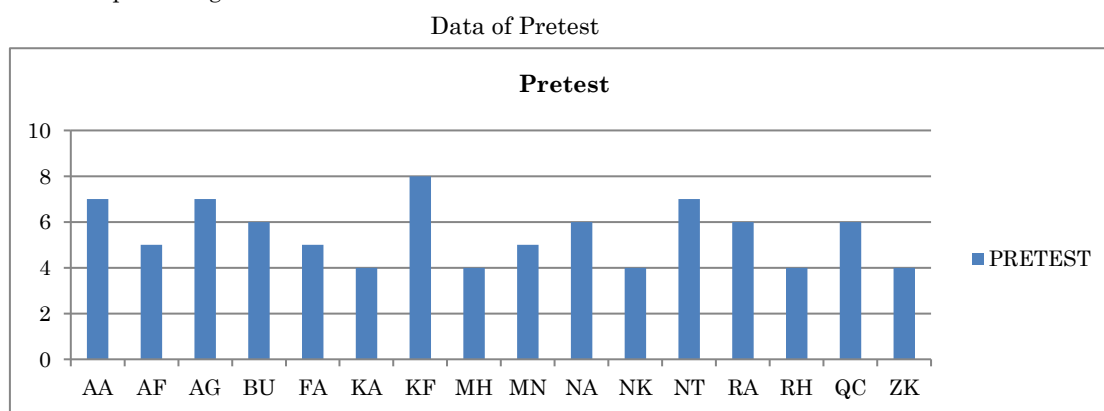
Figure 1. Pretest data

According to the table that the researcher described above, it was obtained for the first indicator that 2 out of 16 children developed as expected by mentioning numbers 1-10, then, as many as 9 children began to develop in saying numbers 1-10, then 5 people had not progressed in saying numbers 1-10. 10. The second indicator is that 6 children are starting to develop in ordering numbers 1-10 regularly, 10 children have not progressed in ordering numbers 1-10 regularly. The third indicator is 2 children starting to develop in counting objects 1-10, 14 children have not progressed in counting objects 1-10. The fourth indicator is 3 children starting to develop in matching the number of objects with numbers, 13 children have not progressed in matching the number of objects with numbers.

Testing Requirements Data analysis

Normality

Table 2. Normality Test

One-Sample Kolmogorov-Smirnov Test			
		Pre-Test	Post-Test
N		16	16
Normal Parameters[a,b]	Mean	5,5000	13,3125
	Std. Deviation	1,31656	1,07819
Most Extreme Differences	Absolute	,185	,238
	Positive	,185	,201
	Negative	-,148	-,238
Kolmogorov-Smirnov Z		,741	,953
Asymp. Sig. (2-tailed)		,643	,324
a. Test distribution is Normal.			
b. Calculated from data.			

The requirement to carry out a normality test is to carry out a t test, according to the normality data above it can be concluded that the data is normally distributed using intervals. The significance level is 0.05. If the significant value is greater than 0.05 then the value is normal.

Homogeneity

The homogeneity test is intended to look at two or more groups of data to come from populations that have the same variation. Homogeneity is met if the significant value is greater than 0.05, then the variation for each sample is the same (homogeneous). Conversely, if the significance obtained is > 0.05, then the variation for each sample is not the same (not homogeneous). With the help of SPSS statistical data management computer software, homogeneous results are shown in the following table:

Table 3. Homogeneity Test

ANOVA					
Pretest					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8,300	3	2,767	1,876	,188
Within Groups	17,700	12	1,475		
Total	26,000	15			

According to the output of homogeneity of variances, the F value is 1.876 greater than 0.05 (1.876 > 0.05) and the hypothesis is accepted that the sample variation is the same (homogeneous).

Hypothesis test

After the results of the treatment, the next step is to analyze the data on the results of the treatment by conducting statistical tests, to see whether there is a significant increase in the environmental care character in children through the project method. In this case a t-test analysis is performed as shown in the **Table 4.**

Table 4. T-test analysis

No	Code	Pre-test Score	Post-tesst Score	D	D2
1	AA	7	14	7	49
2	AF	5	12	7	49
3	AG	7	14	7	49
4	BU	6	13	7	49
5	FA	5	14	9	81
6	KA	4	14	10	100
7	KF	8	13	5	25
8	MH	4	14	10	100
9	MN	5	15	10	100
10	NA	6	15	9	81
11	NK	4	12	8	64
12	NT	7	14	7	49
13	RA	6	13	7	49
14	RH	4	12	8	64
15	QC	6	12	6	36
16	ZK	4	12	8	64
		88	213	125	1009
	Average	5,5	13,3125	7,8125	63,0625

The next step is to provide an interpretation of t, which first takes into account the df or dB, df = N-1 = 16-1 = 15, comparing the magnitude of t obtained with the calculation of t_o= 21,205 and the magnitude of "t" listed at a significant level 1%, namely t_t1% = 3.106, so it can be seen that t is more significant than t, namely 21,205> 3.106. Then the alternative hypothesis is accepted; thus, the cooperative learning method with numbered head together type affects the early numeracy skill in early childhood. Thus, there can be a significant difference between the pre-test and post-test in the sample group. Then hypothesis $H_a$is accepted, and hypothesis H_o is rejected. So, it can be concluded that the Cooperative Learning Method with the Numbered Heads Together (NHT) can be applied to improve early numeracy skill in early childhood. Giving cooperative methods using the Numbered Heads Together (NHT) technique can be used to influence children's initial numeracy skills. The Numbered Heads Together (NHT) technique cooperative method is a learning method that places students into diverse small groups consisting of 4-6 people, thereby providing opportunities for students to learn independently and learn to exchange ideas about their tasks to achieve goals. shared learning.

The results of this study are in accordance with research conducted by Dewi (2016) which means that it can be concluded that the Numbered Heads Together (NHT) cooperative learning model has a significant influence on the learning outcomes of 5th grade elementary school students. In line with this research, according to research conducted by Wakhyudin (2014)

who found that the problem solving skills of students who were given the Numbered Heads Together learning model got better results than students who were given the conventional model. Research conducted by Kholis (2017) found an increase in student learning outcomes given the Numbered Heads Together learning model from cycle 1 to cycle II. The results of research by Wulandari, et al (2014), stated that the ability to recognize children's number symbols became better after applying the Numbered Head Together learning model assisted by number card media. Research conducted by Hartini (2011) also states that the application of the Numbered Heads Together cooperative learning model can be used to improve communication competence and teamwork for vocational high school students.

In line with the opinion of Lestari (2015), the cooperative learning method with the Numbered Heads Together (NHT) type has a good impact in: 1) increasing student achievement; 2) able to deepen students' understanding; 3) training student responsibility; 4) fun students in learning; 5) develop students' curiosity; 6) increase students' self-confidence; 7) develop a sense of mutual ownership and cooperation; 8) each student is motivated to master the material; 9) eliminating the gap between smart and not smart; 10) create a happy atmosphere in learning.

The advantages of Numbered Head Together are developing a sense of responsibility, fostering cooperation and cohesiveness in groups, making students actively look for materials to complete their assignments. Make students more courageous in expressing opinions and asking other groups. Early childhood playtime is the basis for choosing the right learning method with Numbered Head Together. Liveliness and cooperation in solving problems will be formed in his personality, so that children will get used to being compact and helping each other. Characters will be formed as learning objectives to strengthen student character education. The success of a child can be determined from several factors, including internal and external factors. Factors that arise from within students, including will, fear, intellectual level and so on. While external factors can be in the form of teacher attitudes, teaching approaches, methods, visual aids, and other sources. All of these will affect the success of learning. The reference to applying the NHT (Numbered Heads Together) cooperative learning model in PAUD is an option.

4. CONCLUSION

Cooperative learning methods with Numbered Heads Together (NHT) can be given to children to develop numeracy skills from an early age in early childhood. Cooperative learning methods can develop a sense of responsibility, foster cooperation and cohesiveness in groups, make students actively seek materials to complete their assignments. Thus, school principals must be able to encourage teachers to use a variety of cooperative learning methods in classroom learning so as to have a changing impact on other aspects of development. The continuation of this research can be measured by other developmental variables besides the cognitive domain, different research subjects, and the application of cooperative learning methods to overcome any problems in children.

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AUTHOR'S CONTRIBUTIONS

The authors considered the design and analysis, collected the data, performed the analysis, and wrote the paper.

CONFLICT OF INTEREST

The authors have no conflicting interests of any kind in the submission of this research paper.

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