THE EFFECT OF USING THE NAPIER ROD PROPS ON THE MATHEMATICS LEARNING OUTCOMES OF CLASS IV STUDENT'S OF ELEMENTARY SCHOOL

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ABSTRACT

The problem in this study is the low results of learning mathematics. This study aims to find out an overview of the use of napier rod props in mathematics subjects of grade IV students of UPT SPF SDN Maccini II Makassar City, to find out an overview of students' mathematics learning outcomes after using napier stem props in class IV UPT SPF SDN Maccini II Makassar City, and to find out the influence of the use of napier rod props on the results of learning mathematics for grade IV students of upt spf sdn Maccini II Makassar City. This research uses a quantitative approach with an experimental type of research. The research design used in this study is quasi experimental group design with the form of nonequivalent control group design which is carried out in two classes, namely the experimental class and the control class with stages of activity including giving pretests, giving treatment in experimental classes and giving posttests. Data collection techniques are in the form of tests, observations, and documentation. The population in this study was all grade IV students of UPT SPF SDN Maccini II Makassar City. The sample in this study was 54 students consisting of 27 class IV A students and 27 class IV B students. The data analysis techniques used in this study are descriptive statistical analysis and inferential statistical analysis. The results of this study showed that (1) The use of the napier rod teaching aid in the learning process of the experimental class in mathematics class IV UPT SPF SDN Macini II Makassar City went very well. (2) Student learning outcomes in the experimental class are more improved than learning outcomes in the control class. This is evidenced by the learning outcomes in the experimental class which are in the good category, while the learning outcomes in the control class are only in the sufficient category. (3) There is an effect of using the napier rod teaching aid on learning outcomes in mathematics class IV UPT SPF SDN Maccini II Makassar City.

INTRODUCTION

Elementary School is the first form of elementary education that children formally receive. Elementary school aims to lay the foundation of intelligence, knowledge, personality, noble character, as well as skills to live independently and attend further education (Utami, 2018). One of the basic life skills that is important for a child who is in elementary school to have in order to prepare for further education and prepare for an independent life in the future is numeracy skills. These skills can be acquired and honed early in elementary school through mathematics subjects. This is in line with Law No. 20 of 2003 concerning the National Education System article 3 states that: National Education functions to develop abilities and form a dignified national character and civilization in order to educate the nation's life, aims to develop the potential of students to become human beings who have faith and piety in God Almighty, have a noble character, healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens.

Mathematics is a compulsory subject that must be mastered by students, especially in elementary school with a greater frequency of class hours compared to several other subjects (Septiyawili, 2016). In addition, mathematics is also referred to as one of the branches of science that plays a very important role in the rise and fall of a nation. Kline justifies that "the rise and fall of a nation today depends largely on the progress of its field of mathematics" (Ahmadi & Weijun, 2014, p. 41). This assumption is further strengthened by Nani Restati Siregar in his research "Student Perceptions in Mathematics Lessons: The Preliminary Study of Students Who Love Games" showed that of the 20 students who were the subjects of the study, 35% of students found math easy and fun, 45% found it quite difficult, and 20% found it difficult. Furthermore, 20% of students think math is quite important and another 80% think it is important. So Siregar concluded that mathematics is generally considered a difficult but important subject to learn (Siregar, 2017).

The Ministry of Education and Culture through the Indonesia National Assessment Program (INAP) implemented in 2016 showed that around 77.13% of elementary school students throughout Indonesia have very lacking mathematics competence, 22.58% are sufficient, and the rest are in the good category (Pusmenjar, t.t.). Followed by the results of the Indonesian Student Competency Assessment (AKSI) in 2019 which showed that 79.44% of junior high school students in Indonesia have mathematics skills in the less category, 18.98% in the sufficient category, and only 1.58% in the good category (Puspendik, t.t.).

This condition is very concerning and the real evidence can be found directly in elementary schools throughout Indonesia. This includes elementary schools located already in urban areas such as UPT SPF Macccini II Makassar City. After conducting preliminary tests, it can be concluded that elementary school students, especially grade IV, their learning outcomes are still in the category of lacking. This condition is very concerning and the real evidence can be found directly in elementary schools throughout Indonesia. This includes elementary schools located already in urban areas such as UPT SPF Macccini II Makassar City. After conducting preliminary tests, it can be concluded that elementary school students, especially grade IV, their learning outcomes are still in the category of lacking.

Learning outcomes play an important role in every learning process in the classroom. Jihad, et al. (2010), stated that learning outcomes are a real change in student behavior after a teaching and learning process is carried out in accordance with learning objectives (Waqi'ah, 2016). Therefore, learning outcomes have a role for teachers or educators in measuring success in learning that has been carried out (Wahyuningsih, 2020). The low learning outcomes of students in terms of multiplication are due to learning media or teaching aids that are not available to support the mathematics learning process which requires a form of visualization in the learning process that can make it easier for students to understand mathematics, especially the material of multiplication calculation operations. Therefore, teaching aids are needed that can make it easier for students to understand mathematical concepts, especially multiplication. The focus of prospective researchers is to choose napier stem props as one of the tools that can be used in the learning process. Napier rod props are one of the learning media that translate multiplication problems into addition problems (Rahman, 2018). Based on this, this napier rod can also be used to instill an understanding of the concept of multiplication in students. By gaining an understanding of the concept of multiplication, it is hoped that it can improve student learning outcomes in schools.

Mathematics learning in elementary school prioritizes students to play an active role in learning activities carried out with the guidance and direction of the teacher in the classroom. In line with this (Andriani, 2018) stated that active learning needs to be carried out using methods, models, strategies and props that are in accordance with student learning materials, because this can stimulate students to better know and motivate children in learning and at the same time can increase students' understanding of mathematics.

In this study, researchers used napier stem props. Teaching aids are one of the tools that can be used in the process of learning mathematics. Props are tools that can be absorbed by the eyes and ears as aids in creating an effective teaching and learning process (Waqi'ah, 2016). According to Vivin (2017) napier rods have a role for students, namely: (1) students are more enthusiastic about answering multiplication questions by moving number objects, (2) students are more able to understand the material and practice numeracy skills because they use napier bar props multiplication material into addition, and (3) students can interact with props because they are interactive (Putri, 2019). Based on this, researchers chose napier rod props as a teaching experiment tool for elementary school students in solving math problems, especially multiplication calculation operations.

Based on the description above, researchers are encouraged to conduct a study with the title "The Effect of the Use of Napier Rod Props on Mathematics Learning Outcomes of Grade IV Students of UPT SPF SDN

Maccini II Makassar City" by applying research methods that are different from previous research. This research is also expected to be able to help and facilitate students in understanding and completing multiplication calculation operations.

METHOD

The type of research used is experimental research using quasi-experimental group design and quantative approaches. The design used in this study used Quasi Experimental Group Design with the form Nonequivalent Control Group Design. The design of the non-equivalent control group is almost the same design as the pretest-posttest control group design, only in this design the experimental group and the control group are not randomly selected (Sugiyono, 2016). The population in this study was all students in class IV UPT SPF SDN Maccini II Makassar City, semester I (even) of the 2021-2022 school with the total population is 54 students consisting of 2 classes. Which if described in class IV A as many as 27 students and in class IV B as many as 27 students.. The sampling technique used in this study was purposive sampling. This study was conducted with the aim of determining whether there is an influence of the use of napier rod props on student mathematics learning outcomes. In the implementation of this study, the instruments used were learning outcomes tests and observations. The implementation of this research will involve researchers directly in collecting, processing and drawing conclusions from the data obtained by researchers. The procedure researchs will be have 3 step, the first step is pretest, second step is treatment, and third step is posttest. The data analysis techniques used are descriptive statistical analysis and inferential statistical analysis. Descriptive statistical analysis in this study was used to describe student learning outcomes. This analysis is used to describe the improvement of understanding obtained by students in mathematics learning through pretest and posttest, before being given treatment and after being given treatment. Inferential statistical analysis is used to test research hypotheses using t-tests. To test the research hypothesis, prerequisite analysis testing is first carried out, namely the normality test and homogeneity test where all data are processed in the SPSS version 26 system.

RESULTS AND DISCUSSION

Result

The results of this study describe the objectives of the research that has been carried out, including an overview of the use of napier rod props in mathematics subjects and an overview of student learning outcomes in mathematics subjects. From the results of this study, it can also be seen whether there is an influence of the use of napier rod props on the results of learning mathematics for grade IV students of UPT SPF SDN Maccini II Makassar City. The total subjects in this study were 54 students from two classes in one school, namely 27 students from class IV A and 27 students from class IV B UPT SPF SDN Maccini II Makassar. The students of class IV A acted as a control group, while the students of class IV B acted as an experimental group. Data on the learning outcomes of all subjects in this study were obtained using a research instrument in the form of a student learning outcomes test in the form of multiple choice questions. The scores obtained from these measurements are used as analysis material to determine whether there are differences in student learning outcomes in the experimental group and student learning outcomes in the control group.

The implementation of learning using napier stem props that have been carried out can be known through observations. In the implementation of the treatment, it can be seen from the results of observations of the implementation of learning using the following napier stem props:

Table 1 - Results of Observation of Learning Implementation using Napier Rod Props

Observation Results	Treatment
Earned score/maximum score	13/15
Percentage of performability	86,6%
Category	Good

Based on table 1 above through the data processed and attached, it can be concluded that the learning process in the experimental class when giving treatment has been carried out properly. From the results of these observations, it shows that in the learning process with the use of napier stem props, the stages of learning have been carried out.

a. Learning Outcomes Pretest Data

This pretest was performed on experimental classes and control classes. Pretests in experimental classes were carried out to obtain data before using napier rod props in the learning process.

1) Pretest data on students' mathematics learning outcomes in the experimental classes

Pretest experimental groups were carried out to find out and get a preliminary picture of students' mathematics learning outcomes before giving treatment in the form of the use of napier stem props in the learning process. The distribution of the frequency of learning outcomes (pretests) of experiential class students can be seen in the following table:

Table 2 - Distribution of Frequency and Percentage of Learning Outcomes Scores (Pretest) of Experimental Class Students

Value Interval	Category	Experimental Class	
		Frequency	Percentage
80 < x < 100	Very Good	-	-
60 < x < 80	Good	3	11,1%
40 < x < 60	Enough	9	33,3%
20 < x < 40	Less	13	48,2%
0 < x < 20	Very Less	2	7,4%
Sum		27	100%

Based on the table above, information was obtained that in the experimental class as many as 15 students got the pretest result scores in the less category with a percentage of 55.6%. Meanwhile, the pretest results that were in the good category were only 3 students with a percentage of 11.1%. So it can be concluded that students in the experimental class have insufficient learning outcomes.

2) Pretest data on students' mathematics learning outcomes in control classes

The pretest of the control group was carried out to find out and get a preliminary picture of students' mathematics learning outcomes before giving treatment in the form of the use of multiplication tables in the learning process. The distribution of the frequency of learning outcomes (pretests) of experiential class students can be seen in the following table:

Table 3 - Frequency Distribution and Percentage of Learning Outcomes Scores (Pretest) of Control Class Students

Value Interval	Category	Control Class	
		Frequency	Percentage
80 < x < 100	Very Good	-	-
60 < x < 80	Good	3	11,1%
40 < x < 60	Enough	11	40,8%
20 < x < 40	Less	9	33,3%
0 < x < 20	Very Less	4	14,8%
Sum		27	100%

Based on the table above, information was obtained that in the control class as many as 13 students got the pretest result score in the less category with a percentage of 48.1%. Meanwhile, the pretest results that were in the good category were only 3 students with a percentage of 11.1%. So it can be concluded that students in the control class have less learning outcomes.

b. Posttest Data on Learning Outcomes

1) Posttest data on students' mathematics learning outcomes in the experimental classes

Posttest experimental groups were carried out to find out and get a final picture of student learning outcomes after giving treatment in the form of the use of napier stem props in the learning process. The frequency distribution of posttest results of experiential class students can be seen in the following table:

Table 4 - Distribution of Frequency and Percentage of Learning Outcomes Scores (Posttest) of Experimental Class Students

Value Interval	Category	Experimental Class	
		Frequency	Percentage
80 < x < 100	Very Good	4	14,8%
60 < x < 80	Good	11	40,8%
40 < x < 60	Enough	10	37%
20 < x < 40	Less	2	7,4%
0 < x < 20	Very Less	-	
Sum		27	100%

Based on the table above, information was obtained that in the experimental class as many as 15 students got a posttest result score in the good category with a percentage of 55.6%. Meanwhile, the posttest results in the less category were only 2 students with a percentage of 7.4%. So it can be concluded that most of the students in the experimental class have learning outcomes that are in the good category.

2) Posttest data on student mathematics learning outcomes in the control classes

The posttest of the control group was carried out to find out and get a final picture of student learning outcomes after treatment in the form of using multiplication tables in the learning process. The distribution of the frequency of learning outcomes (posttests) of experimental class students can be seen in the following table:

Table 5 - Frequency Distribution and Percentage of Learning Outcomes Scores (Posttest) of Control Class Students

Value Interval	Category	Control Class	
		Frequency	Percentage
80 < x < 100	Very Good	1	3,7%
60 < x < 80	Good	9	33,3%
40 < x < 60	Enough	15	55,6%
20 < x < 40	Less	2	7,4%
0 < x < 20	Very Less	-	
Sum		27	100%

Based on the table above, information was obtained that in the control class as many as 15 students got the posttest result score in the sufficient category with a percentage of 55.6%. Meanwhile, the posttest results in the less category were only 2 students with a percentage of 7.4%. So it can be concluded that most of the students in the control class have sufficient learning outcomes.

c. Hypothesis Test

The results of the inferential statistical analysis are intended to answer the hypothesis that has been formulated. The hypothesis test carried out is an independent sample t-test which aims to determine the difference in student mathematics learning outcomes between the experimental class and the control class. The t-test sample test in this study is as follows:

1) Independent sample t-test pretest experiment class and control class pretest

This analysis was performed by testing the average values of the experimental class pretest and the control class posttest using the IBM SPSS Statistics Version 26 application. The data requirement is said to be significant if the probability value is less than 0.05. The following are the results of the Independent Sample T-Test test of the pretest values of the experimental class and the control class.

Table 6 - Independent Sample t-Test Results between Experimental Class Pretest and Control Class Pretest

Data	t	df	*Sig* (2-tailed)	Description
Experiment class pretest and control class pretest	0,43	52	0,965	0,965 > 0,05 = No difference

With the test criteria, Ho is accepted if the significance value is greater than 0.05, and Ho is rejected if the significance value is smaller than 0.05. Based on the table above, it can be seen that the significance value (0.965 > 0.05) then Ho is accepted, meaning that there is no difference in the average value of the experimental class pretest and the control class pretest. The calculated t value of the test results above is 0.43. The table t value whose significance level = 0.05 and the df = 52 value is 2.006. Since t count is smaller than t table (0.43 < 2.006), it can be concluded that there is no difference.

2) Independent sample t-test experiment class pretest and control class pretest

This analysis was performed by testing the average values of the experimental class pretest and the control class posttest using the IBM SPSS Statistics Version 26 application. The data requirement is said to be significant if the probability value is less than 0.05. The following are the results of the Independent Sample T-Test test of the pretest values of the experimental class and the control class.

Table 7 - Independent Sample t-Test Results between Experimental Class Posttest and Control Class Posttest

Data	t	df	*Sig* (2-tailed)	Keterangan
Experiment class posttest and control class posttest	2,752	52	0,008	0,008 < 0,05 = There is no difference

With the test criteria, Ho is accepted if the significance value is greater than 0.05, and Ho is rejected if the significance value is smaller than 0.05. Based on the table above, it can be seen that the significance value (0.008 < 0.05) then Ho is rejected and Ha is accepted, meaning that there is a difference in the average value of the experimental class posttest and the control class posttest. The calculated t value of the test results above is 2.752. The table t value whose significance level = 0.05 and the df = 52 value is 2.006. Since t count is greater compared to t of the table t (2,752 > 2,006), So it can be concluded that there is a difference between the learning outcomes of experimental class students after treatment in the form of the use of Napier rod props and the learning outcomes of control class students after treatment without the use of Napier stem props.

Discussion

The description of the learning process with the use of napier rod props can be said to be going well. This is evidenced by all the percentage of the implementation of the learning process on the observation sheet is in the good category. This categorization is based on the categorization table for the implementation of the learning process according to Sugiyono in 2016.

The advantages of using napier rod props can be seen from the implementation of every aspect in the stages of using napier rod props as well as the enthusiasm and activeness of students in the learning process using napier rods. This enthusiasm and activeness of students can arise due to activities that involve students during the learning process. This is in line with Aristiani's statement (2013) who stated that the napier rod media had the advantage that the pictures could be moved easily so that students could be more enthusiastic about being physically active by moving the object numbers.

In addition, by using napier rods students are able to solve multiplication problems with larger numbers easily. This is because napier stems have advantages including; (1) The work on the multiplication calculation operation is simpler; (2) The way of working is not many binding rules (Tonen, Tembang, and Rahayu, 2021).

Based on the results of research that has been carried out, it shows that there are differences in learning outcomes in the experimental class and the control class. Student learning outcomes in the experimental class before being given treatment with the use of napier rod props were in the less category and after being given treatment with the use of napier rod props student learning outcomes improved and were in the good category. This is because the use of napier rod props makes it easier for students to solve multiplication problems, especially problems with large numbers. This is in line with the opinion of Aristiani, (2013) who argues that the way to multiply numbers by a napier bar is quite easy, that is, only seeing the number to be multiplied, then summing the diagonal (Aristiani, 2013). In addition, these napier bone props are used as auxiliary tools in solving problems related to multiplication operations, especially for multiplication by large numbers (Rahman, 2018).

Meanwhile, in the control class before being given treatment student learning outcomes were in the category of lacking and after being given treatment without the use of napier stem props, student learning outcomes were in the sufficient category. This is because some students in the control class still do not understand the mathematical material well. In class, control of the learning process carried out only using the worksheet of the multiplication table. Meanwhile, as is known that the use of teaching aids is very important to make it easier for students to understand the material presented by the teacher. This is supported by the opinion of Putri (2019) who argues that the benefit of props is to lower the abstraction of the concept, so that students are able to grasp the true meaning of the concept.

Hypothesis testing is carried out using an independent sample T-Test test to determine whether or not there is a difference between the experimental class pretest and the control class pretest and to find out whether or not there is a difference between the experimental class posttest and the control class posttest. From the results of the hypothesis test using an independent T-Test sample, the results were obtained that there was no difference between the experimental class pretest and the control class pretest and there was a difference between the experimental class posttest and the control class posttest. This shows that when napier rod props are used when giving treatment in the learning process, it will affect student learning outcomes so that there is a difference between the posttest of the experimental class and the control class.

Based on inferential statistical tests, namely data prerequisite tests and hypothesis tests, it shows that there is an influence on student learning outcomes after the use of napier stem props in the learning process. The results of hypothesis testing are carried out in two ways, namely comparing t tables and t counts and comparing probability values. The statistical results using the independent sample T-Test test that has been carried out through SPSS Statistics Version 26 obtained the table t value with df (52) = 2.006 while t count the student test answer results 2.752, t count (2.752) > t table (2.006) so that Ho was rejected and Ha was accepted. Whereas by comparing the probability values, obtained the posttest results values of the experimental class and the control class, the probability value of 0.008 < 0.05 means that Ho was rejected Ha was accepted. So it can be concluded that there is an influence on the use of napier rod props on the mathematics learning outcomes of grade IV upt spf students of SDN Maccini II Makassar City.

CONCLUSION

Based on the results of research that has been carried out by researchers, it can be concluded several things as follows:

1. The use of napier rod props in the learning process of experimental classes in mathematics subjects grade IV UPT SPF SDN Macini II Makassar City went well.
2. Student learning outcomes in experimental classes are more improved than learning outcomes in control classes. This is evidenced by the learning outcomes in the experimental class which are in the good category, while the learning outcomes in the control class are only in the sufficient category.
3. There is an influence on the use of napier rod props on learning outcomes in mathematics subjects grade IV UPT SPF SDN Maccini II Makassar City.

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