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The Influence of Batang Napier Media on the Learning Outcomes of Class III Elementary School Students

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ABSTRACT

This research aims to determine whether or not there is an influence of Napier learning media on the mathematics learning outcomes of class III MI NU Sumber Agung students. This type of research is a type of *experiment* (quasi-experiment). The population in this study were classes III A, III B, and III C MI NU Sumber Agung. The sample in this study was selected by drawing lots and class III A was selected as the experimental class and class III B as the control class. Based on data analysis and hypothesis testing using the t test, t_{count} is obtained amounted to 2,554 and t_{table} of 2.010 at the significance level $\alpha = 5\%$, then $t_{count} > t_{table}$, as a result H_0 rejected, so it can be concluded that there is a difference in the learning outcomes of students taught using Batang Napier media with students taught using the repeated multiplication method. So, with these differences, it can be said that there is an influence of the use of Napier stem media on the learning outcomes of students in class III MI NU Sumber Agung.

1. Introduction.

The world of education is increasingly required to be more effective and enjoyable. Increasing the progress of a nation can be done by improving the quality of education (Syaifuddin, 2017). Education has a very important function in the development of every country. Education is a reflection of the quality of a nation.

Whether a country is said to be developed or not can also be seen from how high the quality of education in that country is (Handayani & Yanti, 2017). Thus, without good education it is difficult for a group of people to achieve a bright, peaceful and prosperous future, so education must be implemented as well as possible to obtain maximum results.

At the elementary school level there are various subjects taught, one of which is mathematics learning, where in learning mathematics students can understand how to think critically and be skilled at calculating and have the ability to apply them in everyday life (Qiftiyah, 2023). In essence, mathematics is a logical and systematic science, which is deductive (from general to specific). In the Big Indonesian Dictionary it is written that mathematics is the science of numbers, relationships between numbers and operational procedures used in solving problems regarding numbers.

In the learning implementation process, mathematics is a teaching and learning process built by educators to develop students' creative thinking and improve their ability to construct new knowledge as an effort to improve their mastery of mathematics material better (Susanto, 2013). Apart from that, mathematics learning is an exact science that is related to reasoning, therefore, in order to implement an effective mathematics learning process, it is necessary to create a situation where students can be active, creative and responsive physically and mentally (Rahmah, 2018). In this case, educators must try to facilitate students to find and solve problems by using appropriate mathematics learning tools or media.

Learning media is a means of infrastructure in teaching and is a tool to make it easier for educators to apply curriculum content so that it is more easily understood by students (Aghni, 2018). The use of media in the learning process is very important because students in receiving learning experiences or deepening their subject matter still need many objects, events that are concrete, easy to observe, observed directly so that the experience will be easier to understand (Wahid, 2018).

The application of learning media is one way for educators to pay attention to the condition of students (Abidin, 2016). Because students' conditions vary in receiving learning which is influenced by several factors. This student factor is precisely the target of using learning media. Without paying attention to and understanding the mental development of students or the level of students' thinking power, it will be difficult for educators to achieve success in learning. In this context, the mathematics learning media used is expected to make students more active and help make it easier for students to multiply whole numbers from smallest to largest.

Based on pre-research observations in class III of MI NU Sumber Agung, a problem was found, namely that there were still many students who did not memorize basic multiplication, as a result, mathematics was considered a difficult subject and ultimately feared, making students quickly bored and inactive. Multiplication of whole numbers is one of the materials that is considered difficult to understand. Students tend to be confused when multiplying whole numbers, especially for large numbers. The lack of learning media and teaching aids in the mathematics learning process causes low learning outcomes obtained by students. In

learning mathematics, it is very necessary to use learning media or teaching aids that are interesting and make it easier for students to learn about multiplication of whole numbers, but in this case it is not optimal. The low learning outcomes of students so that students' success in learning is very minimal is a result of the learning process which is still centered on educators, students mostly listen, write and listen to practice questions given by educators so that learning is less interesting and makes students get bored quickly.

Based on the results of an interview with Mrs. Suprihatin as the homeroom teacher in class III A, she said that for the material on multiplication of whole numbers, multiplication still uses descending order (ordering downwards). Meanwhile, the Napier stem learning media has never been used in teaching and learning activities in the classroom. This happens because of limited time for teaching and learning activities so it is not possible to use learning media or teaching aids. Based on initial observations and interviews with class III A homeroom teachers, it is known that MI NU Sumber Agung students are still weak in multiplication operations, so they experience difficulties when dealing with material that makes it look like the operation of multiplying whole numbers. The following is an analysis of student score data documents, the table below.

Table 1. Data on Learning Results from Daily Mathematics Tests for Class III MI NU Sumber Agung Students for the 2022/2023 Academic Year

Class	KKM	Number of students (people)	The number of students completed (people)	Number of incomplete students (people)	Completed (%)	Incomplete (%)
III A	65	25	9	16	36%	64%
III B	65	25	11	14	44%	56%

Source: MI NU Class III educator documentation Sumber Agung

Based on the table above, it is known that class III A mathematics learning outcomes in daily tests are relatively low, namely only 36% meet the minimum completeness criteria (KKM) while 64% of the 25 students do not meet the KKM. Meanwhile, the mathematics learning results in class III B were only 44% that met the minimum completeness criteria (KKM) and 56% of the 25 students did not meet the KKM. This is also the reason the researcher chose class III as the source of this research because there is a problem, namely that student learning outcomes in mathematics learning are still low and in terms of student activity they are less active in learning. To overcome this, other learning media need to be innovated, one of which is media. napier stem.

Using Napier stem media, it is hoped that it will be easier for students to do multiplication problems even though they involve large numbers because this media offers a simple way of calculating, namely by changing the concept of multiplication into the concept of addition so that it is easier, more fun, practical, and does not

burden the child's brain memory, so that students don't feel burdened by the material and feel happy solving multiplication operation problems correctly. With a pleasant atmosphere, the teaching and learning process will be better, students will be more active in learning, both asking and answering questions given, which will ultimately improve mathematics learning outcomes.

Many studies related to Napier stem media have been carried out previously. (Alwi et al., 2021)(Merdja, J., & Pendy & Afifah Zahra Arinda Ramadhanti, 2022)(Nurapriani et al., 2023)(Yuliyanti, 2017)(Aristiani, 2013)(Merdja & Pendy, 2020)(Putri, 2019) it's just that these studies have not focused on mathematics learning outcomes. Based on the background described above, the author is interested in conducting research on "The Influence of Batang Napier Media on the Learning Outcomes of Class III MI NU Sumber Agung Students".

2. Method

The research method used in this research is the research method like an experiment (quasi-experiment), namely a design that has a control group, but cannot fully function to control external variables that influence the implementation of the experiment (Sugiyono, 2013).

Table 2. Experimental Design Nonequivalent Control Group Design

Group	Pre-Test	Action	Final-Test
Eksperimen	O ₁	X	O ₂
Kontrol	O ₁	C	O ₂

Information:

O₁ = Initial (*pretest*)

O₂ = Final Test (*posttest*)

X = Experiment Group

C = Control Group

The population in this study was classes III A, III B, and III C MI NU Sumber Agung for the 2022/2023 academic year, a total of 3 classes. Meanwhile, the sample is a portion of the population selected to be used as a data source. Sample selection was carried out using techniques of random sampling. Random sampling is a sampling technique by taking sample members from a population randomly without paying attention to the strata in that population. In this study, it was chosen by lottery and class III A was chosen as the experimental class and class III B as the control class.

Data collection techniques in this research are observation, interviews and tests.

3. Results and Discussion

The results of this research include instrument test data and class III mathematics test result data. In this study, data on mathematics learning outcomes were obtained by doing trials mathematics learning outcomes tests consisting of 10 essay questions. This trial was carried out outside the research sample, namely on 25 class III students at MI NU Sumber Agung. The validity of this test instrument includes question material that matches the stated indicators according to competency, material content and class level, questions use standard language and do not give rise to double meanings. The questions use question words or command words, the questions contain instructions on how to do the questions, and have guidelines for scoring the items to be tested.

Test trials are carried out to find out whether the question items can measure what they want to measure. In an effort to obtain accurate data, the tests used in this research must meet good criteria. Testing the validity of the mathematics learning outcomes test in this study uses Microsoft Excel. The results of validity calculations can be seen in the following table:

Table 3. Validity of Mathematics Learning Outcomes Test Questions

Question Item Number	r_{tabel}	r_{hitung}	Result
1	0,396	0,791	Valid
2	0,396	0,666	Valid
3	0,396	0,426	Valid
4	0,396	0,791	Valid
5	0,396	0,019	Invalid
6	0,396	0,541	Valid
7	0,396	0,364	Invalid
8	0,396	0,236	Invalid
9	0,396	0,541	Valid
10	0,396	0,233	Invalid
11	0,396	0,791	Valid
12	0,396	0,544	Valid
13	0,396	0,438	Valid
14	0,396	0,803	Valid
15	0,396	0,045	Invalid

The results of the calculation of the validation of test items on the 15 test items that were tested showed that there were 10 items that were classified as valid, namely item numbers 1, 2, 3, 4, 6, 9, 11, 12, 13, and 14.

Table 4. Difficulty Level of Mathematics Learning Outcomes Test Items

Question Item Number	Difficulty Level	Result
1	0,44	Currently

2	0,424	Currently
3	0,384	Currently
4	0,44	Currently
5	0,44	Currently
6	0,368	Currently
7	0,36	Currently
8	0,304	Currently
9	0,28	Difficult level
10	0,344	Currently
11	0,368	Currently
12	0,44	Currently
13	0,296	Difficult level
14	0,448	Currently
15	0,408	Currently

The results of calculating the level of difficulty of test items for 15 essay questions show 13 questions in the medium category, namely 1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 14 and 15 and 2 questions in the difficult category, namely 9 and 13 with a difficulty level < 0.30 .

There are 10 valid instruments in the mathematics learning outcomes test trial which can be categorized as valid items, namely 1, 2, 3, 4, 6, 9, 11, 12, 13, and 14 with some questions being revised and other questions not used in research, in an effort to find out whether the items can be used for further research, the researcher conducted a reliability test on the 10 questions using the alpha formula. The calculation results can be seen in the table:

Table 5. Reliability test of Mathematics Learning Outcomes Test Questions

Statistic	
<i>r_{count}</i> Conclusion	<i>r_{count}</i> Conclusion

The alpha coefficient has been obtained, so the benchmark for interpretation with a degree of reliability of 0.861 is reliable so that the 10 questions can be used to measure student learning outcomes in future research.

The results of validity calculations, difficulty level tests, and instrument reliability are summarized in the following table:

Table 5. Conclusion of Question Instruments

Question items	Validity test	Difficulty level	Result
1	Valid	Currently	Used
2	Valid	Currently	Used
3	Valid	Currently	Used

4	Valid	Currently	Used
5	Invalid	Currently	Not in use
6	Valid	Currently	Used
7	Invalid	Currently	Not in use
8	Invalid	Currently	Not in use
9	Valid	Dificult Level	Used
10	Invalid	Currently	Not in use
11	Valid	Currently	Used
12	Valid	Currently	Used
13	Valid	Dificult Level	Used
14	Valid	Currently	Used
15	Invalid	Currently	Not in use

Based on the validity calculation table, level of difficulty and reliability of the questions, from the 10 questions tested, the researcher took 10 questions, namely questions number 1, 2, 3, 4, 6, 9, 11, 12, 13 and 14.

The normality test is used to determine whether the data obtained by researchers is normally distributed data or not. The normality test used in this research uses the method Liliefors on a computer program. The determination criterion is to compare the sig.(2-tailed) in the L method test tabel Liliefors with a significance level of 0.05 (5%). Thus the basis for decision making is $L_{hitung} < L_{table}$, then the data is normally distributed. On the other hand, if the decision is taken from the coefficient $L_{hitung} > L_{table}$, then the data is not normally distributed. Then the following data is obtained:

Table 6. Normality Test Results of Pretest Data on Mathematics Learning Results

No	Group	N	L_{hitung}	L_{table}	Test Decision
1	Experiment	25	0,126	0,173	H_0 accepted
2	Control	25	0,163	0,173	H_0 accepted

Table 7. Posttest Data Normality Test Results for Mathematics Learning Results

No	Group	N	L_{hitung}	L_{table}	Test Decision
1	Experiment	25	0,161	0,173	H_0 accepted
2	Control	25	0,160	0,173	H_0 accepted

Based on the calculations in the table above, the average score obtained from the normality results of the mathematics learning results data summarized above, the data will have a normal distribution if $L_{count} < L_{table}$. Thus the data comes from a normal distribution due to learning outcomes pretest $0.126 < 0.173$ for the experimental class and $0.163 < 0.173$ for the control class. And the data is normally distributed on learning outcomes posttest $0.161 < 0.173$ for the experimental class and $0.160 < 0.173$ for the control class..

The homogeneity test is used to determine whether the two samples use the same characters or not. The equality of variances test is carried out on the dependent

variable data, namely mathematics learning outcomes, using the F test. This variance test is by comparing the largest variance and the smallest variance. The results of the homogeneity test examiners with a significance level of (a) 5% obtained data on the significance level of mathematics learning outcomes $F_{(0.05; 24; 24)}$ which was 1.983. Test homogeneity with the F test, namely:

$$F = \frac{\text{largest variance}}{\text{smallest variance}}$$

Pre-test data on mathematics learning outcomes for experimental and control classes:

$$F = \frac{188,56}{158,24}$$

$$F = 1,191$$

So $F_{\text{count}} = 1.191$ and $F_{(0.05;24;24)} = 1.983$ so that H_0 is accepted, meaning the experimental class and control class come from the same variance (homogeneous population).

Posttest data on mathematics learning outcomes for experimental and control classes.

$$F = \frac{140,64}{131,36}$$

$$F = 1,070$$

So $F_{\text{count}} = 1.070$ and $F_{(0.05;24;24)} = 1.983$ so that H_0 is accepted, meaning the experimental class and control class come from the same variance (homogeneous population). Thus it can be concluded that the sample comes from a homogeneous population. So based on the F test it can be stated that the two populations are homogeneous and hypothesis testing can be continued using the t-test.

Hypothesis testing was carried out to see whether there were differences in the pretest and posttest results of students from the experimental group and the control group. The hypothesis test used is the t test because it is based on statistical calculation results and pretest and posttest data are normally distributed and homogeneous. The calculation results of the pretest and posttest hypothesis tests for the experimental group and control group can be seen in the table. The distribution of data can be seen in the attachment. The data analysis technique used in the research, after the prerequisite tests have been met, further tests are carried out, namely hypothesis testing. To test the hypothesis, the t test is used which includes testing the equality of two means using the t-test

H_0 : There is no effect of using Napier stem media on the mathematics learning outcomes of class III MI NU Sumber Agung students.

H_a : There is an influence of using Napier stem media on the mathematics learning outcomes of class III students at MI NU Sumber Agung.

Table 8. Hypothesis Test Results for experimental and control classes

No	Class	T_{count}	T_{table}	Result
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1	Ekspерimen kontrol	dan	2,554	2,010	H ₀ accepted	rejected/H ₁
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In the table above, it is known from the results of the hypothesis calculation that the *posttest* value for the experimental and experimental class t is 2.554 which is greater than the t_{table} which is 2.010 with the conclusion that H_0 is rejected so that H_1 is accepted. Thus, it can be concluded that the learning outcomes of students taught using Napier stem media are different from those of students taught using the repeated multiplication method.

The results of the research show that students' mathematics learning outcomes using Napier stem media are higher than mathematics learning outcomes using the concept of repeated addition. This is in accordance with data analysis and hypothesis testing, obtained t_{count} is 2.554 while t_{table} is 2.010, meaning $t_{count} > t_{table}$ so H_0 is rejected and H_a is accepted, so it can be concluded that there is a significant influence of the use of Napier stem media on mathematics learning outcomes in class III MI NU Source Great. One factor that can influence student learning outcomes is the use of learning media. Implementing learning using learning media includes educators' efforts to innovate and be creative in the learning process, so that learning does not seem monotonous and boring for students. Napier stem media is one of the factors for improving student learning outcomes, where learning activities can be carried out in an interesting, easy and fast way so that they can be maximized to achieve learning outcomes.

Based on the results of research conducted by researchers on students during the learning process, it shows that there are differences in student activities where using Napier stem media in the experimental class makes students who take part in it feel interested in taking part in the learning so that students are more active in listening and understanding the learning in class. This sense of interest creates a deeper desire and effort in students to further improve their understanding and ability to solve problems given by the teacher. The results of this research are supported by various existing studies which state that learning using media has a positive impact (Afriana & Prastowo, 2022; Atikah et al., 2021; Hanisah et al., 2022; Loliyana et al., 2022; Mudinillah et al., 2022; Simanjorang et al., 2020). Using Napier stem media as a learning tool can help improve mathematics learning outcomes (Merdja & Pendi, 2020). Because students not only know the theory explained by the educator, but students can also participate in the transfer of stem multiplication. Apart from that, students are not only given to memorize but also directly multiply the numbers in boxes that have been arranged in a square shape.

However, Napier stem media has a weakness, namely that it can make students dependent on this media. Apart from that, students will experience difficulty in multiplying diagonal results in large numbers, for example multiplying four numbers, five numbers, and so on. However, these shortcomings can be anticipated by students having to concentrate fully and carefully in adding diagonal numbers, and the role of educators is very necessary to help students who experience difficulties. When compared with the control class which uses the concept of

repeated addition, this concept makes students less interested and tend to be more passive in learning and pay less attention to the teacher's explanations. Some students also appear less enthusiastic in participating in learning, especially during learning, especially when the questions are asked. distributed by educators, it turns out it contains the operation of multiplying hundreds.

This is because they have not memorized multiplication, if the number being multiplied is large it will take a long time to do the multiplication using the concept of repeated addition. Thus, based on the results of the research above, Napier stem media is one of the appropriate media that educators can choose to use in multiplication integer operation material, especially for dealing with students who have not memorized multiplication because apart from making multiplication the media does not require expensive costs, this media can immediately help students who have difficulty answering multiplication questions without requiring a long time or process. Apart from that, Napier stem media also provides students with a more real/concrete experience. Napier stem media can be a temporary solution for students who still haven't memorized multiplication. Apart from that, educators must also continue to motivate students and provide an understanding of the concept of multiplication.

4. Conclusions and suggestions

Based on data analysis and hypothesis testing using the t test, t is obtained tcount amounted to 2,554 and ttable of 2.010 at the significance level $\alpha = 5\%$, the tcount > ttable, As a result H0 rejected, so it can be concluded that there is a difference in the learning outcomes of students who are taught using Napier stem media and students who are taught using the repeated multiplication method. So, with these differences, it can be said that there is an influence of the use of Napier stem media on the learning outcomes of students in class III MI NU Sumber Agung. Through this research, it is hoped that it can provide inspiration and motivation for more in-depth research on learning media used in schools, so that problems that have not been studied by the author due to time constraints can be studied in order to perfect this research

5. Author Contributions

Maratul Qiftiyah prepared the research concept and design, collected data, Teguh Yuniyanto presented tables, Atika Nur Hidayati and Tri Maya Sari prepared the discussion, conclusions and abstract).

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