

The Effectiveness of the Use of The Result Determining-Lamp Media Students at SDN Senden Peterongan

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ABSTRACT

Concepts in mathematics include abstract concepts, especially for elementary students. So that teachers are required to always innovate in learning so that learning is effective, not boring and students more easily understand concepts correctly. This learning requires media that is appropriate to the material and cognitive development of students. The media used in this research is result determining lamp to determine the least common multiple (LCM) and the greatest common divisor (GCF) of a number. This study aims to discuss the effectiveness of result determining-lamp media to determine the results of LCM and GCF in grade IV students at SDN Peterongan Jombang. Effectiveness in research is seen from how the average learning outcomes and whether there are significant differences in student learning outcomes with and without the result determining-lamp media. Sampling uses a saturated sample, so that all class IV is used as a sample. Based on the results of the study, it was concluded that the use of result determining-lamp media is an effective determinant of learning outcomes because the average learning outcomes of the experimental class are higher than those of the control class and through the t-test there are differences in the learning outcomes of class IV students with and without the result determining-lamp media.

Keywords: Effectiveness, Learning Outcomes, Result Determining Lamp.

ABSTRAK

Konsep-konsep dalam matematika termasuk konsep yang abstrak, terutama bagi siswa SD. Sehingga guru dituntut untuk selalu berinovasi dalam pembelajaran agar pembelajaran efektif, tidak membosankan serta siswa lebih mudah memahami konsep dengan benar. Pembelajaran tersebut memerlukan media yang sesuai dengan materi dan perkembangan kognitif siswa. Media yang digunakan dalam penelitian ini yaitu lampu penentu hasil untuk menentukan KPK dan FPB dari suatu bilangan. Penelitian ini bertujuan membahas efektivitas penggunaan media lampu penentu hasil KPK dan FPB pada siswa kelas IV SDN Peterongan Jombang. Efektivitas dalam penelitian dilihat dari bagaimana rata-rata hasil belajar serta adakah perbedaan secara signifikan hasil belajar siswa dengan dan tanpa media lampu penentu hasil. Pengambilan sampel menggunakan sampel jenuh, sehingga seluruh kelas IV dijadikan sampel. Berdasarkan hasil penelitian disimpulkan bahwa penggunaan media lampu penentu hasil efektif untuk pembelajaran karena rata – rata hasil belajar kelas eksperimen lebih tinggi daripada kelas kontrol dan melalui uji-t terdapat perbedaan hasil belajar siswa kelas IV dengan dan tanpa media lampu penentu hasil.

Kata kunci : Efektivitas, Hasil Belajar, Lampu Penentu Hasil, Media Pembelajaran

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Introduction

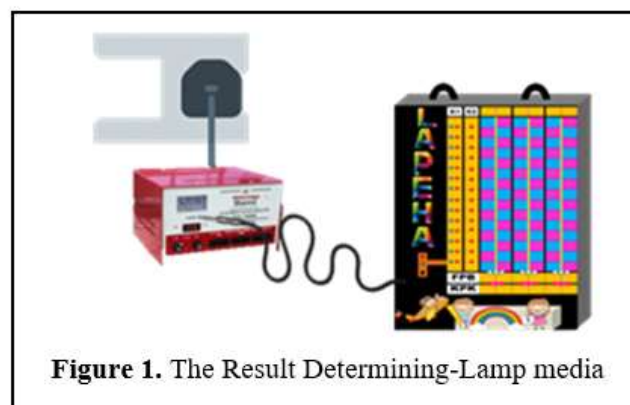
Mathematics is a field of study that occupies an important role in the world of education. Mathematics can be used as a means to help humans overcome problems that exist in life (Alfianika, 2018). Understanding mathematics is an important basis for thinking and solving mathematical and real-life problems (Annisah, 2017). Mathematics basically teaches reason and logical thinking. Mathematics is often associated with counting. Determining LCM and GCF is part of math skills. The results showed that the numeracy skills of upper class students at SDN Talabiu had 4 categories, namely the high category of 16%, the moderate category of 62%, the less category of 14% and the very low category of 8%. Based on the results of this study, it can be seen that the numeracy skills of elementary school students need to be improved (Suciayati et al., 2022).

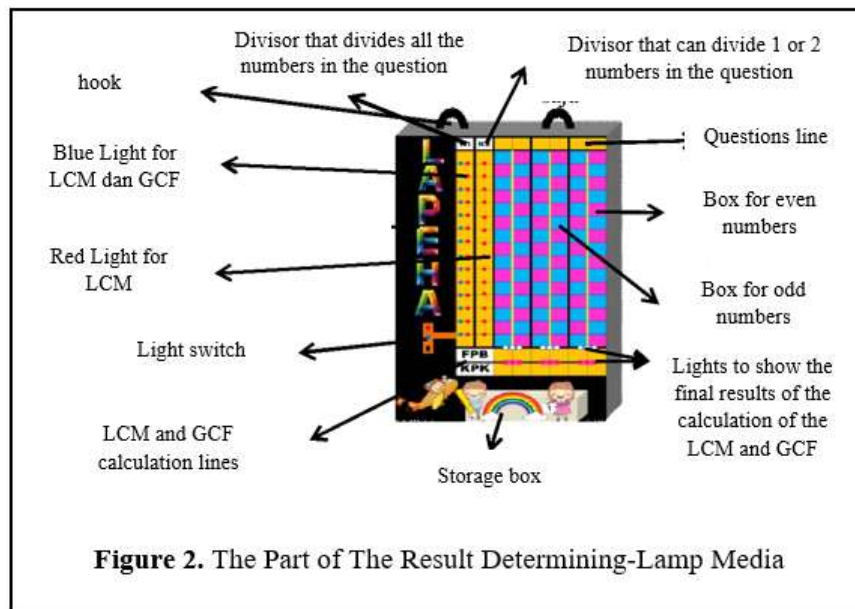
Through learning mathematics, it is hoped that students can develop critical, logical, systematic, careful, effective and efficient thinking skills in solving problems. Based on the information obtained from the fourth-grade mathematics teacher at SDN Senden Peterongan that the use of media and visual aids is rarely used in the learning process, this is due to the limited availability of teaching aids. Students have difficulty understanding the concept of using number factors to solve LCM and GCF problems. Meanwhile, based on the results of interviews with several grade IV students, LCM and GCF materials were difficult for them to understand. This problem in learning mathematics challenges teachers to be innovative in developing learning approaches and media (Muhassanah et al., 2022).

According to Piaget's theory, children aged 7 to 11 years are experiencing cognitive development from pre-operational, namely the development of the ability to use symbols to express objects to the concrete operational stage, namely the ability to think logically, meaning that to understand a concept, children must still be given activities that are related to concrete objects or concrete events that their minds can understand (Trianto, 2011). Therefore, when the learning process takes place, the teacher can use learning media to help the learning process.

Learning media is anything that can convey messages from sources in a planned manner so as to create a conducive learning environment and the recipients can carry out the learning process effectively and efficiently (Munadi, 2013). Meanwhile, according to Arsyad, states that the main function of learning media is as a tool for teaching and influencing the learning environment designed and created by the teacher (Arsyad, 2013).

The use of learning media on LCM and GCF materials is needed so that students can easily understand them. The result determining-lamp media of the LCM and GCF are simple media that use stereofoam and plywood accompanied by red and blue lights that will show the results of the LCM and GCF to make it more attractive to students in learning. The use of the result determining-lamp media as a determinant of results in the learning process will provide optimal results when used appropriately, in the sense that it is in accordance with the procedures and subject matter. The result determining-lamp media has advantages in its application, namely that there are red and also blue lights in determining the results of LCM and GCF which can attract students to pay attention to the learning material of LCM and GCF and it is hoped that with the application of result determining-lamp media, learning can run optimally and get the desired learning outcomes. The shape of the result determining-lamp media of the LCM and GCF is shown in Figures 1 and 2.





The media in this study include manipulative objects. Manipulative objects by type consist of concrete objects and virtual objects. Based on its characteristics, it consists of constructivist manipulatives, informative teaching aids and mathematical games (Istiandaru et al., 2017). Mathematical manipulative objects are objects that can be held by individuals where mathematical thinking is conscious and will not be developed (Swan & Marshall, 2010). The result determine-lamp media that determines the results of the LCM and GCF is a constructivist manipulative object. Through the right media is an effort to prepare better learning conditions which can then increase student activity and cognitive abilities (Agustina et al., 2019). This means that using suitable media can make learning more effective and can attract students' attention to be more active. The use of media should be a part that needs to attract the attention of the teacher as a facilitator in all learning activities. Therefore, all teachers need to learn how to determine effective learning media to achieve learning goals and the educational process (Febrita & Ulfah, 2019).

Learning media for LCM and GCF materials that already exist include dakon, musi boards (multi-function) and dakon sponges. This Dakon media is shaped like a suitcase made of wood. This material was chosen so that the media can be durable and strong. This media is shaped like a suitcase with a handle on one side to make it easier to carry. The size of this media is 70 cm long, 47 cm wide, 7 cm high so that it can be used in classical learning. This media is shaped like a suitcase so that marble items can be put into this media so that it becomes practical (Putra, 2021). Musi Board (Multi Function) is a modified learning media containing a number from 1 to 100. The numbers on the Musi board are adjusted to the existing questions. Musi boards are used by educators to minimize students' difficulties in completing mathematics learning on LCM and GCF material. Because students always have difficulty differentiating the completion of LCM and GCF material by using factor trees which are often taught by educators in general (Nurhasanah et al., 2021). Sponge dakon media is a learning medium in the form of dakon which is shaped like the Spongesbob cartoon character, this was chosen because elementary school children really like cartoons, especially Spongesbob, of course students are very familiar with the cartoon character. So it is hoped that in the learning process students are interested and motivated to carry out learning well and have fun (Fitri, 2020).

In this study, the result determining-lamp media were used in STAD (Student Teams Achievement Division) cooperative learning. STAD type cooperative learning steps, namely the teacher prepares the lesson (opens the lesson), the teacher delivers learning material using the outcome-determining light media, the teacher divides into groups and guides students to discuss and appoints representatives from the group for presentations, the teacher gives quizzes individually, the teacher gives awards to groups based on achievement scores, the teacher guides students to conclude the material that has been studied and closes learning (Trianto, 2009).

Based on this background, the researcher conducted this research with the following problem formulation:

- 1). How is the effectiveness of the result determining-lamp media on LCM and GCF material at class IV SDN Senden Peterongan?
- 2). Is there a difference in the learning outcomes of grade IV students with and without using the result determining-lamp media on the LCM and GCF materials at SDN Senden?

Research Methods

This research is a type of experimental research. Experimental research is a way of looking for a causal relationship (causal relationship) between two factors that are deliberately raised by researchers by reducing or eliminating disturbing factors. (Arikunto, 2010). The purpose of this experimental research is to investigate whether there is a causal relationship and how big the causal relationship is by giving treatments or (treatment) to the experimental class and the control class as a comparison (Arikunto, 2013).

The research design used in this research is a quasi-experimental design posttest control design. Here there is an experimental class and a control class. Where the experimental class learning was given treatment using the result determining-lamp media to determine the results of LCM and GCF while the control class did not use the result determining-lamp media to determine the results of LCM and GCF. After that, the two classes were given a test to find out the learning outcomes of the two classes.

The sampling technique used is a saturated sample, namely taking the entire population as a sample. The saturated sample technique was carried out by researchers because there were only two classes, to determine which class would become the experimental class/control class, the researcher used a simple lottery method. Where the drawing is done with two rolled papers. The papers were written with the words experiment and control, both papers were given to the head of each class. Then the head of the class takes the raffle paper, if the scroll that says experiment is taken, then the class becomes the experimental class, while the class that takes the other roll will become the control class.

The data collection method in this study used a test. This test is to determine student learning outcomes. The instrument in this study used test questions. The instrument is validated before use. Expert and empirical validation. Data analysis techniques in research are conducting normality tests, homogeneity tests and hypothesis testing. The normality test in this study uses SPSS for Windows version 20.0 calculations with the Kolmogorov Smirnov test. The homogeneity test was carried out to find out whether the samples in the control class and the experimental class had a homogeneous variance or not. Test the homogeneity of the data using SPSS for Windows version 20.0 with the Test of Homogeneity of Variance. The hypothesis test in this study is the t-test. The t-test is used to determine differences in learning outcomes

between the learning outcomes of the experimental class and the learning outcomes of the control class. Different tests were carried out using the Independent sample T-test method. To find out the effectiveness seen from the results, the average learning of the two classes.

Result and Discussions

Based on the sampling technique, it was found that the class used as the sample in this study was class IV A which consisted of 24 students as the experimental class and class IV B which consisted of 22 students as the control class.

Test Results Problem

The instrument used in this study was a mathematics learning achievement test which consisted of 5 essay questions. Before being used, the researcher first tested the validity of the expert on mathematics education lecturers. After being validated by the lecturer, the researcher also tested the validity and reliability empirically by testing the test questions to students other than the experimental class and the control class. The researchers conducted trials on students from other schools, namely class IV A of SDIT Segodo Rejo Sumobito Jombang for the 2021/2022 academic year, because students in this class have the same abilities as students in the experimental class and control class seen from the results of learning mathematics. The researcher used the SPSS.20 program to calculate the validity of each question item. In table 1 below are the results of testing the validity of the test questions through calculations using the SPSS 20 software program.

Table 1. Test Results for the Validity of Test Questions

Question Number	Product Moment Correlation	Interpretation
1	0.852	Very High
2	0.879	Very High
3	0.592	Quite High
4	0.588	Quite High
5	0.725	High

Based on the results of the test validity test, the test questions are said to be valid if it has a minimum validity interpretation of quite high. So the five questions are valid. The reliability test is used to find out whether the test items are consistent. The reliability of a test item is also a condition of a test that can be trusted and can be used as a good instrument in research. Researchers used the SPSS 20 program to test the reliability of the questions using the Alpha Cronbach formula. Reliability test results using SPSS 20 as in Table 2 below.

Table 2. Test Results of Reliability Test Questions

Reliability Statistics	
Cronbach's Alpha	N of Items
0,785	5

Based on the output of reliability results through the Alpha Cronbach statistical test is 0.785 according to the interpretation of reliability, the data used has a high interpretation. In this study, the instrument is considered reliable if it meets the interpretation is quite high, high or very

high. So, the instrument of test questions above reliable and can be used as an instrument in the study.

Description and analysis of research data

Test results in the experimental and control class as in Table 3 below.

Table 3. Sample Class Test Results Data

Class	N	$\sum x$	\bar{x}
Experiment	23	1720	74,78
Control	20	1180	59

Table 4. Distribution of Experimental Class Test Results Value

Value Interval	Frequency
20 - 34	2
35 - 49	0
50 - 64	1
65 - 79	5
80 - 94	15
Total	23

Table 5. Distribution of Control Class Test Results Value

Value Interval	Frequency
31- 44	4
45 - 58	6
59 - 72	7
73 - 86	1
80 - 94	2
Total	20

In the experimental class, class IV A at SDN Senden Peterongan Jombang, as many as 23 students took the test because 1 student did not enter. Based on the data in Table 3, the number of 23 students in the experimental class was 1720 and the mean or the average value of 23 students was 74.78. In the control class namely class IV B at SDN Senden Peterongan Jombang, as many as 20 students because 2 students did not enter. As shown in tables 4 and 5 that students who get a score between 80-94 are more experimental classes. Based on the data in Table 3, the number of values of 20 control class students is 1180 and mean or the average value of 20 students is 59. So the average learning outcome of the experimental class is higher than the control class, so that the results of the determinants of the results are effectively used in Learning in LCM and GCF materials that have just been learned by elementary students.

To find out whether or not there are differences in learning outcomes between class IV students and and without using the result determining-lamp media for LCM and GCF material in SDN Senden there are several steps taken, namely the data normality test, homogeneity test and hypothesis test using the t test. In this study all the tests used the SPSS 20 program (Rozak & Hidayati, 2019). To do the data normality test, the following steps are as follows:

- a. Determine the hypothesis
 H_0 : Normal distribution test results data
 H_1 : The test results data are not normally distributed
- b. Determine the significant level
The significant level to test the hypothesis in this study uses 5% ($\alpha = 0.05$)
- c. Calculate the statistical test value
Conduct normality test using Kolmogorov-Smirnov on SPSS 20
- d. Decision-making
Based on the results of the SPSS output it can be seen that the value of sig. (2-tailed) Control class = 0.496 and sig value (2-tailed) experimental class = 0.075 and > 0.05 ; then H_0 is accepted.
- e. Conclusion
So accept H_0 and reject H_1 , so it can be concluded that the test score data is normally distributed.

To test the data homogeneity, the following steps are as follows:

- a. Determine the hypothesis
 H_0 : Both classes have the same variance (homogeneous)
 H_1 : Both classes have variance that is not the same (homogeneous)
- b. Determine the significant level
The significant level to test the hypothesis in this study uses 5% ($\alpha = 0.05$).
- c. Calculate the statistical test value
Conducting a homogeneity test using a test of homogeneity of variance in SPSS 20.
- d. Decision-making
Based on the results of the SPSS output, it can be seen the significant value of based on mean of 0.605 which means more than $\alpha = 0.05$, then H_0 is received.
- e. Conclusion
So accept H_0 and reject H_1 so that it can be concluded that the data on learning outcomes of the two classes, namely control and experimentation have the same variant (homogeneous).
After it is known that the data obtained is normally and homogeneous distributed, the t-test can be done by using the independent sample t-test. T-test is carried out to determine the difference in the learning outcomes of mathematics for grade IV students based on the results of the LCM and GCF student material test results. T-test testing is carried out with the help of SPSS 20.

Testing steps (t-test) as follows:

- a. Determine the hypothesis
 H_0 : $\mu_1 = \mu_2$ means that there is no difference in the average learning outcomes of mathematics for grade IV students with and without using the results determining-lamp media at SDN Senden Peterongan for the academic year 2021/2022.
 H_1 : $\mu_1 \neq \mu_2$ means that there are differences in the average learning outcome of mathematics for grade IV students with and without using the results

determining-lamp media at SDN Senden Peterongan for the academic year 2021/2022.

- b. Determine a significant level
The significant level to test the hypothesis in this study is 5% ($\alpha = 0.05$).
- c. Calculate the statistical test value
This research uses the assistance of the SPSS 20 program.
- d. Decision-making
Based on the output results it can be seen that the value of sig = 0.007 which means less than $\alpha = 0.05$, then H_0 is rejected.
- e. Conclusion
So accept H_1 and reject H_0 so this shows that there are differences in the average learning outcomes of mathematics for grade IV students with and without using the results determining-lamp media at SDN Senden Peterongan for the academic year 2021/2022.

The results of this study are in line with the results of previous relevant research conducted by Fitri entitled The Effect of the Use of Sponges Dakon Media on LCM and GCF Materials on Learning Outcomes (Fitri, 2020). Based on the discussion above and the analysis of the research data shows that there are differences in the learning outcomes of mathematics for grade IV students with and without using the results determining-lamp media at SDN Senden Peterongan Jombang Academic Year 2021/2022.

Conclusion

Based on the results of descriptive analysis seen from the mean, median, and mode. In the experimental class the average value was 74.78 while in the control class 59, there was a difference of 15.78. For the median value in the experimental class is 80 while the control class is 55. then there is a difference in the median value between the experimental and control class of 25. In the experimental class there are 9 students who get the mode value with each score of 80, while in the control class There are 6 students who get the mode value of 50. So it can be concluded that the use of using the results determining-lamp media to determine the results of LCM and GCF is quite effective in learning.

Based on the hypothesis test (T-test) using the SPSS 20 program assistance, the Sig. value was obtained. (2-tailed) of 0.007. Whereas $\alpha = 0.05$, so sig $< \alpha$, then H_0 is rejected. Then it can be concluded that there are differences in the learning outcomes of mathematics for grade IV students with and without using the media determining the results at SDN Senden Peterongan Jombang Academic Year 2021/2022.

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