The Utilization of Online Media in Calculation Operations Mathematics Learning in Elementary School Students

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Abstract

This research aims to study whether it is necessary to use online media in mathematics learning arithmetic operations. The research method used in this study is research with a Quasi Experiment research design. The design chosen by the researcher is the nonequivalent control group design. This research was conducted on grade IVA students of SD Negeri 2 Tomohon divided into two groups: the experimental group collecting 13 children and the control group getting 13 children. The experimental group was approved to use online media (video), while the control group learned to use card media. This research data collection techniques were written tests in pre-test and post-test. Testing the hypothesis using the Independent Sample t-test obtained a significance value of 0.029 < 0.05. The results of the analysis of the t-test got the value of t-count = 2.330 > t-table = 2.064. H_0 rejected is intended a difference in the average learning outcomes of grade IVA mathematics at SD Negeri 2 Tomohon. The average learning outcomes of groups of students who use online media are higher than those required by using number card media. Based on these results, it can be concluded that online media influences mathematics learning in the arithmetic operations of Tomohon 2 Elementary School students.

Keywords: Online Media, Mathematics Learning, Learning Outcomes

1. Introduction

Mathematics is an essential and useful science in life, but many students are not interested in learning mathematics because it is considered that mathematics is a complicated and boring subject. Learning mathematics is generally related to children's inability to read, imagine, integrate knowledge, and experience understanding story problems. Children find it difficult to digest a still abstract phenomenon, so something abstract must be visualized or made real to reach its (V Iasha et al., 2019; Mix, 2019; Shimizu, 2020). In addition, the cause of difficulty in learning mathematics students is the unattractive teaching methods and styles of teachers making students less interested

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and less enthusiastic about the learning (Vina Iasha et al., 2020; Zulela et al., 2022). Another reason that mathematics lessons are not liked is that in providing subject matter, the teacher does not use appropriate learning media so that the information to be conveyed does not reach the students. Therefore, teachers need to develop mathematics teaching skills to become more interested and not consider mathematics a difficult subject (Rachmadtullah et al., 2020).

Learning media are everything that can be used to generate thoughts, feelings, attention, and abilities or skills of students to encourage the learning process (Kim, 2020; Setiawan et al., 2017). Interactive learning media in mathematics learning is one way to visualize abstract mathematical material that can easily be accessible to students and improve their memory of the material presented (Rohendi et al., 2018). The development and use of learning media today significantly affect absorbing material for students. Learning mathematics is very innovative by making learning media because creative learning media will attract students' attention.

The influence of advances in information technology that impact learning activities and programs have given birth to new forms of learning such as online learning, blended learning, and the distance education system or distance learning (Rachmadtullah et al., 2020). Information and Communication Technology quickly and cheaply has eliminated space, time, and place that have limited the world of education (Bal & Erkan, 2019; DAKHI et al., 2020). The rapid development of technology in the current era of globalization has provided many benefits for the advancement of education. With the help of technology, it will be easier for teachers to attract students' attention to mathematics subjects. Teachers make technology a medium in learning, such as online media. Global demands require the world of education to constantly adjust technological developments to improve quality, significantly changing its use for education, especially in the learning process (Caena & Redecker, 2019).

The use of internet technology as online media such as animated videos will provide many advantages for teachers and students. The use of video media in learning, of course, is not only to show students that the current learning media is more advanced, but what is more important is the information displayed through video media for a more complete, precise, varied, engaging, and fun learning experience (Astuti et al., 2021). Using media and technology that are done correctly will make learning activities and efforts to obtain information and knowledge more effective and efficient (Sari et al., 2020).

Based on the results of observations made by researchers at SD Negeri 2 Tomohon, it was found that the learning outcomes of mathematics in fourth-grade students were not optimal. This is caused by students' lack of learning motivation, where many think that mathematics is complicated. Another thing that causes learning outcomes in class IV are not optimal is that teachers have not used various learning media, so the material being studied is not used optimally by students. Therefore, researchers are interested in researching the effect of online media in learning mathematics for arithmetic operations on fourth-grade elementary school students. This research aims to determine whether there is an effect of using online media in learning mathematics for arithmetic operations on fourth-grade students of SD Negeri 2 Tomohon.

2. Research Method

The research method used in this research is the experimental method. The experimental research method is very productive because it can answer hypotheses related to causal relationships (Sukardi, 2011). The design used in this research is Quasi Experiment. A quasi-experimental design develops proper experimental design, which is difficult to implement (Sugiyono, 2010). A quasi-experimental method was used because, in reality, it was difficult to find a control group used for the study. The design chosen by the researcher is the nonequivalent control group design, as shown in table 1. In this design, neither the experimental nor control groups were selected randomly.

Table 1: Research Design Pretest-Posttest Non-Equivalent Control Group Design

Class	Pre-test	Treatment	Post-test
Experiment	O_1	X	O_2
Control	O_3	-	O_4

Information:

O_1 = the condition of the experimental group's initial learning outcomes

O_2 = the condition of the final learning outcomes of the experimental group

O_3 = the condition of the control group's initial learning outcomes

O_4 = the condition of the final learning outcomes of the control group

X = mathematics learning arithmetic operations with online media

The subjects of this study were students of class IVA SD Negeri 2 Tomohon. Twenty-six students in class IVA were further divided into two groups: the experimental and control groups, consisting of 13 children. The object of this research is the whole process of learning mathematics for arithmetic operations in grade IV SD Negeri 2 Tomohon. The data collected in this study were obtained using the Written Test technique. The test was conducted in the form of pre-test and post-test. The questions used in the test were first tested for their validity and reliability by using the SPSS computer program.

The data in this research were presented in the form of average values, maximum values, minimum values, and standard deviations and are presented in frequency distribution tables and histograms. Before testing the hypothesis, a prerequisite test was carried out, namely normality and homogeneity tests, to find out the sample came from a normal population distribution and had the same variance (homogeneous) after doing the normality test and the homogeneity test of the data. If the data is declared to be normally distributed and homogeneous, then to determine whether there is an effect of using online media on mathematics learning material for arithmetic operations for class IV SD Negeri 2 Tomohon. Hypothesis testing was carried out in this study using the t-test (t-test). The provisions are level of significance (α) = 0.05 or 5%, and the criteria used in the t-test are:

- Ho is accepted if Sig > 0.05, or t-count < t-table
- Ho is rejected if Sig < 0.05, or t-count > t-table

3. Result and Discussion

3.1 Result

Based on the research that has been done, the research results can be obtained from two different groups, namely, group A as an experimental group wherein this group uses online media and group B as a control group using number card media. The description of the experimental and control groups' data analysis can be seen in Table 2.

Table 2: The results of the experiment-control group that

Category		Statistics						
		Mean	Median	Modus	Std. Deviation	Minimum	Maximum	Variance
Experiment Class	Pre-test	68.23	68	60	10.568	55	85	111.692
	Post-test	88.46	90	85	7.742	75	100	59.936
Control Class	Pre-test	63	65	60	5.701	50	70	32.500
	Post-test	80.69	80	70	9.196	70	95	84.564

A normality test was carried out as a prerequisite for analysis. The data normality test was conducted to determine whether the distribution of the selected sample came from a normal population

distribution or not. The normality test in this study uses SPSS 25 software. The data is normally distributed if the value of the Asymptotic Sig coefficient at the Kolmogorov-Smirnov test output is greater than the specified alpha value, which is 5% (0.05). The calculation results obtained are shown in table 3.

Table 3: The Normality Test Results Pre-test and Post-test Experiment-Control Group

Data		Kolmogrov-Smirnov	Asymp Sig (2-tailed)	Result
Experiment Class	*Pre-test*	0.203	0.147	Normal
	Post-test	0.134	0.200	Normal
Control Class	*Pre-test*	0.176	0.200	Normal
	Post-test	0.194	0.197	Normal

Based on table 3, it can be seen that the pre-test and post-test data on the learning outcomes of the experimental group and the control group have a sig value > 0.05, so it can be said that the data group is normally distributed.

After knowing the level of normality of the data, then the homogeneity test is then carried out. A homogeneity test was conducted to determine whether the data group came from a homogeneous population. The homogeneity test in this study used Levene's test. The data was said to be homogeneous if the coefficient of Sig. at the Levene Statistic output is greater than the specified alpha value, 5% (0.05). The results of the homogeneity test can be seen in table 4.

Table 4: The Results of Homogeneity Test Pre-test and Post-test Experiment-Control Group

Data	*Levene Statistic*	Sig.	Result	
			Information	Conclusion
Pre-test	2.908	0.101	*Sig.* > 0.05	Homogen
Post-test	0.807	0.378	*Sig.* > 0.05	Homogen

Based on table 4, the value of Sig. on Levene Statistics, the pre-test of the experimental-control group was 0.101 > 0.05 and the post-test of the experimental-control group was 0.378 > 0.05. From these results, it can be concluded that the experimental group data and control group data are homogeneous (same).

Hypothesis testing in this study is carried out if the prerequisite analysis test has been carried out. The analysis prerequisite test consists of a normality test and a homogeneity test. A prerequisite analysis test was conducted to determine whether the experimental and control groups' data were normally distributed and homogeneous (same). After the data is confirmed to be normally distributed and homogeneous (same), the next step is to test the hypothesis because the conditions for testing the hypothesis have been met. The analysis used is the t-test with the help of SPSS 25, the criteria used to decide on the hypothesis with a significance level of alpha 5% (0.05), namely H0 is rejected if the probability significance function (sig) <0.05. If the probability significance value (sig) < 0.05, then the null hypothesis (H_o) is rejected, on the contrary, if the probability significance value (sig) > 0.05, then the null hypothesis (H_o) is accepted.

This t-test was conducted to determine whether there was a significant difference between the post-test results of learning mathematics for arithmetic operations in the experimental and control groups. The hypotheses tested in this study are:

Ho: the average mathematics learning outcomes of students taught arithmetic operations using online media are less than the same as students' learning outcomes taught using number card media

H1: the average mathematics learning outcomes of students who are taught arithmetic operations using online media are higher than students' learning outcomes who are taught using number card media

The criteria used to conclude the hypothesis with a significance level of 5% (0.05), namely, if the value of t-count < t-table or sig> 0.05, then H_o is accepted and H_1 is rejected, which means that the average mathematics learning outcomes of students' arithmetic operations are taught using online media is less than the same as student learning outcomes taught using number card media. On the other hand, if the value of t-count > t-table or sig < 0.05, then H_o is rejected and H_1 is accepted, which means that the average mathematics learning outcomes of students taught arithmetic operations using online media are higher than student learning outcomes using number card media. The results of the post-test t-test can be seen in table 5.

Table 5: Results of Post-test t-test Results of Mathematics Learning Materials Operational Computing Experiment-Control Group

Data	T	Df	*Sig.* (2-tailed)	Conclusion
Pre-test Experiment-Control Group	2.330	24	0.029	There is a significant difference

Based on the table above, the post-test t-test data was obtained from the mathematical learning outcomes of arithmetic operations for the experimental and control groups with a t-value of 2.330 > t-table 2.064 and a sig value. (2-tailed) 0.029 < 0.05. So it can be concluded that H_o is rejected and H_1 is accepted, which means that the average mathematics learning outcomes of students who are taught arithmetic operations using online media is higher than the learning outcomes of students who are taught using number cards media.

This section describes the research results in detail, including displaying calculation results, needs analysis results, etc. The results of this study can also be displayed in the form of tables or figures, provided that the tables or figures should not be too long, too large, and too numerous. The author should use variations in the presentation of tables or figures, and each table or figure presented must be referenced (not rewritten) in the text. We recommend that you do not include SPSS data processing results tables in the article (authors are required to re-summarize and create a separate table according to the format requested in this template).

3.2 Discussion

The study was conducted at SD Negeri 2 Tomohon in April 2020. The research subjects were students of class IVA divided into two groups, namely the experimental group and the control group. The study was conducted in two meetings for each experimental and control group. The difference between the experimental and control groups lies in the learning media used to deliver the material. The teacher provided the material using online media (video) in the experimental group. Meanwhile, the teacher had the material using number card media in the control group. Due to the current COVID-19 outbreak, students study from home.

This research was conducted by visiting students at home in collaboration with researchers, classroom teachers, parents, and students. In this case, students get a guidebook and media distributed by the teacher, and with the guidance of parents, students do learn from home. Meanwhile, the teacher monitors and provides direction to students in carrying out learning through parents. After learning is complete, the teacher picks up student learning outcomes. The difference in the media used in delivering the material aims to determine the effect of using online media (video) on the average mathematics learning outcomes of arithmetic operations material. Before the student learning activities are carried out, a pre-test of the mathematics learning outcomes of arithmetic operations is carried out first. The pre-test was conducted to determine the mathematics learning outcomes of students' arithmetic operations before being given treatment.

Pre-test results of learning mathematics arithmetic operations material experimental group and control group are relatively the same when viewed from the average value of the experimental group and control group. The average value of the experimental group was 68.23, and the average value of

the control group was 63.00. Furthermore, the pre-test prerequisite test for data analysis on the results of learning mathematics for arithmetic operations in the experimental and control groups was carried out, namely, conducting normality and homogeneity tests. After completing the normality test, the experimental group obtained the Asymp Sig Kolmogorov-Smirnov pre-test, the mathematics learning outcomes for arithmetic operations material of 0.147 > 0.05, and the control group the Asymp Sig Kolmogorov-Smirnov scores in the pre-test results in learning mathematics operating materials count as 0.200 > 0.05. Data is normally distributed if the Kolmogorov-Smirnov coefficient of Asymp Sig > output from the specified alpha value, 5% (0.05). While the homogeneity test obtained the value of Sig. on Levene Statistics pre-test mathematics learning outcomes for arithmetic operations in the experimental-control group 0.101 > 0.05. From these results, it can be concluded that the pre-test data of the experimental group and the control group were stated to be normally distributed and have the same initial ability or homogeneous so that research can be carried out in the experimental group and the control group.

The material used in this research is about counting operations with positive integers and negative integers. Analysis in the experimental group of teachers delivered material using online media. Online media is used in videos containing material that students will learn. The uploaded video is divided into two lessons studied by students. The display in the video is made attractive for elementary school students, shown by the pictures and animations. After the treatment, in each lesson, the researcher gave LKS to determine whether the students could understand the material well. Research in the control group used the same material as the experimental group, namely counting operations with positive integers and negative integers. The teacher explains the material assisted by positive and negative number card media, and students pay attention to the explanation given by the teacher. After being given treatment, in each lesson, the researcher gave LKS to find out whether the material presented by the teacher could be understood by students well.

After receiving treatment, a post-test was given to the experimental and control groups. From the post-test results of learning mathematics arithmetic operations material provided to the control group and the experimental group, the data obtained by the average value of the experimental group is 88.46, and the average value of the control group is 80.69. The average value of the experimental group is higher than the average value of the control group, with a difference of 7.77. The experimental and control groups also performed normality and homogeneity tests in the post-test data on mathematics learning outcomes.

The normality test in the experimental group obtained the Asymp Sig Kolmogorov-Smirnov value in the post-test of mathematics learning outcomes for arithmetic operations material 0.200> 0.05. In the control group, Asymp Sig Kolmogorov-Smirnov, the post-test of mathematics learning outcomes for arithmetic operations was 0.197 > 0.05. Data is normally distributed if the output of Kolmogorov-Smirnov coefficient Asymptotic Sig> from the specified alpha value, which is 5% (0.05). While the homogeneity test obtained the value of Sig. on Levene Statistics post-test mathematics learning outcomes for arithmetic operations in the experimental-control group 0.378 > 0.05. These results show that the experimental and control groups' post-test data were declared to be normally distributed and homogeneous so that the t-test could be performed.

The t-test can be carried out after conducting the normality and homogeneity tests on the pre-test and post-test mathematics learning outcomes for the experimental and control groups. The criteria used to conclude the hypothesis with a significance level of 5% (0.05), namely, if the value of t-count < t-table or Sig> 0.05, then H_0 is accepted and H_1 is rejected, which means that there is no significant difference between the pre-test results of learning mathematics arithmetic operations material for the experimental group and the control group. On the other hand, if t-count > t-table or Sig < 0.05, then H_0 is rejected and H_1 is accepted, which means a significant difference between the pre-test results of learning mathematics for arithmetic operations in the experimental group and the control group.

Pre-test t-test using SPSS 25 software, obtained post-test t-test data on mathematics learning outcomes for arithmetic operations in the experimental group and the control group with a t-value of

2.330 > t-table 2.064 and a sig value. (2-tailed) 0.029 < 0.05. From the results of the t-test, it can be concluded that H_o is rejected and H_1 is accepted, which means that there is a significant difference between the post-test of mathematics learning outcomes for the experimental group and the control group. Thus, the findings of this study are that the use of online media can have a significant positive effect on learning mathematics for arithmetic operations in grade IVA students at SD Negeri 2 Tomohon.

The findings of this study indicate that the use of the two learning media provides increased learning outcomes. Still, the more optimal increase in learning outcomes is the learning outcomes in the experimental group, namely the group of students taught by online video media. Using media in learning mathematics makes it easier for teachers to transfer mathematical material that tends to be abstract to students. Research by Burbules et al. says that media has implications for the learning process, which can help teachers deliver subject matter and create a playful, innovative, creative, and fun learning atmosphere (Burbules et al., 2020). In line with that, research conducted by Hillmayr et al. found that learning mathematics using interactive media had a significant effect on improving student learning outcomes (Hillmayr et al., 2020). Also, in learning using interactive media, students felt happy to learn mathematics and were motivated to learn. Mathematics.

The use of online video media in learning can also develop students' abilities in communication and problem-solving (Unal & Cakir, 2021). Karlimah et al. said that animated videos improved students' mathematical representation skills in the fractional material (Karlimah et al., 2021). According to Singh et al., video as a learning medium is easy to use and able to explain content more clearly (Singh & Thurman, 2019). Video media will make it easier for students to understand the material provided, and using video media in learning can support student learning outcomes. The study results are also in line with Syawaluddin et al. study, which states that the use of learning media (in the research of interactive media) can foster enthusiasm and motivation to know to improve learning outcomes (Syawaluddin et al., 2020). The findings of this study are in line with research findings by Yoon et al. that learning using video is fun for students where video media can provide factual information and present learning experiences thus providing optimal learning outcomes (Yoon et al., 2021).

4. Conclusion

Research on using online media in mathematics learning of arithmetic operations on elementary school students has been successfully carried out. Based on the results of the study, it can be seen that there is an average difference between learning outcomes using online media and number card media, where the average learning outcomes of groups of students who use online media are higher than the average learning outcomes of groups of students who use number card media. In addition, the study results show that the average learning outcomes of groups of students who use online media are higher because the use of online video media makes it easier for students to understand the material in detail. Then, the use of online video media also received a positive response from students compared to card media where the group of students who used online video media was more enthusiastic and motivated to learn while the use of number card media was still difficult to understand the rules for using it so that the use of the number card media did not provide good learning outcomes optimally.

5. Acknowledgment

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