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The Effect of Using Youtube Video Media in Mathematics Learning on the Understanding of Mathematical Concepts in Grade VII Students of JHS 2 Bangkinang

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ABSTRACT

This research is motivated by the lack of understanding of mathematical concepts of seventh-grade students of Junior High School (JHS) 2 Bangkingan. The solution given to the problems that exist in JHS 2 Bangkingan is through the provision of youtube video media. The purpose of this study was to test how much influence the use of youtube video media in learning mathematics had on students' understanding of mathematical concepts. This pure experimental research was carried out using the Flipped Classroom learning model. This study involved two classes that were randomly assigned and given different treatments, namely the experimental group and the control group. Based on the results of research and discussion, it can be concluded that the use of youtube media has a significant effect on the mathematical understanding ability of seventh-grade students of JHS 2 Bangkingan. This is proven by the independen*t-test* where the value of sig (2-tailed) is 0.004 < 0.05.

Keywords: Flipped Classroom, Understanding Mathematical, Concepts Mathematics, Youtube Videos.

INTRODUCTION

The development of science and information technology is very influential in life, especially in the world of education. The world of education itself has already implemented advances in science and information technology (Bakri & Yusni, 2021). Technology is very important in the teaching and learning of mathematics, it affects the mathematics taught and enhances student learning (Cullen *et al*., 2020).

The development of information technology is also supported by the existence of the internet which is now a necessity for everyone. Furthermore, e-learning can also be used as a challenge for digital technology to prove effective during remote work due to the pandemic (Ardiansyah & Nugraha 2022). Information technology has an impact on the world of education in Indonesia, especially in terms of gathering information, and the latest references for educators, both in terms of material and learning materials (Kusumaningrum & Nuriadin, 2021). Another influence of the progress of science and technology is the emergence of social media. Social media is online media which includes blogs, social networks, wikis, forums, and the virtual world, which are very useful and beneficial in the modern era like today (Bina, 2021).

Mathematics is a science that is taught at all levels of education. Mathematics at school is a compulsory subject for students (Nugroho *et al*., 2019). Mathematics is a science that studies abstract numbers and spaces, to support smooth learning, in addition to choosing

the right method, it is also necessary to use learning media which play a very important role in guiding students (Dwiana *et al*., 2021). Mathematics is shaped by human thought about ideas, processes, and reasoning (Kusumawardani *et al*., 2018). The interrelationship between one material concept and another is evidence of the importance of understanding mathematical concepts (Novitasari, 2016).

One of the objectives of learning mathematics is contained in the Regulation of the Minister of National Education of the Republic of Indonesia No. 58/2014, namely: understanding mathematical concepts, the ability to explain the interrelationships between concepts, and the use of concepts and algorithms, flexibly, accurately, efficiently and accurately, in problem-solving (Novri *et al*., 2018). Mastering and creating technology requires a strong understanding of mathematics from an early age (Elza, 2018). The world has now entered the era of the industrial revolution 4.0 which is marked by increased connectivity and interaction as well as the development of digital, artificial, and virtual systems (Lase, 2019).

Educators must be able to make progress in using and utilizing technology during its development (Nesti & Dewanto, 2020). Educators must be able to make progress in using and utilizing technology during its development (Dinni, 2018). Educators must be able to provide instruction to students so that they can be fluent in a variety of subjects, especially high-difficulty mathematics. Using the right learning media can be an intermediary for students to understand the material and improve the quality of learning (Nurdin *et al*., 2019). Algebra is a branch of mathematics that is very broad in scope, while algebra itself is defined as a branch of science in mathematics that studies mathematical symbols and the rules used to manipulate these symbols. Algebra can make it easier to solve problems than conventional methods, namely stating problems in words.

Youtube can present something that is seen and heard that can motivate students to learn and provide learning experiences for students (Iwantara *et al*., 2018). Youtube is used as a good and quality teaching medium (Setiyana *et al*., 2021). The purpose of using YouTube as a learning medium is to create a fun and interactive learning environment and atmosphere (Lasabuda, 2017). The main advantage is the ease of uploading and accessing videos available on Youtube with the internet for free without being limited by space and time (Humaidi *et al*., 2021). Youtube makes it easier for students to understand the material, solve steps, writing mathematical symbols or formulas, and videos can be played repeatedly according to students' needs (Pambudi, 2021).

Conceptual understanding is the ability to behave, think, and act as shown by students to understand definitions, understand the special characteristics, nature, and essence or content of mathematics, and the ability to choose the right process to solve problems (Aqsa *et al*., 2021). Understanding Mathematical Concepts supports students' cognitive thinking processes (Virgana, 2019). To support the ability to understand mathematical concepts, meaningful learning is needed, where students are required not to be passive and not stop at the material presented by the teacher, but as subjects who actively carry out the process of thinking, searching, processing, reducing, combining, concluding, and solving problems (Purwanti *et al*., 2016). Based on the problems above, to see the effect of learning strategies on student learning outcomes at JHS 2 Bangkingan. The researcher wanted to do research with the title "The Influence of Using Youtube Video Media in Mathematics Learning on the Understanding of Mathematical Concepts in Class VII Students of JHS 2 Bangkingan".

METHODS

This study was a non-equivalent *Pre-test-Post-test* control group type of study (pure experiment) involving two classes that were determined randomly and given different treatments, namely the experimental group and the control group. The variables used in this study are two variables, namely the independent variable and the dependent variable. The independent variable in this study is the understanding of mathematical concepts in mathematics learning using the influence of YouTube media, while the dependent variable is student learning outcomes.

The research location is the place where research activities take place. This research was conducted at JHS 2 Bangkinang and was conducted during class hours. This research was conducted at JHS 2 Bangkingan, which is located at Jl. Lieutenant Boyak No.11, Bangkinang City, Riau. The time for the research started from August to October 2022. The population in this study was 158 of all class VII students of JHS 2 Bangkingan for the 2022/2023 academic year. The total sample in this study was 60 students of class VII JHS 2 Bangkinang for the 2022/2023 academic year. It consists of 30 experimental class students using the flipped classroom learning strategy and 30 control class students using conventional learning methods. The sampling technique in this study is the probability sampling technique, namely the simple random sampling technique. Simple random sampling is said to be simple because the sample members from the population are taken randomly without regard to the superior class in that population. The research instrument used in this study was a test of students' mathematical understanding abilities, namely validity, reliability, discriminating power, and level of difficulty.

Data analysis techniques in quantitative research are using statistical analysis. There are two kinds of statistical analysis used in data analysis in research, namely descriptive statistical analysis and inferential statistical analysis. Descriptive statistical analysis is used to describe student learning outcomes towards learning mathematics obtained in the experimental group and the control group. Inferential statistical analysis consists of a normality test to find out whether the distribution of sample data to be analyzed is normally distributed or not by using the *Kolmogorov-Simrnov test* in SPSS 25 software, homogeneity test to find out whether the data obtained has the same variance or vice versa by using the Levene statistic test. on SPSS 24 software, and the hypothesis test performed was the *t-test* (Independent Sample *T-test*) with SPSS 25 software.

RESULTS

This study used one control class and one experimental class, in the control class applied conventional learning methods while the experimental class applied the flipped classroom learning model assisted by YouTube video media. The material taught in both classes is algebraic forms. The subjects used consisted of 58 students. The control class consisted of 29 students and the experimental class consisted of 29 students. The learning process in each class was carried out in 8 meetings.

The data obtained was in the form of giving a treatment (*Pre-test*) and after being given a treatment (*Post-test*) in the control class and the experimental class. Data collection was obtained from the answers to the two tests that had been given which consisted of 12 and 5 questions. Based on the results of the research that has been done, the acquisition of *Pre-test* scores shows that there is no significant difference between the control class and the

experimental class. The results of calculating the *Pre-test* data in the control class and the experimental class were calculated using the SPSS 25 program. These results can be seen in Table 1 below.

Table 1. *Pre-test* value data for the control class and experimental class

Data	*Pre-test*	
	Control Class	**Experimental Class**
Mean	44,38	42,86
Median	48,00	42,00
Minimum	16	16
Maximum	74	74
Standard Deviation	17,383	15,231
Varians	302,172	231,980

Based on Table 2 above, it can be seen that the mathematics learning outcomes in the *Post-test* in the control class found an average in the control class of 55.34 while in the experimental class, it was found an average of 68.79. After the *Pre-test* and *Post-test* values are obtained, these values are processed by conducting an analytical test using the SPSS 25 program. The analytical tests carried out are the normality test, homogeneity test, and hypothesis testing (independent sample *t-test*). The data analyzed in this normality test are the *Pre-test* and *Post-test* value data of the control class and the experimental class. The normality test uses the *Kolmogorov-Simrnov test*. The following is the data from the *Pre-test* normality test results in the control class and the experimental class in Table 2 below.

Table 2. *Pre-test* normality test results for control class and experiment class

Class	Sig. Value.	Information
Control class	0,200	Data is normally distributed
Experiment class	0,060	Data is normally distributed

Based on Table 2 above, it can be seen that the mathematics learning outcomes in the *Post-test* in the control class found an average in the control class of 55.34 while in the experimental class it was found an average of 68.79. After the *Pre-test* and *Post-test* values are obtained, these values are processed by conducting an analytical test using the SPSS 25 program. The analytical tests carried out are the normality test, homogeneity test, hypothesis testing (independent sample *t-test*). The normality test is carried out with the aim of knowing whether the data from each class is normally distributed or not. The data analyzed in this normality test are the *Pre-test* and *Post-test* value data of the control class and the experimental class. The normality test uses the *Kolmogorov-Simrnov test*. The following is the data from the *Pre-test* normality test results in the control class and the experimental class in Table 3 below.

Table 3. *Pre-test* normality test results for control class and experiment class

Class	Sig. Value.	Information
Control class	0,200	Data is normally distributed
Experiment class	0,060	Data is normally distributed

Based on Table 3 above, it can be seen that the results of the *Pre-test* data normality test in the control class obtained sig = 0.200 > 0.05, while in the experimental class it was obtained sig = 0.060 > 0.05. The data obtained is normally distributed. So it can be

concluded that the data from the *Pre-test* results in the control class and the experimental class are normally distributed. The data from the *Post-test* normality test results in the control class and the experimental class are in Table 4 below.

Table 4. *Post-test* normality test results for control class and experiment class

Class	Sig. Value.	Information
Control class	0,156	Data is normally distributed
Experiment class	0,147	Data is normally distributed

Based on Table 4 above, it can be seen that the results of the *Post-test* data normality test in the control class obtained sig = 0.156 > 0.05, while in the experimental class it was obtained sig = 0.147 > 0.05. The data obtained is normally distributed. So it can be concluded that the *Post-test* data results in the control class and the experimental class are normally distributed. The homogeneity test was carried out to find out whether the data from each class had the same variance (homogeneous) or not the same (non-homogeneous) before receiving different treatments. This analysis uses the SPSS 25 program, namely Levene's test. If the results of the homogeneity test show that the significance level is > 0.05, it can be stated that the variance of the sample concerned is not much different, then the sample is declared homogeneous. The hypothesis used is as follows.

- H_0 = Data is not homogeneous if Sig (2-tailed) < 0.05
- Hα = Homogeneous data if Sig (2-tailed) < 0.05

The following are the results of the *Pre-test-test* in the control class and the experimental class in Table 5 below.

Table 5. *Pre-test* homogeneity test results for control class and experiment class.

Class	Sig. Value.	Information
Control class dan Experiment class	0,191	Homogeneous data

Based on Table 5 above, it can be seen that the data from the *Pre-test* homogeneity test results in the control class and the experimental class with a significance of 0.191 > 0.05. So it can be concluded that the data from the *Pre-test* results in the control class and the experimental class have the same variance or the data is homogeneous. The data from the *Post-test-test* results in the control class and the experimental class are in Table 6 below.

Table 6. *Post-test* homogeneity test results for control class and experimental class

Class	Sig. Value.	Information
Control class dan Experiment class	0,975	Homogeneous data

Based on Table 6 above, it can be seen that the data from the *Post-test* homogeneity test results in the control class and the experimental class with a significance of 0.975 > 0.05. So it can be concluded that the *Post-test* result data in the control class and the experimental class have the same variance or the data is homogeneous. Based on the results of the *Pre-test* data analysis prerequisite test, it was found that the control class and the experimental class were normally distributed and homogeneous. If the data is stated to be normally distributed and homogeneous, then the next step is to test the hypothesis. The independent *t-test* is used to compare the *Pre-test* and *Post-test* in certain classes. The hypothesis used with a significance level of 0.05 is as follows:

- H_0 : $\boldsymbol{\mu_1}=\boldsymbol{\mu_2}$ there is no difference in the average learning outcomes of mathematics between students who receive conventional learning models compared to students who obtain the application of the flipped classroom learning model assisted by YouTube video media.
- H_0 : $\boldsymbol{\mu_1}=\boldsymbol{\mu_2}$ a. there is a difference in the average learning outcomes of mathematics between students who receive conventional learning models compared to students who obtain the application of the flipped classroom learning model assisted by YouTube video media.

Information:

- $\boldsymbol{\mu_1}$ = average mathematics learning outcomes of students who obtain the modelconventional learning.
- $\boldsymbol{\mu_2}$ = average mathematics learning outcomes of students who getapplication of the flipped classroom learning model assisted by video mediayoutube.

The decision-making criteria for the test are as follows:

- If the value of Sig (2-tailed) < 0.05 then H_0 is rejected and Hα is accepted
- If the value of Sig (2-tailed) > 0.05 then Hα is rejected and H_0 is accepted

The results of the *Pre-test* data acquisition from the control class and the experimental class can be seen in the complete data in the appendix written in Table7 below.

Table 7. Independent *t-test Pre-test* results

Class	Sig. Value.	Information
Control class dan Experiment class	0,725	There is no significant difference

Based on Table 7 it can be seen that the sig value (2-tailed) > 0.05 is 0.77. Based on the research hypothesis where if the sig value (2-tailed) > 0.05 then Hα is rejected and H_0 is accepted. This means that at a significance level of 0.05 it can be concluded that there is no difference in the average learning outcomes of mathematics between students who receive conventional learning models compared to students who obtain the application of the flipped classroom learning model assisted by YouTube video media. While the results of the *Pre-test* data acquisition from the control class and the experimental class can be seen in the complete data in the appendix written in Table 8 below.

Table 8. Independent *t-test Post-test* results

Class	Sig. Value.	Information
Control class dan Experiment class	0,004	There is no significant difference

Based on Table 8 above, it can be seen that sig (2-tailed) milai<0.05, namely 0.004. Based on the research hypothesis where if the sig value (2-tailed) <0.05 then H_0 is rejected and Hα is accepted. This means that at a significance level of 0.05 it can be concluded that there is an average difference in mathematics learning outcomes between students who receive conventional learning models compared to students who obtain the application of

the flipped classroom learning model assisted by YouTube video media. The research data was obtained from the results of the students' *Pre-test* and *Post-test*. Students in the control class have a lower level of learning outcomes compared to the experimental class. This statement is evidenced by the average score of mathematics learning outcomes in the control class of 37.10 while in the experimental class of 41.52. The results obtained indicated that the results of learning mathematics in the experimental class were higher than the control class. Therefore, to improve the learning outcomes of mathematics, a treatment is given in the form of applying the flipped classroom learning model assisted by YouTube video media. After being given a treatment in the form of a conventional learning model in the control class and the flipped classroom learning model assisted by YouTube video media in the experimental class, the results of students' mathematics learning increased. This is evidenced by the results of the average score of mathematics learning outcomes in the control class 58.76, while the experimental class 70.17. From the acquisition of *Pre-test* and *Post-test* scores, both in the control class and in the experimental class, mathematics learning outcomes have increased.

The results of this study are in line with research conducted by Ribawati (2019). Title: Effect of using video media on motivation and learning outcomes. The similarities, in this study the same as using learning video media. Differences: differences in variable Y, namely Ribawati uses motivation and learning outcomes, while researchers use the ability to understand mathematical concepts. The flipped classroom learning model assisted by YouTube video media is a learning model that is applied in groups (Gilboy *et al*. 2014). Currently, the flipped classroom concept has been implemented in various disciplines (Akçayÿr 2018). The learning process by means of groups is an interesting and fun learning process for students so that they can improve learning outcomes in mathematics. This statement is proven through research conducted by Yasser (2018) the results of the study concluded that students' understanding of mathematical concepts by applying the flipped classroom learning model assisted by YouTube video media is better than understanding concepts by applying conventional learning in class VII JHS 2 Bangkinang. Based on the research that the researchers have done and the various studies that have been done before, it can be concluded that the application of the flipped classroom learning model assisted by YouTube video media has an influence on students' mathematics learning outcomes. In this study, the application of the flipped classroom learning model assisted by YouTube video media had an effect on improving the mathematics learning outcomes of class VII students of JHS 2 Bangkingan on material in algebraic forms.

CONCLUSION

Based on the results of the research and discussion, it can be concluded that the use of YouTube media has a significant effect on the mathematical understanding ability of class VII students of JHS 2 Bangkingan. This is proven by the independen*t-test*, which has a significant value of 0.004 <0.05. Suggestions from the research conducted are, 1) the

flipped classroom learning model can be used as a consideration in teaching and learning activities to improve the ability to understand students' mathematical concepts as well as being used as a fun way of learning and more adapting learning time in class; and 2) Schools can provide information to teachers about the importance of developing students' understanding of mathematical concepts in learning mathematics.

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