EFFECTIVENESS OF POWTOON VIDEO-BASED LEARNING MEDIA TO IMPROVE STUDENTS' MATHEMATICAL UNDERSTANDING ABILITY

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Abstract

The results of observations of SMA Negeri 3 Brebes showed that students were less motivated in the learning process, they preferred to play and be engrossed in their own activities, there were only a few students who were very enthusiastic about the material being studied. In order for learning in class to run well, it is necessary to innovate learning activities by using one of the innovations used, namely learning media, while the learning media used is powtoon animated videos. This study aims to look at the effectiveness of learning media on students' learning outcomes in mathematics by using powtoon animated videos. The media of this research is experimental research, this research is students of class X E-9 experimental class (powtoon video animation media) with a total sample of 36 students. Sample selection based on purposive sampling technique. The instrument used was a written test consisting of 5 essay questions. The data collection technique was pretest and posttest, then analyzed using the normality test, homogeneity test, and T test as well as the N-Gain test on the hypothesis test with excel 2016. The results showed that there were differences in students' mathematical understanding before and after being taught using media-based learning. Powtoon animation videos. It can be concluded that powtoon video-based learning media is very effective in increasing the mathematical understanding of Brebes 3 Public High School students.

Keywords: Effectiveness, Powtoon animation video media, and mathematical understanding.

1 INTRODUCTION

Advances in science and technology never stop developing with the times in the field of education, so it is not surprising that educational technology will develop into a scientific and professional field in the future so that it can provide benefits for the purpose of effectiveness and effective education. So, in this case students will get a lot of learning information from the teacher that they did not get before using technology. Now, teachers can improve students' understanding, skills, and needs so that they can do their best in the learning process by utilizing technology to help develop student processes. To improve educational standards is one of the most important components of formal education. Mathematics is one of the subjects taught in educational institutions. Science illustration is an example composed with many ideas. Concepts are abstract ideas that it is possible for us to categorize an object as an example or not. Mathematical concepts are related to each other. The interrelationships between various material concepts show the importance of understanding mathematical concepts. As a result, students cannot understand a subject if they do not understand the previous material or the prerequisites of the subject being studied (Bp et al. n.d.: 2–3).

An important part of efforts to improve the quality of education is the teaching of mathematics as one of the subjects taught in formal educational institutions. A lesson in mathematics covers a wide variety of ideas. Concepts are abstract ideas that can be used to group objects into examples or out of examples. In mathematics, concepts are related to one another. The idea that one material is more important than another shows the importance of understanding mathematical concepts. Therefore, students cannot understand a subject if they do not understand the previous material or the prerequisites of the subjects studied (Novitasari 2016: 8).

SMA Negeri 3 Brebes is a school that implements the independent curriculum for class X and the 2013 curriculum for class XI and XII. In the interview that was conducted by representatives of mathematics teachers at SMA Negeri 3 Brebes namely Mr. Muhammad Toha, M.Pd. as a class XI math teacher, and Pak Bambang Setiawan, S.Pd. as a class X mathematics teacher who produced the result that the learning model carried out during learning used conventional models, discovery learning, jigsaw, and problem solving. And the learning media used are using PPT, videos via

YouTube, and teaching aids. According to Mr. Muhammad Toha, M.Pd as a class XI mathematics teacher, the attitude of most students did not want to know or their curiosity towards mathematics learning material had greatly decreased due to the effects of the co-19 pandemic. Students also had to study online and students were required to can master the material taught online. So that the students' understanding of mathematics learning material is less than optimal and sometimes some teachers use question and answer methods and conventional educational models to make students bored in the learning process. So that students have difficulty understanding the material presented by the teacher. So that researchers will conduct research on students' mathematical understanding in the mathematics subject of Statistics material in class X.

Mathematical understanding is a very important part of learning because it helps students understand what is being taught to them, not only through rote memorization but also by helping them better understand the material. Therefore, to improve mathematical understanding, a good and correct learning process is needed. Students' mathematical understanding will be able to develop if the learning process takes place effectively and efficiently.

Indicators of mathematical understanding as indicated by the NCTM (National Council of Teachers of Mathematics) in particular: write down verbal and written definitions of concepts; distinguish and create models and non-models; display designs using models, diagrams, and symbols; change between different types of representations; examine the different ways that concepts can be interpreted; then distinguish the quality of ideas and understand the circumstances that determine ideas (Praja et al. 2021: 14).

So it is necessary to develop learning media that support the learning process so that it runs optimally. Learning media that can improve students' mathematical understanding are very diverse, for example, video-based media. Learning media is something that resembles: tools, objects, environment, and various other things that can be used to convey messages or information, especially learning materials. Therefore teachers can more easily communicate learning material to students by incorporating learning media into the teaching and learning process. In addition, incorporating media into the teaching and learning process can encourage students to pay attention to and understand the material presented by the teacher in order to achieve learning objectives. The purpose of using learning media in the teaching and learning process is not solely to perfect the process and attract students' attention. Conversely, the purpose of using media is in the teaching and learning process and achieving learning goals (Zulfiana 2019: 1).

Therefore, the researcher intends to improve mathematics learning by using animated video-based learning media to attract students' interest in the content. It is hoped that student interest can encourage them to participate more actively in all aspects of education and can improve students' mathematical understanding.

In this study the teaching materials that will be used utilize Powtoon. Powtoon is an online presentation creation service with a number of interesting animation features, including handwriting animations, cartoon animations, and effects that make transitions seem more lively. Other features make setting up the timeline easy to understand. Because teachers can access most of the features from a single screen, Powtoon is easy to use when creating learning materials. Services with cartoon characters, animated models and other cartoon objects are ideal for educational media. Thus, to animate students' excellence in learning the material being taught, the instructor must present the material clearly so that students can understand and remember the material explained in class (Mayra Dian Purnami n.d.: 26). The data used in this research includes high school statistics material.

2 METHODOLOGY

This study uses experimental research, which aims to determine whether there is a causal relationship by comparing one or more experimental groups that receive treatment with one or more comparison groups that do not receive (Rizqi and Sina n.d.: 26). This study used a quantitative approach and a Pre-Experimental Design with a Pretest-Posttest Control Group Design model. The reason for this design is that there is a posttest so that the results of the treatment can be compared with the conditions before getting the treatment (Pretest). This design can be described as follows:

Table 1 Research Design

Group	Experiment	control
Pretest	O_1	O_3
Treatment	X_1	X_2
Posttest	O_2	O_4

Information :

$O1$: Pretest Results of Students' Mathematical Understanding in the Experiment class

$O2$: Posttest Results of Students' Mathematical Understanding in the Experiment class.

$O3$: Pretest Results of Students' Mathematical Understanding in the Control class

$O4$: Posttest Results of Students' Mathematical Understanding in the Control class

X1: Learning by using powtoon-animated video-based learning media in the experimental class.

X2: Learning does not use powtoon-animated video-based media in the control class.

The time used in this study was in the even semester from March 21 2023 to May 12 2023. The object used as the research location was SMA Negeri 3 Brebes, Brebes District, Brebes Regency. The population in this study were students of class X Phase-E Even Semester, SMA Negeri 3 Brebes for the academic year 2022/2023 consisting of 358 students. In this study the sample to be used consisted of 3 classes. The sampling technique used was purposive sampling, namely taking all E phase classes as a sample then cluster random sampling (Sugiyono, 2012: 65), namely by drawing lots of 3 E Phase classes to be taken as samples, namely:

1. The experimental class is the class that gets the learning treatment by using powtoon video-based media. In this case class X Phase E-9 as the experimental class.
2. The control class is the class that receives conventional learning treatment. In this case class X Phase E-4 as the control class.
3. The trial class is the class used to test the mathematical understanding test before the test is in the experimental class and the control class. In this case class X Phase E-10.

Table 2 List of the number of students in the sample

No	**Class X**	**Number of Students**	**Information**
1.	X Phase E-9	36	Experiment Class
2.	X Phase E-4	36	Control Class
3.	X Phase E-10	35	Trial Class
Jumlah		107	

The research procedure begins with initial observations, identifying problems, formulating problems from identifying existing problems, collecting data, analyzing data, and providing conclusions. The data used in this research is nominal scale data. While the instruments used in this study were tests (pretest and posttest). For data collection, researchers used documentation techniques, namely to obtain data about students who became the population and members of the research sample. There are 2 stages of data analysis techniques. First, before conducting the research, a prerequisite analysis test was carried out first, namely the sample equivalence test which consisted of a normality test, homogeneity test, and one-way anava test and an instrument test consisting of validity, reliability, discriminatory power, and level of difficulty tests. Then proceed with hypothesis testing which consists of a paired t-test and the N-Gain test.

3 RESULTS

3.1 Normality Test Results with the Kolmogorov test with Excel assistance

3.1.1 Pretest normality test results

Table 3. Pretest normality test results.

No	Class	$L_0\ Maks$	L_{tabel} $(\alpha = 5\%)$	Decision
1.	Experiment	0,133	0,148	Normal
2.	Control	0,135	0,148	Normal
3.	Trials	0,141	0,150	Normal

Based on the summary of the normality test in table 3, it shows that $Lhitung < Ltabel$ at a significance level of 5%, it can be concluded that the data is normally distributed.

3.1.2 Posttest normality test results

Table 4. Posttest normality test results.

No	Class	$L_0\ Maks$	L_{tabel} $(\alpha = 5\%)$	Decision
1.	Experiment	0,139	0,148	Normal
2.	Control	0,111	0,148	Normal

Based on the summary of the normality test in table 4, it shows that $Lhitung < Ltabel$ at a significance level of 5%, it can be concluded that the data is normally distributed.

3.2 The results of the data homogeneity test of mathematical understanding abilities

Table 5.Homogeneity test results.

No	Variabel	$\mathcal{X}^2{}_{hitung}$	$\mathcal{X}^2{}_{tabel}$	Keterangan
1.	kemampuan pemahaman matematis	1,957	3,842	Homogen

Based on the table above, it shows that data on students' mathematical understanding abilities $\mathcal{X}^2{}_{hitung} < \mathcal{X}^2{}_{tabel}$ where α=5% so that it can be concluded that students' mathematical understanding abilities are taught using learning media based on powtoon animated videos in the experimental class and conventional learning in the control class has a homogeneous variance.

3.3 The Hypothesis Test Results

H1 : There are differences in students' mathematical understanding before and after taught using animated video-based learning media powtoons.

H0 : There is no difference in students' mathematical understanding before and after being taught using video-based learning media powtoo animation

The results of hypothesis testing used in this research is to use a paired two sample t-test (paired t-test) and N-Gain test.

Table 6. Results of two paired samples (one paired t-test)

No	t_{count}	t_{table}	Conclusion
1.	5,448	1,69	5,448 > 1,69 Ho rejected

The results of the table above show that $thitung$ = 5.448 then the results are consulted with the value $ttabel$ =1.69. And because |$thitung$| > $ttabel$ then Ho is rejected which means there is a difference in students' mathematical understanding before and after taught using video-based learning media powtoon animation.

Hypothesis testing is used to answer hypotheses The second part is calculating the increase in the previous value and after being taught using learning media based on the Powtoon animation video, the N-Gain test was carried out.The summary of the calculations is as follows criteria:

N- Gain ≥ 0.70 : High

0.30 < N- Gain < 0.70 : Medium

N- Gain ≤ 0.30 : Low

Based on that calculation shows that the N- Gain obtained is 0.5 and meet the moderate criteria.

4 CONCLUSIONS

Based on the results of the analysis that has been obtained in class X research SMA N 3 Brebes, it was concluded that there were differences in students' mathematical understanding before and after using learning media based on Powtoon animated videos.

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