The Effect of Watching *Mantappu Academy* YouTube Educational Videos on Students Mathematics Learning Outcomes

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Abstract. Mathematics learning is often perceived as difficult and tedious by many students, particularly when delivered using conventional methods that lack visualization and interactivity. With the advancement of digital technology, platforms like YouTube have been increasingly utilized as engaging and accessible learning media. This study aims to examine the effect of educational videos on YouTube on students' mathematics learning outcomes. This research employed an experimental method with a post-test only control group design. The participants were 21 tenth-grade students from MA Muhammadiyah Purwokerto, divided into two groups: a treatment group (10 students) who received instruction through YouTube-based educational videos, and a control group (11 students) who received conventional instruction. Data were collected through post-tests and analyzed using the Independent Samples T-Test. The analysis indicated that the data met the assumptions of normality and homogeneity. The t-test result showed a significant difference between the two groups ($t = -2.11$; $p = 0.024$), with the treatment group scoring higher ($M = 67.7$) than the control group ($M = 53.6$). These findings suggest that using YouTube-based educational videos significantly improves students' mathematics learning outcomes compared to conventional teaching methods.

Keywords: mathematics, educational video, YouTube, learning outcomes, experimental research

1. Introduction

Mathematics is often considered a difficult and even scary subject for most students [1]. This bad stigma is evidenced by students' low learning outcomes compared to other subjects. Low math learning outcomes have the potential to reduce student confidence and motivation in the learning process. Learning approaches and media that are more in line with the characteristics of today's digital generation are needed [2]. In today's digital era, the use of technology-based media in education is growing rapidly. Learning media is a tool used to channel messages from sender to receiver so that it can arouse students' thoughts, feelings, attention and interest in learning [3]. According to the *Association for Educational Communications and Technology* (AECT), media refers to all forms and channels used to convey messages or information. In the context of learning activities, media can be understood as a communication tool used in the teaching and learning process to convey information from teachers to students [4].

The use of video media plays an important role in supporting effective learning by helping students focus more on the material and making the learning process more interesting. [5] state that students' comprehension and memory significantly increase when information is conveyed through the senses of hearing and sight. One of the popular video media among students is YouTube, which is widely used as an alternative to reinforce understanding of subject matter, including difficult subjects such as math [6].

The reality is that in many schools, including high schools, students' math learning outcomes are still relatively low. Students often have difficulty understanding concepts, which has an impact on low grades and interest in the subject. This is also the case at MA Muhammadiyah Purwokerto, where the research was conducted, where the average grade X student's math score is still below the KKM. The contributing factors include uninteresting learning methods and the lack of media that is in accordance with the learning style of the current generation, which in turn can reduce students' motivation and confidence in learning.

Video and multimedia media are effective in improving student motivation and learning outcomes , especially when combined with innovative learning methods such as *Program Based Learning* (PBL). Video media, especially YouTube, has been proven effective in improving student learning outcomes, especially in subjects that require high visualization. According to [7] YouTube is a popular and potential medium in education because it encourages teacher creativity, increases learning activities, and helps students understand the material quickly. Every day, around 100,000 videos are watched and in the last 24 hours around 65,000 new videos were uploaded, showing the high dynamism of this platform. One of the featured educational channels is Mantappu Academy, initiated by Jerome Polin, a Mathematics graduate from Waseda University, which provides engaging and easy-to-understand learning videos to motivate the younger generation to love and understand math.

While the benefits of YouTube and video media in learning have been widely researched, the effectiveness of content from popular educational channels such as Mantappu Academy has rarely been studied. This study aims to fill this gap by examining the effect of Mantappu Academy math videos on learning outcomes of grade X high school students. The study focuses on whether there is a difference in learning outcomes between students who watched the video and those who did not. The main objective is to find out whether the video can improve the mathematics learning outcomes of grade X students.

2. Literature Review

Math Learning Outcomes

According to [8] learning outcomes are the level of mental development of a person that shows improvement compared to before participating in the learning process. Specifically, mathematics learning outcomes refer to students' academic achievements that can be measured after they complete the learning process in that subject. Mathematics has long been considered a difficult subject among students, often perceived as abstract and intimidating [1]. Traditional teaching methods, such as lecture-based teaching, are often criticized for being monotonous and uninteresting, especially for students who come from the digital generation [9] Mathematics learning outcomes refer to students' academic achievements that can be measured after undergoing the mathematics learning process.

Watch YouTube Educational Videos

The use of audio-visual media in mathematics learning is influenced by both supporting and inhibiting factors. Supporting elements include adequate facilities, student enthusiasm, and

teacher professionalism. However, challenges such as students' inconsistent focus and the time-consuming nature of video use require careful preparation by teachers to ensure efficient learning. One of the innovations in education is the utilization of audio-visual media integrated with the internet, such as YouTube. This platform provides an opportunity for educators to increase student engagement in learning and help them focus more on understanding the material efficiently [6]. YouTube as a medium for mathematics learning has shown positive results at various levels of education. One study conducted in the fourth grade at SDIT Al-Furqon found that interactive videos on YouTube were able to increase students' interest in learning mathematics. Teachers reported that students were more interested and active when the material was delivered through videos, especially when explaining abstract concepts. In addition to increasing student engagement, this medium also helps students who previously had difficulty understanding the material more concretely through the illustrations displayed [10].

3. Method

The independent variable in this study is watching learning video media from YouTube channels. Learning video media from the YouTube channel is a digital technology-based learning media that utilizes an online video platform as a means of delivering teaching material audio-visually. While the dependent variable is student math learning outcomes. Learning outcomes are the level of student success in learning subject matter at school which is expressed in the form of a score obtained from the results of a test on a number of subjects that have been previously studied. This study employed a true experimental design using a post-test only control group design. Participants were randomly assigned to two groups (experimental and control) using a simple counting method. Each participant took turns counting sequentially from one to two, and those who counted "one" were placed in the experimental group, while those who counted "two" were assigned to the control group. The randomization process ensured that each student had an equal chance of being in either group, thus minimizing potential selection bias.

Table 1. Research Design

Group	Randomization	Treatment	Post-test
Experiment	R	X (Learning Video Media)	$\mathbf{O_1}$
Control	R	- (Conventional Learning)	$\mathbf{O_2}$

Description:
R = Randomization, performed in the assignment of subjects to experimental and control groups
X = Treatment in the form of learning using videos from the *Mantappu Academy* YouTube channel
$\mathbf{O_1}$ = Post-test in the experimental group
$\mathbf{O_2}$ = Post-test in the control group

The independent variable in this study is watching a video from *Mantappu Academy* with the title "EXPONENT ITU ASYIK! Discuss Grade 10 Exponents Study With Jerome Polin" at the following link https://youtu.be/AlrOq3W7IZ4?si=BqQkMNY9tbVGyP9I. The video was

selected based on the suitability of the material with the grade X curriculum, has a duration of 12 minutes 34 seconds, and contains educational and interactive elements. To ensure that participants really received and paid attention to the treatment, a manipulation check was carried out before the mathematics test was carried out in the form of short questions related to the content and appearance of the video, such as the duration of the video, the color of the main character's clothes, and the learning topics presented.

Table 2. Participants Characteristics

Demographic Characteristics	Experimental Group (n = 10)	Control Group (n = 11)	Total (n = 21)
Gender	Female (100%)	Female (100%)	Female (100%)
Grade Level	10th Grade	10th Grade	10th Grade
School	MA Muhammadiyah Purwokerto	MA Muhammadiyah Purwokerto	MA Muhammadiyah Purwokerto
Boarding Status	Santriwati (boarding students)	Santriwati (boarding students)	Santriwati (boarding students)

This research was conducted at MA Muhammadiyah Purwokerto with a subject of 21 class X students. This research procedure was carried out through several stages, starting from the planning, implementation, to the evaluation of the results. In the planning stage, researchers compiled an experimental design, prepared question instruments, tested the validity and reliability of the questions, and took care of licensing from the school. On the day of implementation, the activity began with an introduction of the research team, an explanation of the purpose of the research, and a request for willingness to participate from participants (informed consent). After obtaining consent, participants were randomly divided using the counting method into two groups: experimental (10 students) and control (11 students). The experimental group was given the treatment of learning through videos from YouTube Mantappu Academy, while the control group followed conventional learning. To ensure that the participants really paid attention and received the treatment, a manipulation check was conducted before the post-test. Manipulation check was conducted by giving some short questions about the content and appearance of the video, such as the duration of the video, the color of the main character's clothes, and the topic of learning presented.

The data collection instrument was a math learning outcome test consisting of 10 essay questions. This instrument has gone through a validity test using the Item-Total-Correlation correlation technique, with the results showing that all items have a significant correlation value. Furthermore, the reliability test was carried out using Cronbach's Alpha, with the result of the reliability coefficient of 0.754 which indicates good enough reliability. This means that the ten items (A1-A10) have adequate internal consistency. This instrument is suitable for measuring mathematics learning outcomes because it is stable and fairly consistent.

4. Result

Data analysis was conducted by comparing post-test results between two groups, namely the treatment group (who watched the video) and the non-treatment group (who did not watch the

video). Before conducting the difference test, the assumptions of normality and homogeneity were tested.

Table 3. Research Test Result

Group	N	Mean	Median	SD	SE	Statistic	df	p
Control	11	53.6	60	17.7	5.32	-2.11	19.0	0.024
Experiment	10	67.7	66.5	12.0	3.78			

Normality test using Shapiro-Wilk showed a significance value of 0.169, which means the data is normally distributed because p> 0.05. The variance homogeneity test using Levene's Test resulted in a significance value of 0.387, which indicates that the variance of the two groups is homogeneous (p > 0.05). With the assumptions of normality and homogeneity fulfilled, it can proceed to the t test.

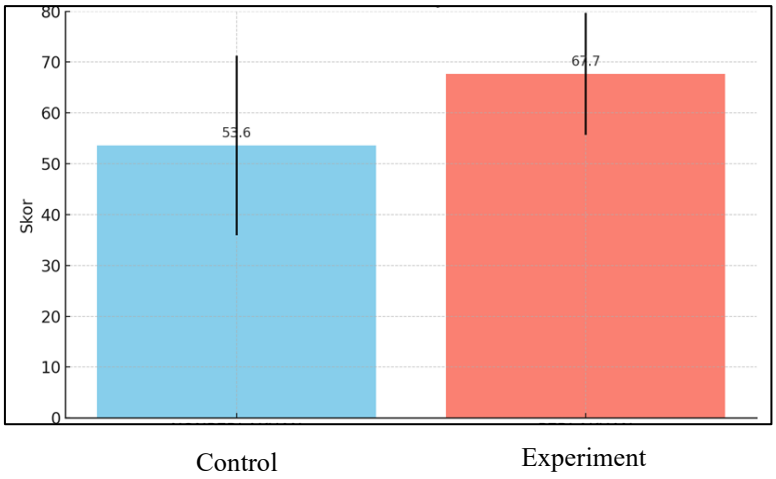

Fig.1. Average mathematics learning outcomes

The results of descriptive analysis showed that the non-treatment group had an average learning outcome value of 53.64, while the treatment group obtained an average value of 67.70. Based on the results of the Independent Samples T-Test test, a significance value of 0.024 was obtained. Because the p value <0.05, it can be concluded that there is a significant difference between the math learning outcomes of students who watch *Mantappu Academy* educational videos and students who do not watch them.

5. Discussion

The results of this study indicate that YouTube-based video learning materials from the Mantappu Academy channel have a significant positive effect on students' mathematics learning outcomes. The videos from this channel help students better understand the material presented verbally, as they are packaged in an educational and interactive manner and interspersed with humor by Jerome Polin. The use of videos as a learning medium has proven to be an important

factor in enhancing motivation and learning outcomes, especially for students in today's digital age. This finding aligns with previous research by Dian Yuliana and Noer Fajri Aminullah (2020), which showed that the use of YouTube media contributes to increased motivation and learning outcomes among students.

One of the factors contributing to the success of these videos is Jerome Polin himself, who is highly relatable to many Indonesian students. His personal experiences studying abroad and overcoming various challenges in understanding mathematics make him an inspiring figure. Jerome's approach, which uses simple language and aligns with the communication style of young people, makes the material easier to comprehend. The videos presented have a systematic structure, starting with an explanation of basic concepts, followed by graded example questions, and concluding with a recap of key points through engaging visualizations. Jerome also frequently provides concrete examples of how the material being studied can be applied, making this approach not only enrich understanding but also strengthen students' retention of the material. This approach is supported by research by (11) which states that the use of YouTube as a learning medium plays an important role in complementing students' knowledge, helping them obtain information related to assignments, monitoring information development, exploring material in depth, and providing concrete examples of material application.

Additionally, according to (12) the use of YouTube as a learning medium has proven effective in capturing students' attention, as the platform presents images and sound simultaneously and is easier to access compared to traditional learning methods such as reading textbooks or listening to lectures without visuals. Videos can reduce students' cognitive load. They do not need to imagine or visualize concepts on their own because the video presents them directly, allowing students to focus more on understanding the material. Therefore, there is a very clear and significant difference in mathematics learning outcomes between students who learn using YouTube videos from Mantappu Academy and those who learn through conventional teaching methods. Students who watched Mantappu Academy's educational videos showed statistically superior learning outcomes. This study provides strong evidence that utilizing educational videos from YouTube channels such as Mantappu Academy can be a highly effective strategy for improving mathematics learning outcomes.

The results of this study are also in line with several other studies, such as those conducted by (7) and (6) which show that the meaningful use of educational videos can improve students' understanding and learning outcomes, including in subjects considered difficult, such as mathematics. Other benefits of video media include flexibility in terms of time, learning materials, and concept development through animation or visualization, which is not possible with conventional methods. Flexibility in terms of time, learning materials, and concept development through animation or visualization, which is not possible with conventional methods.

6. Conclusion

Based on the results and discussion of the research, it can be concluded that the use of educational videos from the Mantappu Academy YouTube *channel* significantly improves the math learning outcomes of grade X MA Muhammadiyah Purwokerto students. This is indicated by the average value of the *post-test* of the treatment group which is higher (67.7) than the

control group (53.6), as well as the results of the Independent Samples T-Test test with a value of p=0.024 (p<0.05). Educational, interactive, and humorous learning videos are proven to be effective in improving students' understanding and memory of mathematics materials**.**

For future research, it is recommended to apply this method to students at different educational levels, such as junior high school or elementary school, to explore whether similar improvements in learning outcomes and motivation can be observed among younger learners. Additionally, there is a growing need to develop more localized and culturally relevant educational video content, which not only aligns with national curricula but also resonates with the digital habits and interests of Indonesian students.

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