



Development of Website-Based Learning Video to Enhance Student Mathematics Learning Motivation

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ABSTRACT

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Keywords

website-based learning video; mathematics learning motivation; creative; innovative

Purpose This research aims to find out the impact of web-based learning video developed on boosting student mathematics learning motivation.

Methodology This research was conducted in class V in the mathematics subject of SD Cipadu, Tangerang, Indonesia for the academic year 2020/2021 with a population of 84 students. Using the Slovin formula, this study was conducted on a sample of 70 students from the population, who were asked to fill out a questionnaire using experimental research methods and using a single group pre-test - post-test. The collected data were analyzed using normality test, homogeneity test and T-test.

Findings The normality test using Kolmogorov-Smirnov presents that $p = 0.20 > 0.05$ meaning that the pretest and posttest data have normal distribution. The homogeneity test appears that significant value gets 0.069 larger than 0.05 showing that the tested data are homogeneous. Based on 70 students who have filled out the questionnaire, the results of t-test display that Sig. (2-tailed) value equal to 0.000 which is less than 0.05. It shows that there is an effect of increasing students mathematics learning motivation after using the website-based learning video. **Implications to Research and Practice** This Research is expected to initiate or act as input for teachers to create learning media that are more creative and innovative using website-based learning video.

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Introduction

The world is currently leading to the digitalization era which is also in line with the rapid development of the industrial revolution 4.0. The presence of Information, Communication and Technology (ICT) greatly affects life, as well as changes the characteristics of an interaction or relationship between human beings, business, government, education, and other aspects (Butt et al., 2020; Roztocki et al., 2019; Yang & Gu, 2021). Furthermore, the development of ICT has contributed to a paradigm shift in all aspects of daily life based on technology, such as changes in communication patterns from letters to email, shopping in the market directly to online shopping, and the pattern of learning through face-to-face in the classroom into a pattern of learning through e-learning media. There is even a reciprocal relationship between technological developments and developments in the world of education (Beli Riyadi et al., 2018). Not only technology can affect learning patterns in the world of education, but also the development of technology contributes to the world of education itself.

This phenomenon is clear evidence that all aspects of life including learning patterns in the world of education need to adapt with the development and involvement of ICT acting as a medium or tool for delivering information in a communication process that is more accessible, faster, more effective, and efficient. Teachers as facilitators in the world of education need to actively contribute to the process of sustainable transformation through the use of technology as a medium of continuous learning (Albion & Tondelur, 2018). This is of course very important considering that it is closely related to the process of improving the quality of education that will be given to students, which is also reflected in the quality of the teachers themselves in conveying information or messages through technology-based learning media.

In these conditions, a teacher is required to adapt quickly, especially with regard to the delivery of information and messages through learning media (Akrim, 2018). Basically, learning media is one of the important supporting factors in the process of delivering information or messages in the teaching and learning process. Therefore, in this digitalization era, teachers need to prepare more creatively with up-to-date learning methods or media so that they can stimulate students' interests in the material delivered (Akrim, 2018; Presicce et al., 2020). Submission of information or messages in learning can be done in various ways both verbally and non-verbally so that the information or messages conveyed by the teacher can be well received by students, but it is undeniable that the possibility of failure can occur in the learning process. For this reason, the use of appropriate learning media can help the process of delivering information or messages in learning effectively (Bambaeeroo & Shokrpour, 2017). Learning media is everything that can be used to channel the sender's message to the recipient, so that it can stimulate the thoughts, feelings, concerns, and interests of students to learn.

Learning media commonly known as printed teaching materials have evolved in the current technological era. Technology is developing very rapidly and continues to evolve until now, as evidenced by many innovations created by humans. The use of appropriate learning methods and technological support can create new learning methods or media that are more creative and able to develop student interest and learning academic topics in the teaching and learning process (Akrim, 2018; Chan et al., 2018; Presicce et al., 2020). The

use of instructional media in the teaching and learning process depends on the creativity and innovation of the facilitator or teacher that can increase students understanding and acceptance of the learning materials provided more quickly.

At first the learning process only occurred in the classroom, but now the learning process is not limited by space and time. The all-digital education system currently provides a learning method known as *e-learning* in the world of education (Reichelt, 2018). This learning media is one form of technological innovation in the field of education. Delivery of learning materials can be done through computers or telecommunications media such as the internet, intranets, and extranets, as well as digital media (Beli Riyadi et al., 2018). Through this kind of learning method, teachers and students are enabled to use a combination of several learning media such as audio, video, infographics, power point materials, chat rooms or discussion rooms and other learning media. In e-learning, instructional media packaged in the form of video presentation, video animation or audio recording is considered significant enough to provide favorable results on better academic side through involvement of digital platforms (Akrim, 2018; Anastopoulos & King, 2015; Çakıroğlu et al., 2017). This research will discuss about the development of website-based learning videos. This website-based learning video is a learning media intended to optimize teaching and learning activities during the current distance learning period.

The well-planned use of technology supported by its right combination with pedagogy is more effective than traditional face-to face classroom teaching (Siemens et al., 2015). Careful planning in using technology will lead to effective learning, therefore it is better for teachers to prepare careful planning before starting learning. The main purpose of a website-based system containing educational materials is to provide students with a personalized, learner-centered, open, fun, and interactive learning environment as well as to support and increase the motivation of the learning process (Rodrigues et al., 2019). In other words, it is very helpful for students in learning with the convenience provided in it. Learning media presenting audio-visual or video is one form of learning media being more flexible (Sireci, 2020). Learning using video influences better learning outcomes. The application of video as a learning medium really helps students to better understand the material presented (Hansch et al., 2015; Hughes et al., 2019).

Website-based learning video media can increase the motivation of learners and improve student learning outcomes in school (Abou El-Seoud et al., 2014; Zhang, 2006). This research focused on the use of website-based learning video to increase student learning motivation in mathematics. This theme is important considering that there are studies finding that students motivation towards mathematics subjects tends to be low compared to other subjects. In addition, traditional mathematics classroom learning approaches tend to be less flexible and have little opportunity for students to develop mathematical or interpersonal solving skills and provide little space to engage in class conversations or discussions (Huang et al., 2020; Lerkkanen et al., 2012). Recently, more and more researchers are focusing on learner-centered approach using video and technology in effort to reduce the above-mentioned learning problems. This research requires students to communicate, reflect on their understanding, and make their understanding visible to others. The teachers combine video instruction and video creation to engage students in learning. This also provides new opportunities and challenges in mathematics education.

Literature Review

i. Website-Based Learning Video Media

Website-based learning video media is an intermediary for delivering subject matter to students by using certain tools so that students can understand quickly and receive knowledge from educators (Nuraini et al., 2020; Rihatno et al., 2020; Umasih et al., 2019). Making website-based learning video media required creativity and innovation from the teacher. Creative and innovative learning media will foster student enthusiasm for learning. A student must prepare well for a new movement and must educate students according to their era.

Website-based learning video media encourages students to learn more deeply, improves their attitudes towards learning, increases learning motivation, builds connections with peers and fosters creativity (Kamariah, 2018). The use of website-based learning video media as an instructional tool for teaching and learning has more cognitive and emotional impact on learners. The widespread use of website-based learning video media as a learning medium is highly valued as evidenced by the many studies on the topic (Jaaman et al., 2013). It proves that the teachers are aware that website-based learning video media can facilitate teaching and learning activities. This application allows students to process the information received both through visual and audio channels (Hughes et al., 2019; Lange & Costley, 2020). The combination of visual and audio in this media can present information better because information is received by two senses at once so that it can make it easier for students to receive information.

The cognitive integration process is most likely to occur when the learner has an appropriate image and verbal representation in memory at the same time. Learning videos combined with websites presenting images and verbal have the benefits of sending teaching materials as learning support, improving the quality of learning, assessment and distributing learning materials so that they can be accessed openly (Maziriri et al., 2020; Rodrigues et al., 2019). The use of website-based learning video media is quite easy to use because in one website page consisting of learning series has been incorporated to make it easier for students to learn.

The subject matter is not only seen from the content of the material, but also how the material is delivered using media attracting the attention of students in classroom (Safitri et al., 2019; Safitri et al., 2020). The method of delivering learning media is the most prominent aspect of the existence of learning media because teaching and learning process allows for interaction. The ease of using technology depends on individual perceptions about the technology itself. Therefore, the role of the teacher as a mediator of the transformation of technology-based learning is very important to build students perceptions of the effectiveness and efficiency of using technology. The perception of technology usefulness affects attitudes towards the application of technology (Scherer et al., 2019). The material delivery of teachers with learning media is the key in learning, therefore teachers who are creative and innovative in delivering learning materials are needed in the current era of globalization

ii. Mathematics Learning Motivation

The relationship between motivation and student academic achievement cannot be underestimated because motivation determines whether individuals will be involved in an activity or not. Motivation affects the mathematics achievement (Atit et al., 2020; Mutiarawati et al.; Novalia et al.; Nurfatanah et al.; Umboh et al.). Motivation involves students' ability to set academic task goals and their efforts to complete assignments even when it does not interest them (Zusho, 2017). Motivation in learning is divided into internal and external. Internal factors are factors that come from inside the students. External factors are factors that influence learning activities that come from outside the students. An example of internal factor learning motivation is success. Students perceive success as motivation, and they will engage in mathematics if they hope to succeed. In addition, students will tend to enjoy tasks for which they have a high probability of success. When the students attribute their success to their abilities, they are more likely to succeed. When they attribute their failure to a lack of ability, they are more likely to fail (Power et al., 2020; Wang et al., 2018). While the external factor such as website-based learning video media fostering student interest in learning materials, its main purpose is to provide students with a personalized, participant-centered, open, fun, and interactive learning environment as well as to support and increase the motivation of the learning process (Rodrigues et al., 2019). Website-based learning video media builds student learning motivation and makes learning meaningful.

Problem statement

Many studies have been conducted related to website to enhance the motivation of the learners (Abou El-Seoud et al., 2014; Huang et al., 2020; Lerkkanen et al., 2012; Zhang, 2006). These studies pay attention to flexibility and many chances for students to be more engaged in learning and diminish difficulty in learning. However, there is a lack of creativity and innovations in learning activities for students. This research gives an address to this space and tried to develop website-based learning video as well as measuring its impact on student learning motivation. This research is expected to be able to initiate or as input for teachers in creating more creative and innovative learning media using website-based learning videos. In addition, it is also hoped that it can help teachers deliver lessons and support distance learning activities more effectively and efficiently through a series of learning on one platform, namely the website.

The research objective of this study was identified as under:

1. to develop website-based learning video in mathematics.
2. to examine the impact of website-based learning video on student mathematics learning motivation

Consequently, the research questions framed for the study were:

1. How to develop website-based learning video in mathematics?
2. How is the effect of website-based learning video on student mathematics learning motivation?

Methodology

Research Design

This research was conducted in 2021 at elementary schools at the sub-district of Cipadu in Tangerang in Indonesia. This research method used pre-experimental one group pretest-posttest involving one group, which was given a pre-test (O^1), treatment (X), and a post-test (O^2) as shown in Table 1.

Table 1

Website-Based Learning Video Media Research Design

Pre-Test	Treatment	Post-Test
O	X	O ²

Description:

O¹ = Pre-test given before treatment

X = Treatment in the form of website-based learning video media

O² = Post-test given after treatment

Research Sample

The population is all of fifth-grade students at SD Cipadu, Tangerang, Indonesia in 2020/2021 academic year. Sampling of the research was done randomly as many as 70 students from a population of 84 students.

Research Instrument and Procedure

The instrument used to collect data was a questionnaire designed to determine the effectiveness of using website-based learning video media on mathematics learning motivation for the fifth-grade elementary school students. The validity of the instruments used in the preparation of this research instrument was content validity and construct validity. Content variation indicated the extent to which the research instrument reflected the desired content. In this study, content validity was carried out by consulting the instrument with several parties who were considered experts on the subject, while construct validity was carried out by calculating the validity test using the Product Moment correlation technique. The mathematics learning motivation instrument is related to the four indicators referring to Chumbley shown in Table 2 (Chumbley et al., 2015).

Table 2

Instruments of mathematics learning motivation

Variable	Indicators	Sub-Indicators
Motivation to learn	Intrinsic Motivation	1. Interested in learning
		2. Not in despair
		3. Not immediately satisfied with the results achieved
		4. Tenaciousness in the face of learning difficulties
Self-Efficacy	Self-Efficacy	1. Curiosity
		2. Interested in learning
Self-determination	Self-determination	1. Efforts to achieve goals
		2. Perseverance in learning
Class motivation	Class motivation	1. Importance in getting good grades in subjects
		2. Interesting learning media

The decision-making criteria to determine whether a material is valid or not is by comparing the counted $r(r_{xy})$ with r_{table} at a significance level of 5%. Calculation of validity test using SPSS version 22.0 computer program. The reliability test with Alpha Cronbach formula is used to determine whether a questionnaire in collecting data reliable or not.

Data Analysis

The normality test was carried out using the Kolmorov Smirnov formula with the Asymp rule of sig or p-value at 5% significance level. The homogeneity test used paired sample t-test to find out whether there was a difference in the mean of the two samples paired. The normality and homogeneity calculation were carried out with SPSS version 22.0. The data analysis technique used to test the hypothesis in this study was the t-test. The t-test was intended to test the mean value of the pre-test, and the post-test score had a significant difference. Interpretation of the t-test results was done to see the value of sig. (2-tailed), followed by a comparison with a significance level of 0.05. The data requirements were significant if the p-value was less than the 5% significance level. The normalized gain test (N-Gain) was carried out to determine the increase in students' motivation to learn Mathematics after being given treatment. This increase was taken from the pre-test and post-test scores obtained from the students before and after treatment.

Results

System Interface

In Figure 1, it can be presented the project menu of website-based learning video media. This menu contained student worksheets that must be done to determine students' understanding of the material in mathematics learning. The assignment on the Student Worksheet was a video tutorial for making nets of cubes and blocks by students. In the column 'optional picture of netting patterns' on the website displayed various patterns of nets of cubes and blocks for students to choose in completing his.

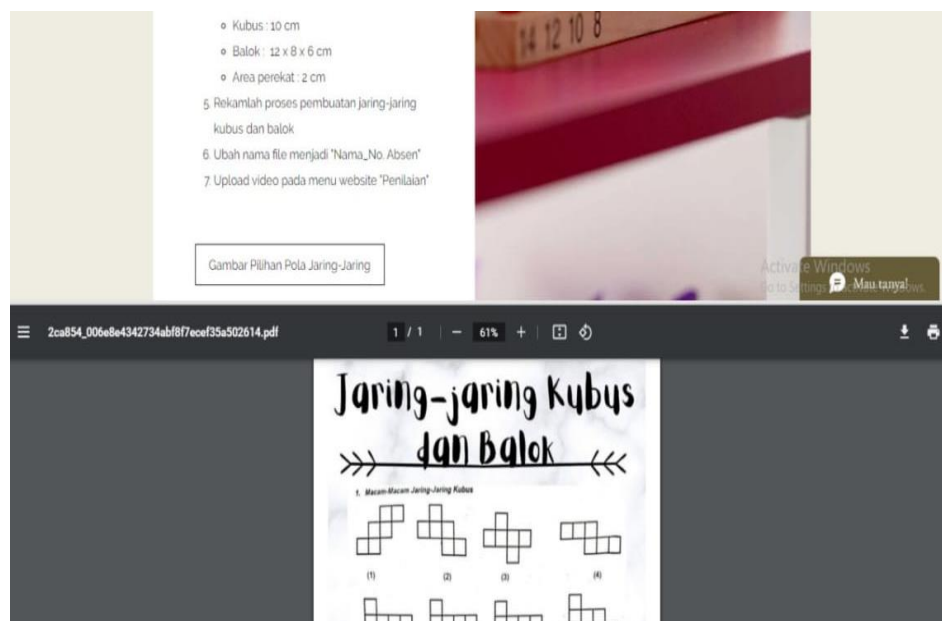


Figure. 1 Project Menu

After completing the task on the student worksheet in the assessment menu, students were asked to submit it to the teacher. This menu provided a column of 'assignment collection link' which was linked to Google Drive from the teacher, so that other friends could see and appreciate the work of students. The word of motivation was presented again in the absent menu, to raise the enthusiasm of students in receiving education in the next lesson. There was an 'attendance' column connected to the Google Form that must be filled in as a sign of student attendance.

The Effect of Website-Based Learning Videos on Students Mathematics Learning Motivation

The Kolmogorov-Smirnov normality test applies a formula performed using the Asymp rule with Sig or p-value at 5% alpha significance level. If $p > 0.05$, the data was normally distributed. This normality calculation used SPSS version 22.0 computer assistance. The results of the normality test calculated utilizing SPSS version 22.0 can be seen in table 3.

Table 3

Normality Test

One-Sample Kolmogorov-Smirnov Test		Unstandardized Residual
	N	70
Normal Parameters ^{a,b}	mean	,0000000
	Std. Deviation	1.14177376
	Absolute	,081
Most Extreme Differences	Positive	,081
	negative	-,055
Test Statistics		,081
asymp. Sig. (2-tailed)		,200 ^{c,d}

b. Calculated from data.

c. Lilliefors Significance Correction.

d. This is a lower bound of the true significance.

The test results prove that if $p > 0.05$ then the data is normally distributed because if the results $p = 0.20 > 0.05$ then the pretest and posttest data are said to be normally distributed. Next was the homogeneity test. To ensure homogeneity, a variance test was carried out on the distribution of the groups concerned. The homogeneity test was carried out on the pretest and posttest scores with the rules if the calculated significance value was greater than the 0.05 significance level (5%). The calculation of homogeneity performed with the help of SPSS version 22.0 computer program can be seen in table 4.

Table 4

Homogeneity Test

Levene Statistics	df1	df2	Sig.
2,291	4	64	0.069

The hypotheses proposed for this variance similarity test were:

H₀ : Variance in each homogeneous group

H₁ : The variance in each group is different (not homogeneous)

Based on the SPSS output above, it was known that the significance value is 0.069 which indicated it was greater than 0.05 so it could be concluded that the tested data showed the same variance (homogeneous) which meant it was accepted. Testing of product effectiveness used parametric statistics through t-test (t-test) using the Paired Samples Test formula as shown in Table 5.

Table 5

T-Test: Paired Samples Test

Pairs	Pretest- Posttest	Paired Differences				t	df	Sig. (2-tailed)	
		mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
1		-18,057	6,685	,799	-19,651	-16,463	-22.5969	,000	

Based on the output, it is known the value of Sig. (2-tailed) of 0.000 > 0.05, because the value of Sig. (2-tailed) is equal to 0.000 less than 0.05. It can be concluded that the use of website-based learning video media can have a positive effect on students' motivation to learn mathematics.

Discussion

This study was designed to determine the effect of website-based learning video media on the motivation to learn mathematics for the fifth-grade elementary school students at Cipadu Elementary School, Tangerang, Indonesia. This is in line with the study found that website-based learning video media has an effective influence on academic achievement and increase students' motivation (Abou El-Seoud et al., 2014; Hansch et al., 2015; Rodrigues et al., 2019; Zhang, 2006). The results showed that there was an effect of increasing students' motivation to learn mathematics after using website-based learning video media. Another study confirmed that 94% of students found that website-based learning video media was very helpful to facilitate their learning and provided facilities to communicate remotely (Freasier et al., 2003; Hartshorne & Ajjan, 2009).

It was felt that the development of website-based learning video media was a complete package to boost student motivation in learning mathematics. Website-based learning video media was one form of electronic media which was useful and did not have a negative impact on academic success. The results of the study showed an increase in student learning potential by increasing the availability and accessibility of electronic media, but it still needed self-regulation from participants educated (Anastopoulos & King, 2015; Kirkorian et al., 2008). The setting time and learning environment was characterized by an individual's ability to perform academic tasks that are being worked on, pay no attention to other distractions during the task, and eliminate interference. This includes

students' ability to effectively manage their time and the surrounding environment to achieve meaningful learning (Kwon et al., 2018; Maziriri et al., 2020).

The use of website-based learning video media can improve the student motivation. This is similar to the results of research stating that students who are taught using website-based learning video media have better learning outcomes, especially for students who are relatively weak in learning in the classroom (Jaaman et al., 2013; Sudha & Amutha, 2015). Changes in learning styles help students not to feel monotonous during learning which requires changing learning styles in the classroom to learning styles at home. Changes in teacher teaching styles must be done to make the existing learning not too monotonous (Wibowo et al., 2019; Wibowo et al., 2020). Teachers should also be aware of long periods of screen time causing headaches, blurred vision, dry eyes, and other physical health problems. After the students pay attention to the material presented by the teacher through website-based learning video media, students are asked to work on projects and upload them on the google drive link provided. The convenience provided by website-based learning video media can help teachers and students in doing learning because they can access some aspects of learning only on the website.

Conclusion and Recommendations

It can be concluded that website-based learning video media affect students' motivation in learning mathematics. Website-based learning video media is one of the innovations to facilitate learning in which the students can access learning links easily, quickly, anywhere, and anytime. This website-based learning video media can make learning easier for the students because in one click, learning implementation plan, attendance, active interaction with the teacher, material in the form of audio-visual, worksheets, task collection to motivational words can be accessed on the website.

Website-based learning video media can be used by teachers to grow students' motivation in learning mathematics. The role of the teacher as a mediator of the transformation of technology-based learning methods is very important to build students' perceptions of the effectiveness and efficiency of using technology in learning media. The limitation of this research was that the sample only covers the elementary school students in one region and only limited to mathematics learning motivation variable. It is hoped that further research can conduct research on the effect of website-based learning videos on students' cognitive outcomes to clearly know whether students can understand the material presented. It is only recommended that effectiveness of website-based learning video media can be tested not only in one region but also other regions. The implication of this research is that website-based learning video media can be used not only in mathematics but also in other courses.

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