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The influence of using Learning Videos for High School Mathematics Curriculum Subjects with Flipped Classroom Models on Learning Achievement in the UIN Walisongo Semarang

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Abstract

During the current pandemic, students are having difficulty understanding mathematical material; normally, they are taught by lecturers face-to-face, but now online. The obstacle that students face is that they believe that learning is not optimal because the signal is often poor and inconsistent, and they are unable to meet with the lecturer. To alleviate this issue, it is required to create a video of learning material that will be supplied by a mathematics lecturer by the lecturer who teaches, the video is published on YouTube, and the youtube link is given to students to study beforehand for the forthcoming meeting. This is consistent with the flipped classroom concept, in which students are expected to first understand the lecturer's video before being discussed directly by the lecturer.It is expected that students are able to think creatively about video content created by their professors, and students are able to examine material flaws that they have not understood and then clarified by their lecturers at the next meeting. In research on the development of instructional video media for high school mathematics curricular with the ADDIE stage model. This model, as the name suggests, consists of five main phases or stages, namely (A) analysis, (D) design, (D) development, (I) implementation, and (E) evaluation. The Implementation and Evaluation stage was carried out in the second year, with expanded tests carried out at UIN Walisongo Semarang in a fun and enjoyable manner, with posttests and user response questionnaires given with the following results: Based on research at UIN Walisongo, posttest results were processed using tests t results obtained are 0% <5%, then H0 is rejected. This means that we accept H1, which means that the results of learning mathematics using video learning media for high school mathematics curriculars are better than conventional learning models. Looking at the average learning achievement in the mean column, Group Statistics table, the experimental class average is 86.00, while the average -the average control class is 64.74. These results show that the learning outcomes of the experimental class are better than the control class. R Square value of 0.804 = 80.4%. This value means that the influence of virtual lab media on learning achievement is 80.4%, while 19.6% of learning achievement is influenced by other variables outside of the independent variables in this research.

Keywords: *Influence, Learning Videos, Flipped Classroom, Critical Skills, Creative Abilities*

INTRODUCTION

Therefore, it is necessary to innovate learning, one of which is by making learning videos for each chapter of the material on the digital book for high school mathematics curricular courses that can be uploaded on the UIN Walisongo website as a supplement to high school mathematics curricular material, while the learning model that is in accordance with the learning video is one of the models flipped classroom which requires students to learn independently first. There are several research on the efficacy of learning films that have a tremendous influence, such as generating mathematical learning videos helped by social media. Instagram as an alternative learning is extremely effective because Instagram gives ease for students in studying mathematical subject through videos that are packed beautifully and according to students' preferences [1], The effectiveness of the flipped classroom model using mathematics learning videos on concept understanding is then demonstrated, with students mastering 60% of the material uploaded in the learning video, implying that when the learning process is in the virtual classroom, students only need 40% more to understand the uploaded material according to the standard of mastery of the material. 2], then with interactive multimedia-based video mathematics learning media, students feel excited about studying math information since it is entertaining and simple to recall the style of thinking [3. The flipped classroom model has been widely used in learning and is very effectively applied in online classes. It has been shown that using the flipped classroom

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model with the help of power point and audio visual media in elementary schools is able to completely improve 70% of student learning outcomes. [4], then students' problem solving abilities through the flipped classroom model in 21st century chemistry learning improve very well, especially students can preparation for practice by viewing learning videos with the flipped classroom model first [5]. Then, in order to help students in the UIN Walisongo Mathematics Education study program understand the material for high school mathematics curricular subjects, an interesting learning video media will be created by incorporating the flipped classroom model into the learning process in the virtual classroom, as outlined in the LPPM UIN Walisongo research plan for 2021.

LITERATURE REVIEW

Video Learning Video is a means for conveying communications that includes audiovisual media or viewing and listening media [6]. Audio-visual media, sometimes known as video, can be classified into two types: pure audio-visual media, which combines sound and picture functions into a single unit, and non-pure audio-visual media. The first category includes motion films, television, and videos, while the second type includes slides, opaques, OHPs, and other sound-enabled visual devices [7], Learning films are renderings or visualizations of the story of learning information, packed concisely, in words. Another learning video is a learning media that incorporates sound, visuals, motion, and text that is presented in a compact, clear, and succinct way [8]. Flipped Classroom Learning Model Flipped Classroom is a learning approach that "reverses" the standard technique, in which information is often provided in class and students complete tasks at home [9]. Flipped Classroom involves active learning, student interaction, and podcasting [10], In the flipped classroom, information is first delivered via learning videos that students must watch at home; on the other hand, classroom learning sessions are utilized for group discussions and assignment completion. the professor serves as a coach or consultant [11]. Menu flow chart for flipped classroom 3. High school mathematics curriculum material is a science that works with or investigates abstract forms or structures and their interactions at the high school level [12]. To grasp the structures and linkages, a comprehension of the concepts included in mathematics is obviously required [13], According to the IQF curriculum, mathematics is defined as: (1) an accurate and methodical field of science. (2) Mathematics is knowledge of a literature review of no more than 1000 words that states the current state of the art and a road plan for the topic being researched/technology being created. The route map might be shown as a chart or graphic. Sources of important primary literature/references, as well as emphasizing research findings from the most recent scientific publications and/or patents. Numbers and computations. (3) Mathematics is the study of logical thinking and working with numbers. (4) Mathematics is the study of quantitative facts as well as spatial and formal difficulties. (4) Mathematics is an understanding of logical structures. (5) Mathematics is the understanding of hard rules[14]. Critical and creative thinking abilities Critical thinking may be defined as a method and ability used to comprehend concepts, apply, synthesize, and evaluate information collected or created [15], Not all information collected may be utilized as knowledge that is considered to be real to be used as a guide in action, and the information provided is not always right [16], Critical thinking is a high-level thinking talent that has been shown to play a role in moral, social, mental, cognitive, and scientific growth [17]. Creative thinking is a mental activity that creates something new as a result of progress [18], Then creative thinking is a mental activity that enhances creativity and insight while producing anything (generating). Create or develop something fresh.

METHOD

Research Design

This research process is called research and development (RD). Research and development (Research and Development) is a research approach used to build specific goods such as designs, models, prototypes of learning media, etc., and to assess the usefulness of these products [26]. The research model employs the ADDIE model development research design paradigm. This paradigm, as the name indicates, comprises of five major phases or stages: (A) analysis, (D) design, (D) development, (I) implementation, and (E) assessment. The ADDIE model's five phases or stages must be carried out systemically and systematically [27], with the first year devoted to analysis, design, and development, and the second to implementation and assessment.

Samples and Data Collection

The samples in this study were students of the Mathematics Education study program at UIN Walisongo, and the data were collected using random sampling.

Analyzing of Data

Student answer questionnaire data, expert validation data, and student test data were t-tested on their critical and creative thinking skills, although the validation employed an average % with quantitative descriptive

RESULT AND DISCUSSION

In this project, a video product for learning high school mathematics curriculum courses was built using a flipped classroom structure based on the ADDIE principle. During the first year, three stages were completed: analysis, design, and development. The results of product development are reported utilizing the ADDIE development approach (Sugiyono, 2010). As follows.

Analysis

At this stage of analysis, an analysis of the problems of learning high school mathematics curricular subjects at the Open University in the Mathematics Education study program has been conducted, revealing that 70% of students continue to struggle with high school mathematics curricular subjects, particularly those related to materialLinear Equation and Linear Inequality Systems, as well as their Linear Program, are still below 70 based on the results of the initial pretest, then the students stated that during the 2020-2021 pandemic, 90% of Open University students really need learning media that can improve students' critical and creative thinking skills, especially material System of Linear Equations and Linear Inequality, this is in accordance with the research of Saputra, MEA, and Mujib, M. (2018). This is because this subject is still presented in traditional learning formats. and continue to use simple learning media such as PowerPoint, it is necessary to create learning video media containing high school mathematics curricular material whose recordings are uploaded on YouTube and can be accessed by students at any time and from any location, so that students fit the flipped classroom model, in which students are asked to study independently at home before offline or online learning at a meeting led by the lecturer.

Design

After the learning video product is finished, a focus group discussion is held regarding the design display and the depth of the material displayed, namely the system of linear equations and inequalities, the results of the focus group discussion show that students need to be given practice to determine the position of the system of linear equations and inequalities with animation and other mathematical software. so that they understand the mathematical concepts better. This is confirmed by research The results of the focus group discussion show that students need to be given practice to determine the position of a system of linear equations and inequalities with animations and other mathematical software so that they understand the mathematical concepts better. This has been validated via study. The results of the focus group discussion indicate that students should be provided practice determining the location of a system of linear equations and inequalities using animations and other mathematical tools in order to better comprehend the mathematical concepts. This is supported by research by Suseno, PU, Ismail, Y., and Ismail, S. (2020), which shows that students' critical and creative thinking skills improve even more when they are given a touch of renewable media in the form of learning videos packaged in attractively based mobile media that are appealing and practical to use. Students, then Akbar, RRA (2018), by creating learning videos independently by lecturers, it is highly engaging for students to study the subject for systems of equations and linear inequalities in a calm and entertaining way since they can learn independently.

Image 1. Front view of learning video products

Figure 2. Display of mathematics curriculum topic content packed in instructional films.

Development

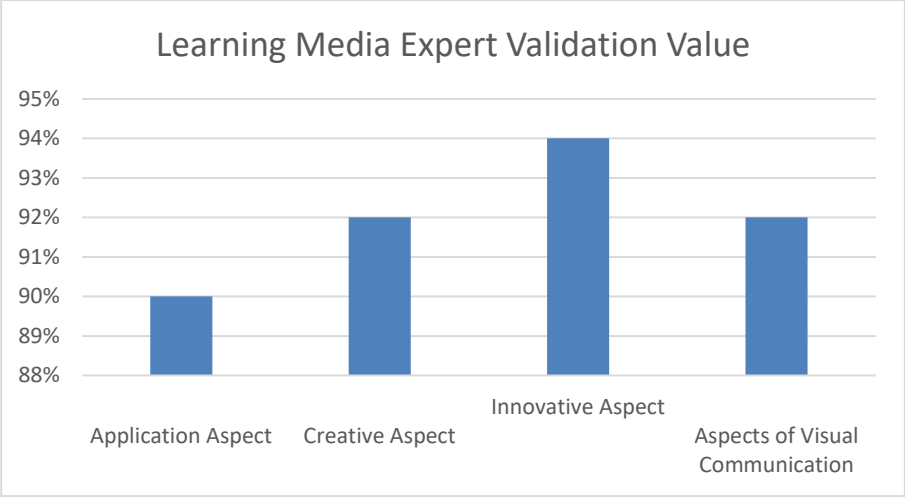
During this stage of development, the proposed framework is realized, resulting in a product that can be implemented. At the creation stage of the Geometry Virtual Lab media, when the android-based media is complete, it is verified by media professionals and material experts by the validator to collect input and assess according to the input supplied by the validator. Furthermore, the mathematics curricular topic content bundled in learning videos is amended based on the validator's feedback to improve the product.

During this development stage, a learning video product was created that was tailored to the findings of a focus group discussion between lecturers and students, which included the design of high school mathematics learning video media and the level of high school mathematics curriculum covered. Before the product is tested in the field, it is validated by specialists in high school mathematics and video-based learning media.

Figure 3. Validating the product material for high school mathematics curricular learning videos.

(7) This learning video product can be used correctly and in accordance with the KKNI content, (8) students may solve problems regarding systems of linear equations and inequalities in a sequential and entertaining manner, (9) users will have no difficulty operating this learning video product, (10) This learning video product may develop students' creative and critical skills by viewing the material repeatedly until they comprehend it. According to the validation data, the average result of the learning media expert assessment is 92. This high school mathematics curricular learning video package has been evaluated. The viability of the design of this learning video product suggests that it is well-suited for educational purposes. This is consistent with the findings of Maemanah, S., Suryaningsih, S., and Yunita, L.

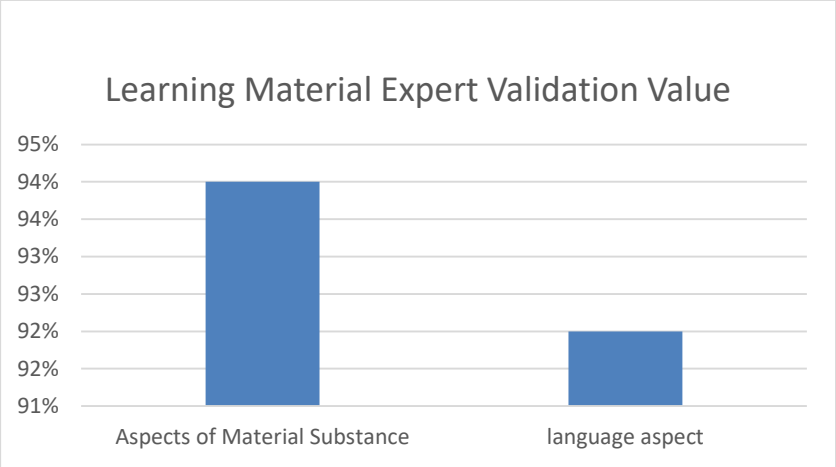
Table 1. Learning Media Expert Validation Results for Learning Video Products



Meanwhile, based on the results of material expert validation, the following findings were obtained: (1) this learning video product is suitable as a virtual supplement for high school mathematics curricular material, (2) concepts related to this SPLDV material can be understood virtually, (3) learning video is interesting to use in other courses, (4) the menus on the learning video product can be used in a cool and fun way, (5) this SPLDV material can be linked to students' critical and creative thinking skills, (6) the questions that have been there need to be related to, (8) Students can solve questions about SPLDV sequentially, (9) it is not difficult to operate this learning video product, (10) this learning video product is able to improve students' creative and creative thinking skills, based on the expert assessment of SPLDV learning materials shows that the material presented in this learning video media is very feasible to be applied in eye learning high school mathematics curricular lectures with an average value of 93%, meaning This implies that the SPLDV content supplied is ideal for use

in education. This implies that the SPLDV content supplied is ideal for use in education.

Table 2. Expert Validation of Learning Materials for Material Depth Video Products



Implementation

At this implementation stage, a limited test was conducted for students of the mathematics education study program from the Open University and PGRI University Semarang using learning video products in learning high school mathematics curricular lectures with SPLDV material by first downloading the video on YouTube, then taking a pretest before high school mathematics curricular learning, and a post-test after following the lesson using this learning video. This implementation activity is carried out online using Zoom meetings.

Figure 3. Implementing a limited test of learning video products at UIN Walisongo Semarang

Evaluation

In this study and development, the quality of learning video products was evaluated, as well as the influence of the usage of learning videos at the University of PGRI Semarang, as shown below.

Evaluation of the Quality of Teaching Media

The findings of the questionnaire evaluation of learning video teaching media were distributed to learning media experts, learning material experts, and students who participated in the experiment. This assessment can be used to inform the modification of the learning video product. According to the validation results from material experts and media development experts, the learning video product is valid and feasible to use because it meets the criteria for material and media indicators with an average score of 92.5, indicating that the virtual geometry

lab product is very feasible to use.

a. Evaluation of the Impact of Using Video Learning for High School Mathematics Curricular Courses

This evaluation is intended to inform the usage of video-based learning material in learning activities in online or offline classrooms. One of the benefits of employing this learning video medium may be observed in the post-test results, which are 86.33, which meets good requirements after previously receiving a pretest of 75.25.

University Semarang by selecting fifth-semester students from class 5B as the experimental class and class 5A as the control class. Post-test data analysis was performed to assess whether the experimental and control classes differed in their approach to conventional learning and learning utilizing learning media, namely learning videos. Furthermore, the researchers examined post-test data from students in grades 5A and 5B.

The steps taken to examine the post-test data are as follows.

Normality test

To calculate the normality of the initial data using the Liliefors test with a significant level of 5%. The hypotheses and criteria in the normality test are as follows.

Ho : L0 < Ltable then the population is normally distributed

Ha : L0 > Ltable then the population is not normally distributed

The following results were obtained.

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Kelas	Statistic	df	Sig.	Statistic	df	Sig.
Nilai	Kelas Eksperimen	.101	22	.200*	.932	22	.134
	Kelas Kontrol	.125	19	.200*	.960	19	.568

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

From the Test of Normality table on Shapiro-Wilk above, the significant value for the experimental class is 0.134 = 13.4% and the significant value for the control class is 0.568 = 56.8%. Because 13.4% > 5% and 56.8% > 5%, based on the criteria H0 is accepted. This means that the samples in the experimental class and control class are normally distributed.

Homogeneity Test

Test of Homogeneity of Variances

Nilai

Levene Statistic	df1	df2	Sig.
1.687	1	39	.202

From the Test of Homogeneity of Variances table above, the significant value is 0.202 = 20.2%. Because 20.2% > 5%, based on the criteria, H0 is accepted. This means that the variance of the experimental class and control class populations is the same (homogeneous).

t test

The efficiency of android-based learning media based on learning videos was evaluated using an experimental method known as the Posttest Only Control method. In this design, there are two groups: experimental and control group. This experimental design was used to compare student learning success in the experimental and control groups, with the assumption that the experimental group would outperform the control group.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Nilai	Equal variances assumed	1.687	.202	5.774	39	.000	21.263	3.682	13.815	28.712
	Equal variances not assumed			5.649	32.804	.000	21.263	3.764	13.604	28.922

The Implementation and Evaluation stage was carried out in the second year, with expanded tests carried out at UIN Walisongo Semarang in a fun and enjoyable manner, with posttests and user response questionnaires given with the following results: Based on research at UIN Walisongo, posttest results were processed using tests t results obtained are 0% <5%, then H0 is rejected. This means that we accept H1, which means that the results of learning mathematics using video learning media for high school mathematics curriculars are better than conventional learning models. Looking at the average learning achievement in the mean column, Group Statistics table, the experimental class average is 86.00, while the average -the average control class is 64.74. These results show that the learning outcomes of the experimental class are better than the control class. R Square value of 0.804 = 80.4%. This value means that the influence of virtual lab media on learning achievement is 80.4%, while 19.6% of learning achievement is influenced by other variables outside of the independent variables in this research.

This is supported by Yanuarto WN (2018), who demonstrates that with a flipped classroom supplemented by video learning, pupils become more independent.According to Rosiyanti, H., Adriansyah, AF, Widiyasari, R., and Dewi, NS (2020), using mathematics learning videos in class VII SMP increased students' favorable impressions of mathematics.Kusumaningrum, B., and Wijayanto, Z. (2020) verified that online learning in mathematics can be most effective if the instructor utilizes media that is appropriate for the content being taught.

CONCLUSION

Based on the results of the validation of material experts and learning media experts, the average value is 92.5 percent, indicating that the video product learning material for linear inequality systems, linear equations, and linear programs is categorized as very suitable for use in learning high school mathematics curricular subjects, while student responses after using a learning video product with a feasibility value of 87.82% is in the good category, according to the results of. The posttest average value for the experimental class is x1 = 81.33, whereas the control class average is x2 = 70.59, with a tcount of 4.29 and a ttable of 1.78. Because tcount > ttable, which is 4.29 > 1.78, Ho is refused. This means that we accept H1, which means that the results of learning mathematics using video learning media for high school mathematics curriculars are better than conventional learning models. Looking at the average learning achievement in the mean column, Group Statistics table, the experimental class average is 86.00, while the average -the average control class is 64.74. These results show that the learning outcomes of the experimental class are better than the control class. R Square value of 0.804 = 80.4%. This value means that the influence of virtual lab media on learning achievement is 80.4%, while 19.6% of learning achievement is influenced by other variables outside of the independent variables in this research.

LIMITATIONS

The research is confined to high school mathematics curriculum areas, thus more learning films are needed to augment other courses.

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