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Research Article

The Evaluation of using Learning Videos for High School Mathematics Curriculum Subjects with Flipped Classroom Models on Learning Achievement in the IVET University Semarang

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Abstract.
This research deals with the development of learning video media for high school mathematics curricula using the ADDIE stage model. This model, as the name implies, consists of five main phases or stages, namely (A) analysis, (D) design, (D) development, (I) implementation, and (E) evaluation. The implementation and evaluation phase was carried out in this second year, with an expanded test carried out in the mathematics education study program at IVET University Semarang in a fun and enjoyable way, with a posttest and a user response questionnaire with the following results: Based on research at IVET University Semarang, the results of the posttest were processed using The t-test obtained a result of 0% < 5%, then H0 was rejected. This means that we accept H1, which means that the results of learning mathematics with learning video media for high school mathematics curricula are better than conventional learning models, looking at the average learning achievement in the mean column, the group statistics table, it is obtained that the average of the experimental class was 85.50 while the average of the control class was 70.42. These results show that the learning outcomes of the experimental class were better than those of the control class. R Square value is 0.825 = 82.5%. This value means that the effect of virtual lab media on learning achievement is 82.5%. In comparison, 17.5% of learning achievement was influenced by other variables outside of the independent variables in this study.

Keywords: the evaluation, learning videos, high school mathematics curriculum; flipped classroom models

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1. Introduction

In producing prospective teachers at open universities, especially mathematics education study programs, several innovations related to learning during the pandemic have been carried out, such as online learning, digital books and so on, however, for high school mathematics curricular subjects, which are mandatory subjects for students to

master as preparation for tomorrow when being a high school teacher during this pandemic there has been no innovation for lecturers of high school mathematics curricular subjects who make learning videos that students can access before online learning, the facilities available on the UT website or UT online learning are still limited to digital books, therefore it is necessary One of the learning innovations is by making learning videos for each chapter of the material in the digital book for high school mathematics curricular courses which can be uploaded on the UT website as a supplement to the high school mathematics curricular course material, while the learning model that is suitable for learning videos is one of the flipped classroom models which requires Students study independently first.

There is a lot of research on the effectiveness of learning videos that have a big influence, for example in the development of mathematics learning videos assisted by social media, Instagram as a learning alternative is very effective because Instagram provides comfort for students in studying mathematics material through videos that are packaged attractively and according to students' wishes [1], then The effectiveness of the flipped classroom model using mathematics learning videos on understanding concepts is shown that students are able to master 60 percent of the material uploaded in the learning video, so that when the learning process is in the virtual classroom, students only need 40 percent more to properly understand the uploaded material according to the standards for achieving mastery of the material [2], then with multimedia-based interactive video mathematics learning media, students become enthusiastic about studying mathematics material because it is interesting and easy to remember the flow of thinking [3]. in the application of the flipped classroom model, it has been widely used in learning and is very effective in online classes. It has been shown that using the flipped classroom model assisted by powerpoint and audio-visual media in elementary schools is able to increase 70 percent of student's complete learning outcomes [4], then their solving abilities Student problems through the flipped classroom model in 21st century chemistry learning improve very well, especially students can prepare for practice by watching learning videos using the flipped classroom model first [5]. So the impact of the flipped classroom model on students' academic achievement This is demonstrated by the large number of students who are able to study independently before meeting face-to-face in class [6]

Then, to overcome the problems of Open University mathematics education study program students in understanding high school mathematics curricular subject material, interesting learning video media will be created by applying the flipped classroom model in the virtual classroom learning process, this has been linked to the Open University

LPPM research strategic plan for 2021 to 2021. 2025 specifically in 2022 focuses on the development stage, namely the development of research in the field of science and technology to strengthen UT's digital learning ecosystem because it is very suitable to develop learning videos related to high school mathematics curricular subjects which are packaged attractively and are easy for students to understand with online learning, this is stated in TKT 4 up to 6 resulting in learning media products that are tailored to the level of thinking of UT students and UT's digital learning ecosystem.

2. Method

This research method is research and development. Research and development (Research and Development) is a research method used to produce certain products such as designs, models, learning media prototypes, etc., and test the effectiveness of these products [7]. The research model uses the ADDIE model development research design 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 five phases or stages in the ADDIE model need to be carried out systemically and systematically [8] , the product was then tested on a limited basis at IVET University Semarang from August to September 2023 by selecting 1 experimental class and 1 control class with the results tested by simple regression after students were treated with learning video-base Learning Videos for High School Mathematics Curriculum Subjects

3. Result and Discussion

Expansion Test of Learning Video Products for High School Mathematics Curricular Courses at IVET University Semarang. In the learning process using Video Learning Media for High School Mathematics Curricular Courses at IVET University Semarang, it has been carried out simultaneously with the following steps:

1. Choosing an experimental class by random sampling, namely semester IV at the IVET University, Semarang, to be subjected to face-to-face learning
2. The High School Mathematics Curricular Learning Video Application includes 6 chapters which have been revised by the team based on expert input, student and lecturer respondents in the second year covering material on systems of linear equations and inequalities, quadratic functions, systems of quadratic equations

and inequalities, power forms, roots, and logarithms, equations of exponential and logarithmic functions, inequalities of exponential and logarithmic functions, matrices, vectors, mathematical logic, sequences and series, circles, polynomials and remainder theorems, composition functions, inverse functions, trigonometry, space geometry, statistics and probability, function limits, function derivatives, and integrals which are packaged in the form of mobile and computer-based learning videos.

3. Students are required to use this High School Mathematics Curricular Learning Video in their classroom learning

4. Assessment is carried out at the end of each video-based learning material

5. Then students and lecturers filled out questionnaire responses regarding the learning process using High School Mathematics Curricular Learning Videos.

The expanded test was carried out at IVET University Semarang by taking fourth-semester students in class 4A as the experimental class and class 4B as the control class. Post-test data analysis was carried out to find out whether the experimental class and control class had differences between conventional learning and learning using video learning media for high school mathematics curricular subjects. Next, the researchers analyzed the post-test data that had been carried out on class 4A and 4B students. The steps used to analyze post-test data are as follows.

The effectiveness of the High School Mathematics Curricular Learning Video media was tested using an experimental design, namely Post-test Only Control Design. In this design, there are two groups, namely the experimental group and the control group. This experimental design is used to compare student learning achievement between the experimental group and the control group with the hope that the experimental group's achievement will be better than the control group.

In this research, to find out which learning is better, the t test (Independent Sample Test) was used with the help of the SPSS program. The hypotheses used in this research are as follows Table 1.

TABLE 1: output score t-test with SPSS.

Group Statistics					
	Kelas	N	Mean	Std. Deviation	Std. Error Mean
Nilai	Kelas Eksperimen	22	85.50	9.546	2.035
	Kelas Kontrol	19	70.42	9.760	2.239

By looking at the average learning achievement in the mean column, the Group Statistics table shows that the experimental class average is 85.50 while the control class average is 70.42. These results show that the learning outcomes of the experimental class are better than those of the control class. The use of the flipped classroom instructional model in higher education enables students to learn independently using video-based learning media [9], while The Effect of Flipped Classroom Model on Students' Classroom Engagement in Teaching English shows that children who have studied independently are assisted by learning media anything at home makes children confident when studying at school because they already understand the material that will be taught by the teachers [10], then The Effectiveness of the Flipped Classroom Model Using Mathematics Learning Videos on Concept Understanding shows that the flipped classroom model is very effective used with the help of learning videos in increasing students' understanding of concepts because the material can be repeated by students anytime and anywhere [11]

To find out how much influence the independent variable (High School Mathematics Curricular Learning Video Media) has on the dependent variable (learning achievement) can be seen in the R square value contained in the SPSS output as follows.

TABLE 2: output score R-square with SPSS.

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.323[a]	.825	.873	6.953
a. Predictors: (Constant), Video Pembelajaran				

From the Model Summary table above, it is found that the R Square value is 0.825 = 82.5%. This value means that the influence of virtual lab media on learning achievement is 82.5%. In comparison, 17.5% of learning achievement is influenced by other variables outside of the independent variables in this research.

It is said that previous research on the Development of Multimedia-based Interactive Video Mathematics Learning Media shows that by developing interactive multimedia products based on learning videos, children are interested in taking mathematics learning seriously and interestingly [12], then Problem-solving ability through flipped classroom model in 21st -century chemistry learning shows that by studying independently at home, difficult chemical material can be analyzed by previous students at home so that at school students can easily digest the material presented by the teacher [13], then with the Development of character education-oriented learning video media is able to foster critical thinking character children [14], then The Flipped Classroom

Learning Model for Fostering Independent Mathematics Learning and Maximizing the Role of Technology in Education makes technology an inseparable learning supplement because with technology learning becomes more impressive [15], then with Analysis of students' perceptions of class VIII mathematics learning videos during the pandemic showed that 95% of children with learning videos made it easier for children to learn independently at home, then the learning videos studied previously could be criticized regarding the depth of the material and examples of questions in the learning videos [16]. The expanded test documentation at IVET University Semarang can be seen in the following image.

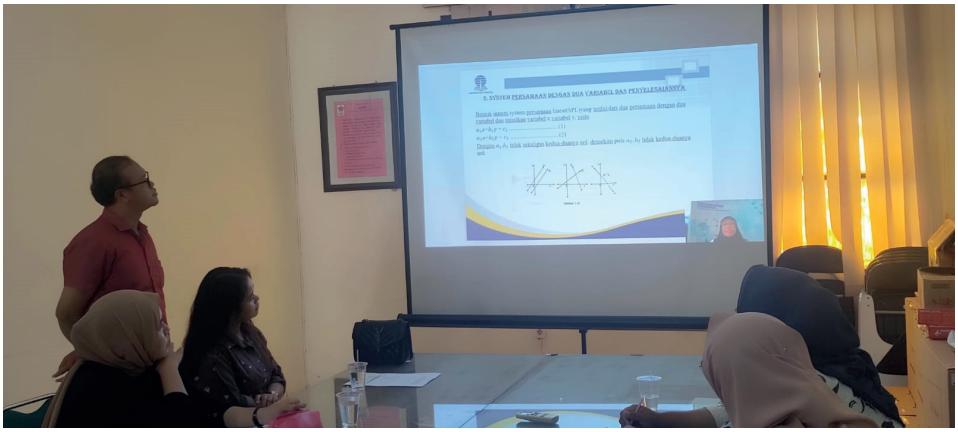

Figure 1: Expanded test of High School Mathematics Curricular Learning Video products at IVET University Semarang.

4. Conclusion

The Evaluation after using Video Learning Media for High School Mathematics Curricular Courses at IVET University Semarang means that the results of learning mathematics with learning video media for high school mathematics curricula are better than conventional learning models, looking at the average learning achievement in the mean column, the Group Statistics table, it is obtained that the average experimental class is 85.50 while the average -The control class average is 70.42. These results show that the learning outcomes of the experimental class are better than those of the control class. R Square value is 0.825 = 82.5%. This value means that the effect of virtual lab media on learning achievement is 82.5%. In comparison, 17.5% of learning achievement is influenced by other variables outside of the independent variables in this study.

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