DESIGN VIDEO COURSE LEARNING HIGH SCHOOL MATHEMATICS WITH FLIPPED CLASSROOM MODEL FOR IMPROVING STUDENTS' CRITICAL THINKING ABILITY

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Abstract: During the current pandemic, students have difficulty understanding mathematical material, usually they are taught by lecturers face-to-face and now bravely, the obstacle experienced by students is that they feel that their learning is not optimal because often the signal is not good and is not stable enough to not be able to meet the lecturer. , to reduce this problem, it is necessary to make a video of learning material that will be delivered by a mathematics lecturer made by the teaching lecturer, the video is placed on youtube and the youtube link is given to students to study first for the upcoming meeting, this is in accordance with the flipped classroom model where students are asked to study first the videos made by their lecturers before being explained directly by the lecturers, it is hoped that students are able to think creatively about the video material made by their lecturers and students are able to analyze the lack of material that they have not understood n is explained by the lecturer at the next meeting, while the research method used is using the ADDIE R & D model (Analysis, Design, Develop, Implementation and Evaluation), The research subjects were college students of mathematic education program of Open University. The sampling technique used was purposive sampling. The results of this study are design of learning video with flipped classroom model with material expert validation results with a feasibility percentage of 92% and media expert validation results of 93% with very good criteria. Thus, this product is is very suitable to be used as a supplement to lecture material at open universities, especially high school mathematics curricular subjects and make college student improve critical thinking in the class and the results of this study using a one-sided t-test showed or 2,097 > 1,674 so that the average learning outcomes of the experimental class using learning videos were better than the average learning outcomes of the control class without using learning videos as learning supplements; of student responses that is 88.4% in the very good category.

Keywords: Design; Learning videos; Flipped classroom; Spatial ability; Tutorial video.

INTRODUCTION

Education is something that must be taken for every citizen who wants the progress of his nation, then the science of education can be developed again. Education is directed at the creation of quality human resources, this shows that human resources are dominant in the learning process, it also means that managing human resources is a very important area for carrying out the learning process in schools.(Rustam, 2016). Education is currently undergoing very rapid changes. Various new ways or methods have been introduced and used so that learning becomes more impressed and more meaningful(Rahmawati et al., 2016). Education begins with providing basic knowledge and application in work situations.

Learning basically does not only apply concepts, theories, and facts but also applications in everyday life and in the learning process the teacher is no longer the center of learning. With such learning, students are expected to be accustomed to independent and active

learning during the learning process. But the reality is that in learning, especially in learning mathematics, students often find a tendency not to ask the teacher even though they do not understand the material presented by the teacher. For this reason, the teacher must be wise in determining an appropriate learning model, which can create conducive classroom situations and conditions so that the teaching and learning process can take place in accordance with the expected goals.(Hadiyanti, et al, 2012).

In the current era of technology, teachers should be more creative in utilizing IT-based learning media. IT-based learning media needed by students is interactive learning media. Things that must be developed in the field of education such as updating the education system or curriculum, learning methods, learning media, or the quality of education. Technology-based media can make students more interactive and adapt to the current developments in the field of technology. The use of the internet in education will help the world of education, increase the number of students. Apart from increasing the quantity, the same applies to the quality of students.

From the results of observations that researchers have done previously, it shows that the motivation and learning outcomes of students at the Open University and Pgri Semarang University in linear inequalities are still low. Due to the fact that the teacher is still minimal in utilizing the visually concrete media in learning. The low learning motivation and mathematics learning outcomes in mastering social arithmetic material provide evidence that human resources need to require sustainable development, human resource development, this must be supported by optimal mathematics learning, because mathematics has an important role in everyday life. Mathematics becomes a model in solving every problem.(captured byMujahid,2018).

The use of media in education plays an important role in the learning process, the success of learning is largely determined by two main components, namely teaching methods and learning media. The use of learning media can save time in teaching preparation, increase student learning motivation, and reduce student misunderstandings about the explanations given by the teacher. In every opportunity, learning mathematics should begin with the introduction of problems that are appropriate to the situation (contextual problems). By posing contextual problems, students are gradually guided to master mathematical concepts(Zuhri & Rizaleni, 2016).

Learning with an ethnopedagogical approach in the 2013 curriculum which is based on the regulation of the Minister of Education and Culture of the Republic of Indonesia Number 79 of 2014 states that in learning at the Elementary School/Madrasah Ibtidaiyah level up to Senior High/Vocational Middle Schools must contain local content which is study material or subjects in Education unit that contains content and learning process about local potential and uniqueness which is intended to form students' understanding of local excellence and wisdom in the area where they live. According to Tilaar(Octavianti & Ratnasari, 2018)states that local wisdom has pedagogical value in regulating behavior that is beneficial for the

common good of the community.According toAlexander (cited by Muzakkir, 2021)find the relationship between the era of pedagogy and the socio-cultural life of the community.

Therefore, there is a need for a learning innovation that is oriented to local wisdom, so that the learning that takes place will run optimally, with this learning innovation as a means and infrastructure that needs to be done using interesting learning media innovations for students.According to(Sanaky, 2013)Media is a tool that has a function to convey messages. Video media presents learning objects that are concrete or learning with realistic messages. video featuring animation which may be advantageous, due to the ability to use visual cues to highlight a particular component, and also to slow down or speed up various processes to emphasize a concept(Miller, 2014).With learning video media oriented to local wisdom, for example, so that the values of local wisdom in learning video media can be an understanding for students to recognize the unique culture and local wisdom in the area where they live.

Motivation comes from the Latin word movere which means encouragement, driving force or force that causes an action or deed. Motivation is an impulse that makes people act or act with motivational methods that refer to the cause of the emergence of an attitude, such as factors that urge someone to do or not do something.According to(Asrofi, 2008)effective learning conditions are the interest and attention of students in learning.Motivation can actually be seen as the basis for achieving success in various areas of life through increasing skills and desires(Hastuti, 2016). This strong motive often declines when it reaches satisfaction or meets failure(Sapti, 2019).In addition to motivation, learning outcomes are a reference for measurement, student learning outcomes also have an important role in creating the learning process that will be carried out, because learning outcomes are the value of actions taken by students after being given treatment.. According to(Widayanti, 2014)learning outcomes are patterns of actions, values, understandings, attitudes, appreciation and expertise. Learning outcomes are the result of an interaction between learning and teaching actions. Learning outcomes are also the result of completing the learning process, where through learning students can recognize, understand, and can apply what they have learned.(Ricardo & Meilani, 2017).All activities that are in the learning process greatly affect the learning outcomes of each studentin learning.According to(Sulastri et al., 2015), learning outcomes are things that can be seen from 2 parts, namely the student side and from the teacher's side. From the student's perspective, learning outcomes are a better level of mental progress when compared to before learning.

With this, it is necessary to develop learning media in the high school mathematics learning process, this can be done by developing mathematics learning video media with a flipped classroom model that is oriented to cultural values and local wisdom, it is expected to be able to foster interest and motivation in learning mathematics students in order to create a learning process with optimal learning objectives and learning outcomes as expected by students and teachers, with satisfactory learning outcomes it is able to determine that students have completed understanding the learning material that has been given.

Method

This research was conducted using research and development research with a subject of 25 Open University students and PGRI Semarang University students from the Mathematics Education study program from each class. Sampling was done by using cluster random sampling. While the research steps are divided into four parts, including: preparation stage, implementation stage, data analysis and report writing.

This study uses instruments including: lesson plans, student worksheets, learning outcomes tests, and student motivation questionnaires. The object under study was the answers to the test results of 50 students' work, math questions that were made and packaged in the form of essays as many as 5 questions.

Based on the explanation above, that the research data that has been obtained by the next researcher performs an analysis in the following way:

1. Product validation by experts

in validating learning video products for high school mathematics curricular courses using a Likert scale which later the validator uses the results of validation of material experts and learning media experts as a benchmark for conducting limited tests at open universities and PGRI Semarang universities

2. t test analysis

The right-hand t-test is used to determine whether the average learning outcomes of the experimental class are better than the average learning outcomes of the control class. The right-hand t-test criteria for the average experimental class learning outcomes are better than the control class average learning outcomes are$t_{hitung} > t_{tabel.}$

3. Student Response Analysis

The data on the results of the student learning motivation questionnaire responses were then analyzed using the calculation of the average score in each aspect, then it would be categorized according to table 2 below.

Table 1. Classification of Student Response Assessment

Average Score Interval	Classification
81% - 100%	Very good
61% - 80%	Well
41% - 60%	Enough
21% - 40%	Not enough
0%– 20%	Less once

4. Analysis of the Effectiveness of Mathematics Learning by Using Learning video media with the flipped classroom model.

The effectiveness of learning mathematics using instructional video media with an ethnopedagogical approach can be said to be effective if the average learning outcomes of the experimental class are better than the average learning outcomes of the control class, and learning outcomes in the form of students' critical thinking skills are in the minimal

category enough, while the questionnaire responses to student learning motivation are at good criteria.

RESULTS AND DISCUSSION

1. Product validation by experts

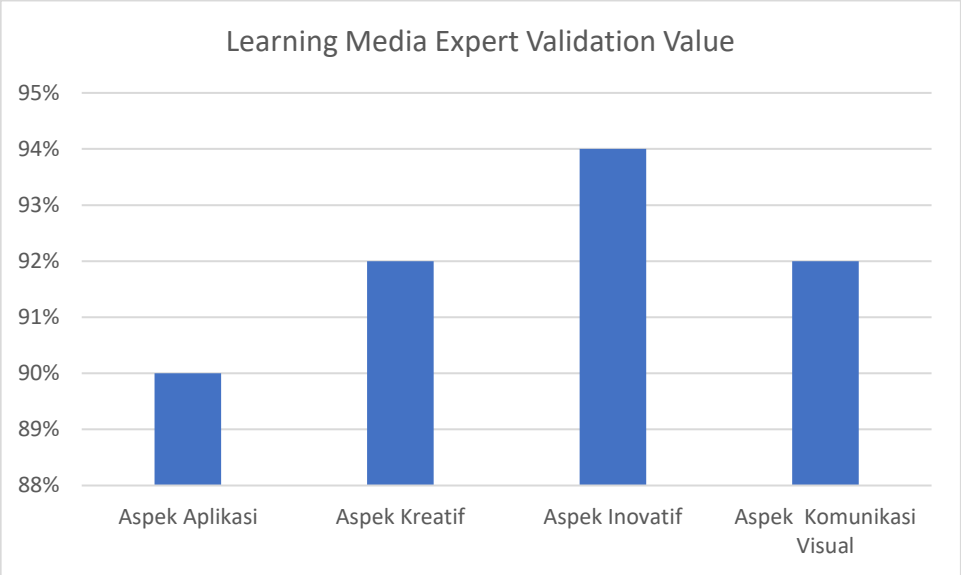
Figure 1. The material validation process for high school mathematics curricular learning video products

The learning video product was validated by media experts with the following results: (1) the appearance of the learning video product on the system of linear equations and inequalities is suitable as a supplement to virtual high school mathematics curricular subject matter, (2) color gradations related to the material system of equations and linear inequalities can be understood virtually and interestingly, (3) learning video products are interesting for lectures because quizzes are displayed with interesting animations, (4) menus in learning videos can be used in a fun, easy and fun way, (5) products can relate material for this system of linear equations and inequalities with independent, critical and creative skills of students with 3D objects, (6) Existing questions need to be related to the context of the latest high school mathematics problems, (7) this learning video product can be applied properly and according to the IQF material, (8) students can complete questions about a system of sequential and interesting linear equations and inequalities, (9) users will have no difficulty in operating this learning video product, (10) this learning video product is able to improve students' creative and critical skills by playing the material repeatedly until they understand, from the results In validation.

This research it was shown that the average result of the assessment by learning media experts was 92, which indicates that this high school mathematics curricular learning video product in terms of the feasibility of the design of this learning video product is very suitable for use in learning. This is in accordance with the research of Maemanah, S.,

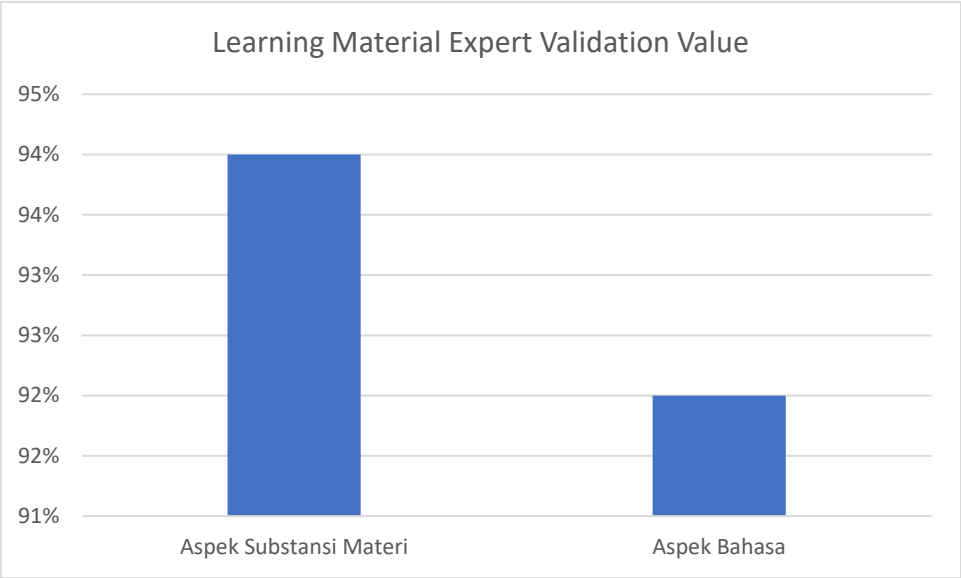
Suryaningsih, S., & Yunita, L. (2019) which shows that video-based learning media products are very effective in helping students improve their learning independence and their critical and creative thinking skills, especially in chemistry learning in high school, then strengthened by Wisada, P. D., & Sudarma, I. K. (2019) who explained that the influence of the use of learning videos in improving student learning outcomes and improving student character is high.

Table 2. Results of Learning Media Expert Validation of Learning Video Products



Meanwhile, based on the results of material expert validation, the following results were obtained: (1) this learning video product is suitable as a virtual supplement to high school mathematics curricular subject matter, (2) concepts related to SPLDV material can be understood virtually, (3) learning videos interesting to use in other courses, (4) the menus on learning video products can be used in a fun and enjoyable way, (5) this SPLDV material can be related to students' critical and creative thinking abilities, (6) questions that have been there needs to be related to the context of the latest SPLDV problems, (7) this learning video product can be applied properly and is in accordance with the IQF material, (8) students can solve questions about SPLDV sequentially, (9) there is no difficulty in operating this learning video product, (10) this learning video product is able to improve students' creative and creative thinking abilities, based on expert judgment SPLDV learning material shows that the material presented in this learning video media is very appropriate to be applied in learning high school mathematics curricular courses with an average score of 93%, meaning that the SPLDV material presented is very suitable for use in learning.

Table 3. Results of Expert Validation of Learning Materials on the Depth of the Material Learning Video Products



2. Results of t test analysis

Table 4. Results of t test analysis

Class	N	t_{hitung}	t_{tabel}	Conclusion
E	27	2.097	1,674	The average learning outcomes of the experimental class are better than the average learning outcomes of the control class
K	27			

From the data obtained for student learning outcomes using the t test which shows that for = 27, and = 27 with a significant level of 5% after being obtained for 2.097 and 1.674. This shows that the price is thus rejected. So based on these calculations, it can be concluded that the average student learning outcomes of the experimental class are better than those of the control class students.$n_1 n_2 t_{hitung} t_{tabel} t_{hitung} > t_{tabel}\, H_0$

2. Student Responses to Learning Mathematics Using Learning Video Media with an ethnopedagogical approach.

One of the most important factors in the success of using video learning media is that students are active in learning by using video media. Student response data were obtained from the results of questionnaires that had been distributed to students, as shown in Table 4 below.

Table 5. Student Response Results

Aspect	Average Score
General	87.6%
Theory	89.1%
Language	90.5%
Exercises	86.5%
Final Total Average	88.4%
Category	Very good

Based on the results in Table 5 above, it was found that the response of students' learning motivation when learning mathematics using instructional video media with an ethnopedagogical approach was 88.4% with a very good category.

4. Learning Effectiveness Using learning video media with the flipped classroom model

From the results of the analysis at points 1, 2, and 3, it can be obtained data that the average learning outcomes of the experimental class are better than the control class, the learning outcomes of the experimental class students are in the Good classification. Meanwhile, the students' learning motivation questionnaire responses were classified as very good. Thus, it can be concluded that learning mathematics using instructional video media with the flipped classroom model is said to be effective.

In this study, for the effectiveness of learning mathematics using instructional video media, it was obtained from learning outcomes and student responses. In the results of the study, the results of this study using a one-sided t-test showed or 2,097 > 1,674 so that the average learning outcomes of the experimental class using learning videos were better than the average learning outcomes of the control class without using learning videos as learning supplements; of student responses that is 88.4% in the very good category. So from this category it can be concluded that the learning video media with the flipped classroom model is effectively used in high school mathematics learning at universities.$t_{hitung} > t_{tabel}$

The results of this study also obtained a questionnaire response to student learning motivation towards learning mathematics using instructional video media with an ethnopedagogical approach which was classified as very good. students like learning video media, easy to access, time efficient, and easy to use anytime. This is because the learning video media is easy to use and easy to access.

CONCLUSION

From the results of data analysis and discussions that have been carried out, namely learning mathematics using learning video media with the flipped classroom model, it can be concluded that: 1) the score of validation from expert judgment showed if produk learning video is very suitable to using in the class, 2) the average learning outcomes of the experimental class are better than the average learning outcomes of the control class, 3) students' responses to the provision of media Mathematics learning videos with the flipped classroom model are in the very good category. So from the three categories it can be concluded that high school mathematics learning using learning video media with the flipped classroom model is effectively used at the college level.

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