

# Development of Animated Learning Video Using Videoscribe on The Linear Two Variables Equation System

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**Abstract:** *This research aims to develop a learning media in the form of animated video using Videoscribe application on Two-Variable Linear Equation System (SPLDV) material on seventh grade SMP Negeri 1 Jember. This type of research is research and development (R&D) with modified Plomp model research method consisting of 4 phases which include Investigation Phase, Design Phase, Realization and Construction Phase, and Evaluation and Revision Test Phase. The media trial was conducted on 21 seventh grade students of SMP Negeri 1 Jember. Data collection techniques are carried out by validation test, practicality test, and effectiveness in animated learning video media. The result of media validation obtained a correlation coefficient of 91% that states the level of validity (very high).*

**Keywords**—Video Animation; Videoscribe; Plomp Model Modification; Two-Variable Linear Equation System (SPLDV)

## 1. INTRODUCTION

Indonesia has now entered a modern transitional era where all activities are always side by side with technological sophistication or what is commonly called the industrial revolution era 4.0. The sophistication of technology and information has mastered various fields in human life, including education. Currently the use of technology in the learning process is both a necessity and a demand [1]. So that it's inside the learning process, educators are required to take advantage of technological sophistication in the teaching process.

Mathematics is a branch of science that supports other sciences related to everyday life [2]. Therefore mathematics is a basic subject that must be taught in formal education at the primary and secondary levels because it is considered an essential subject [3]. The students' perceptions about learning mathematics obtained results of 45% which stated that learning mathematics was difficult [4]. So that the learning process should be made interesting and creative so that students are interested in learning mathematics. An innovation is indispensable in learning mathematics to make it easier for students to understand material that is abstract and requires visualization assistance. Visualization tools that can be developed in instructional media are animated videos.

Animated videos are a very attractive visualization medium for anyone who sees them. Through animated videos, it is not uncommon for moral messages to be conveyed in the story line so that it is more useful in every narrative that is delivered. This can be used by educators as a learning medium. So that the learning process will be more innovative and attract students' interest in learning, especially in mathematics learning, whose learning activities require visualization media in solving an abstract problem.

The visualization video that is presented in learning is in the form of a two-dimensional (2D) animation video in order to attract students' interest in learning. Given that the learning activities in the 2013 Curriculum (Revision) use the Problem Based Learning (PBL) method, which is a learning activity based on a problem method, the use of learning media in the form of two-dimensional (2D) animated videos is very useful as a visualization medium for delivering material and a problem that is presented. One application that can create a two-dimensional (2D) animated video is the Videoscribe software.

According to Joyce and B. White, Videoscribe is an application software that creates short whiteboard style animations to explain certain concepts both made by instructors (teachers) and students [5]. Videoscribe is an animated video media application software consisting of a series of image tools that can be compiled into a complete video. Through a unique and interesting combination of image and sound (dubbing) characters, Videoscribe can present animated learning video content that students can see and enjoy in learning.

The Two-Variable Linear Equation System is one material that is considered difficult for students, because it contains abstract stories in life that are difficult to understand for some students. This is evidenced by the results of internal interviews with several class VIII G students of SMP Negeri 1 Jember. Most of the students answered that they had difficulty working because they did not understand the concept of changing the story problem into a mathematical equation in the Two Variable Linear Equation System. So that new innovations are needed in the learning process of students. So that the process of delivering abstract material in the Two-Variable Linear Equation System can be conveyed clearly,

Based on previous research, regarding the development of animation learning videos using the Videoscribe software application, it has a weakness, namely the absence of online interactive media for students, in order to support the implementation of learning so that interactive media is needed to support learning. One of the online interactive support media used between students and teachers is Google Classroom as an online class and GeoGebra as a medium for Student Worksheets in working on the questions given. With the existence of online interactive support media, it will facilitate learning activities between teachers and students that can be done in person or online. So that even though Indonesia is currently exposed to the Covid-19 pandemic which requires no activities outside the home, learning activities can still be done at home online. Therefore, from the background presented, the authors are interested in conducting research and development with the title **"Development of Animation Learning Videos using Videoscribe on the Two Variable Linear Equation System"**.

## 2. RESEARCH METHODS

The type of research method in this development is (R&D). According to Borg and Gall, development research is a process in developing and validating a research product [6]. The product in this study is an animated video (Videoscribe) on the material of Two Variable Linear Equation Systems. The trial location was conducted at SMP Negeri 1 Jember in class VIII G with 21 students as the trial subjects. The development model in this study uses a modified Plomp model which consists of four phases, namely, the Investigation Phase, the Design Phase, the Construction Realization Phase and the Test, Evaluation and Revision Phases (Test, Evaluation and Revision). An explanation of the procedure for developing a modified Plomp model is as follows:

- Investigation phase, in this phase consists of beginning-end investigations, media investigations, investigations of the formulation of learning objectives. In the investigation phase, the activities carried out were to obtain information through formal interviews with mathematics teachers of class VIII G SMP Negeri 1 Jember.
- The Design Phase, in this phase consists of the media selection phase, the format selection phase, the learning outcome test preparation phase, the initial design phase of the animation video. In the media design phase that was developed or prototype I was an animated video (Videoscribe) on the Two Variable Linear Equation System material to help students understand the material on the Two Variable Linear Equation System.
- Realization / Construction Phase, in this phase the activities carried out are validation of experts and testing of media that have been developed. Prototype I was validated by experts consisting of two Mathematics Education lecturers at the University of Jember and one Mathematics

teacher at SMP Negeri 1 Jember. The revised media will be prototype II and if it meets the valid criteria and is ready to be tested, it will be Prototype III.

- Test, Evaluation and Revision Phase (Test, Evaluation and Revision), in this phase the activities carried out in the form of trials and media distribution were carried out at SMP Negeri 1 Jember by providing soft copies of animated video files and G-Drive links to mathematics subject teachers .

The research instrument in the data collection analysis technique was in the form of a media validation sheet that was given to the experts, provided an observation sheet device to the teacher and provided a response questionnaire and a test of learning outcomes for students at the end of learning activities. The results of the data collection analysis techniques include analysis of the validity, analysis of practicality and analysis of effectiveness.

- The validity analysis was obtained from the validity assessment data of the learning media that had been recapitulated by the validator experts then determined the mean results of the total validation value of the three validators.

Table 1. Interpretation of the validity coefficient

Magnitude $\alpha$	Interpretation
$0,8 <  \alpha  \leq 1$	Very high
$0,6 <  \alpha  \leq 0,8$	High
$0,4 <  \alpha  \leq 0,6$	Moderate
$0,2 <  \alpha  \leq 0,4$	Low
$0 <  \alpha  \leq 0,2$	Very low

- The practicality analysis is obtained from the questionnaire data on the responses of learning media users that have been recapitulated then determines the mean results of the user response questionnaire answers then the mean value is changed into a percentage to match Table 2.

Table 2. Category Percentage of User Response Questionnaire

Percentage Category	Score
Very good	$P > 95\%$
Good	$80\% < P \leq 95\%$
Enough	$65\% < P \leq 80\%$
Not good	$50\% < P \leq 65\%$
Very Less	$P < 50\%$

- Selecting Analysis of the effectiveness of the indicators used in the effectiveness of learning media, namely in the form of student learning outcomes tests.

## 3. DISCUSSION

The results of this research are in the form of animation learning video media using Videoscribe on the Two Variable Linear Equation System. The research and development method used is the modified Plomp model and the results are

based on the following four phases of the modified Plomp model.

### 1) Investigation Phase

The investigation phase has three phases of the procedure, namely.

- **Early-Late Investigations**

The first thing that was done in the Early-Late investigation phase in this study was to determine the school location to be used in the research, namely SMP Negeri 1 Jember. The next step in the preliminary investigation was in the form of observations and interviews with the mathematics subject teachers of class VIII G at SMP Negeri 1 Jember. Through observation and interviews it is known that learning seems bored and boring because the media aids in learning only use a blackboard and power point. Therefore, a fun visualization media is needed to help students understand the material in mathematics learning.

- **Media Investigation**

During the observation and interview activities at SMP Negeri 1 Jember, it was found that learning activities had not fully taken advantage of technological developments. Therefore, it is necessary to develop a learning media that can help students understand the concept of mathematical material presented in the form of animated video visualization using the Videoscribe application.

- **Investigating the Formulation of Learning Objectives**

This phase is carried out in order to know the learning objectives to be achieved. With the development of media in the form of animated videos, it is hoped that learning will be more enjoyable and easier to accept in understanding mathematical concepts both directly and online.

### 2) Design Phase (Design)

In the design phase, there are four phases of the procedure, namely.

- **Media selection phase**

Based on the results of preliminary investigations carried out by researchers, the selection of media was determined in the form of animated videos using the Videoscribe application as a conveyor of material on the Two Variable Linear Equation System (SPLDV). Researchers chose media development in the form of animated videos because it became a special attraction as a delivery agent for students.

- **Format Selection Phase**

Animated videos (Videoscribe) which were developed using the .scribe format and then rendered into MP4, where students can then access and watch animated videos through Google Classroom online classes so that students can access and watch videos easily. There are four

animated videos and each video explains the understanding method in the sub-chapter of the material Substitution, Elimination, Combination and Graphics in the Two-Variable Linear Equation System.



Fig. 1. Initial Display of Animated Video Learning Media

- **Learning Outcome Test Preparation Phase**

The activities carried out in this phase are the preparation of student learning outcomes tests that are related to the material on the Two-Variable Linear Equation System. The grid created is to determine an SPLDV equation from the given graph, determine the value of the variables in the story problem using the substitution, elimination and combination methods. There are 5 student learning test questions, all of which are multiple choice.

- **Animation Video Initial Design Phase**

The initial design of the media resulted in an animated video (Videoscribe) and an instrument in the form of Prototype I. An animated video that was made explained how to solve a problem in everyday life related to the Two-Variable Linear Equation System using the basic concepts that exist in the material. The finished animation video is uploaded to the Google Classroom Online class via the Google Drive link and is named the folder "ANIMATED LEARNING VIDEO" link: <https://drive.google.com/file/d/131RoEzujikicBoCI5amZDomQcjN0kMrhA/view?usp=drivesdisk>.

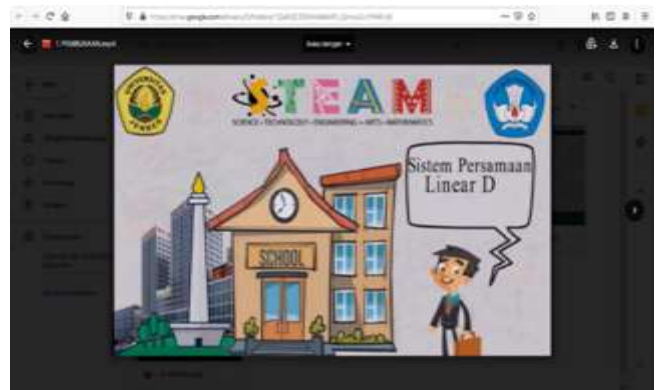


Fig. 2. Video Display on Google Classroom

### 3) Realization/ Construction Phase

The realization phase is the phase where the media validates by experts and produces the media in the form of Prototype III. Prototype III is an animated video media that has been validated by experts and received input along with revisions. The validators in this research on developing animation learning videos consisted of two expert lecturers in Mathematics Education at the University of Jember and one expert teacher in mathematics at SMP Negeri 1 Jember.

Aspects of validity criteria in animation learning video media include aspects of content, format and language. Based on the validation carried out by the three expert validators, the mean value of the content aspect was 3.67, the linguistic aspect got a mean value of 3.67 and the format aspect got a mean value of 3.59. This shows that the animation learning video has met all the assessment indicators on the validation sheet. So that the mean value which includes aspects of content, format and language gets a correlation coefficient of 0.91 and has met the validity criteria with the interpretation of the validity coefficient "Very High". Learning media that have met the validity interpretation can be used to help students understand the concept of material in the Two Variable Linear Equation System so that students are expected to get learning test results above the minimum completeness criteria so that animation learning videos can be tested try it. This is in accordance with the development research entitled "Development of Interactive Learning Media with Animaker and Articulate Storyline on Permutation and Combination Subject", that animated video media which has a very high level of validity can be tested on students so that it helps in learning test results. students [7]. The development research entitled "Use of Animated Text to Improve The Learning of Basic Mathematics" also explains that animated videos that have high validity interpretations can help students in learning outcomes tests so that they can meet the minimum completeness criteria [8]. So that the animation learning video using Videoscribe on the Two Variable Linear Equation System is feasible to be tested on students.α

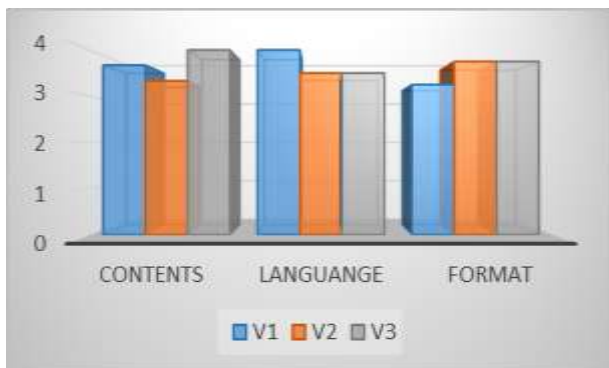


Fig. 3. Average of Each Aspect by the Three Validators

4) Test, Evaluation and Revision Phase (Test, Evaluation and Revision)

In the Test, Evaluation and Revision Phase, there are two phases of the procedure, namely.

- Testing

The trial activity was carried out at SMP Negeri 1 Jember to determine the level of practicality and effectiveness of using animation learning video media Videoscribe in the Two-Variable Linear Equation System (SPLDV). The practicality of the media was obtained from the mean value of the student response questionnaire conducted by 21 students and got a questionnaire response percentage of 91.6% which stated the level of practicality was "Good". This is in accordance with the research entitled "Does Animation Enhance Learning, A meta- Analysis", that with the animated video learning that is carried out easier and more practically to understand the students also understand more about the concepts given [9]. Another development research entitled "A Study of the Quality of Interaction Among Participants in Online Animation-Based Conversations About Mathematic Teaching", also explains that by using learning animation video learning is more practical besides that students more easily understand the mathematics learning material described [10].

Then the effectiveness of the media is obtained through the results of student learning tests which are known to be 17 of 21 students who have met the minimum completeness criteria (KKM), with a completeness percentage of 80.95% so that it can be said that this media is effective and helps students in solving problems. This is in accordance with the research entitled "Effects on Learning of Multimedia Animation Combined with Multidimensional concept maps", that with animated videos can have a positive effect on students who see and also help student learning test results in order to meet the minimum completeness criteria (KKM) [11]. Another study entitled "Development of Circle Equation Learning Youtube in High School Using Videoscribe" also explains that learning using animated videos can help students meet the minimum completeness criteria (KKM) with a percentage of 82% [12].

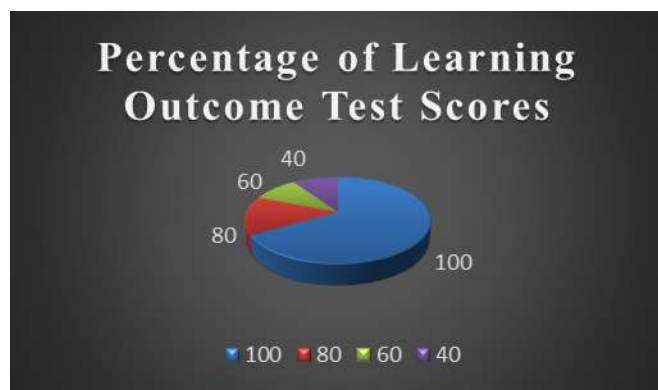


Fig. 4. Value of Student Learning Test Results

This the development of animation learning videos using Videoscribe on the Two-Variable Linear Equation System has met the criteria of validity, practicality and effectiveness. So that animation video learning media can be used as a support for student learning.



- Deployment stage  
The media dissemination stage is carried out when the learning media has met the valid, practical and effective criteria based on the results of validation and trials that have been carried out. The dissemination stage of learning media was carried out at SMP Negeri 1 Jember as a place for conducting research by submitting manuals for making and using animation learning video development media using *Videoscribe* in the Two-Variable Linear Equation System (SPLDV) in class VIII G totaling 21 students through the mathematics education teacher of SMP Negeri 1 Jember. And the spread is carried out open source through the google site website link <https://sites.google.com/view/room-class-mathematic.com>.



Fig. 5. Display of G-Drive Used in the Deployment Stage

#### 4. CONCLUSION

The conclusion obtained from this research is that the development is carried out using the modified Plomp method through 4 phases, namely the Investigation phase, the Design phase, the Realization / Construction phase and the Test, Evaluation and Revision phase which produces animated video media in the form of Prototype III. The results of the media analysis carried out obtained the validity level of the correlation coefficient on the media of 0.91, which means that the interpretation of the validity coefficient in the "Very High" category, the level of practicality received a questionnaire response mean of 91.6% which stated the practicality level was 'Good', then the effectiveness obtained from the value of the learning test results which got a percentage of 80.95% of the students achieved the minimum completeness score  $\alpha$

Suggestions that can be conveyed by researchers are that animated video learning media (2D) can be developed more broadly both in terms of learning material and school level and can use more technological sophistication to assist students in carrying out learning activities at school.

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