Development of Macromedia Flash 8-Based Learning Media in Simulation and Digital Communication Subjects in Vocational High School

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Abstract: Vocational education has a real goal, which is to prepare students to enter the world of work. The aims of this study were (1) to find out the planning stages of macromedia flash-based learning media, and (2) to find out the feasibility of macromedia flash-based learning media in simulation and digital communication subjects in vocational schools. This type of research is development with the model used is the V model or commonly called the verification and validation model. The system development process includes requirements analysis, requirements standards, design specifications, and program specifications. Based on the test results, it is known that the learning media based on macromedia flash on simulation and digital communication subjects in SMKs that have been developed are suitable for use as learning media in SMKs. The average score obtained as a whole aspect of media experts was 3.58 in the very good category, material experts with a score of 3.62 in the very good category, and the student response score to macromedia flash-based learning media was 3.89 very well. good category. good. So that learning media based on Macromedia Flash 8 shows very feasible to be used as a learning medium in simulation and digital communication subjects in Vocational High Schools.

Keywords: Macromedia Flash, Vocational Learning, Simulation, Digital Communication

INTRODUCTION

Vocational education is believed to be an integral part of the development of society, and even contributes greatly to the economic improvement of a country. Vocational education has developed from time to time following changes in the world of work. However, this does not change its essence as a place to prepare workers who are expected to have a good set of knowledge, skills, and personalities to meet the expectations of the world of work and industry (Hanafi, 2012). Education is public goods not private goods, education is also a series of concepts from the formulation of public policies (Arwildayanto, 2018). The purpose of education is the expected changes in students after experiencing the educational process, including changes in individual behavior, individual life and society (Maunah, 2009). Understanding the importance of education as the main driver of the nation's progress, public institutions consistently complete changes in the field of education, especially those related to educational capacity, funding, framework conditions, educational programs, and others (Alfirzan, 2021).

In the competence of Electrical Power Installation Engineering expertise at SMKN 2 Serang City, there are competencies that must be mastered by students, one of which is Simulation and Digital Communication Subjects. Simulation and Digital Communication Subjects are one of the compulsory subjects for class X students of TITL skill competency at SMKN 2 Serang City. Mastery of Simulation and Digital Communication subjects is very much needed, because these materials are basic materials that will be very useful for further learning such as in Digital Engineering and Microcontroller subjects.

Based on the results of observations and interviews with researchers at SMKN 2 Serang City on Wednesday, April 6, 2022 to Mr. Hasanudin, S. Kom., M.T.I, the following results were obtained: (1) In Simulation and Digital Communication Subjects during the Covid-19 pandemic. 19 students who scored below the KKM (Minimum Completeness Criteria) were 60% with a KKM of 70; (2) Learning still uses the lecture method (conventional), so that learning is passive. This can be seen from some students who are off-cam and there is no discussion during the Digital Communication and Simulation learning process; and (3) In the Simulation and Digital Communication learning process, especially practicum activities, they still use learning media that are less attractive and interactive. Where the learning media used are Power Point and Edmodo.

One of the software that can be used to create multimedia-based learning media is Macromedia Flash Professional 8. Software Macromedia Flash Professional 8 has the following advantages: (1) easy to learn; (2) students are able to be creative easily and freely in making animations with preferred movements, and (3) the resulting file is small in size. Based on the capabilities of the Macromedia Flash Professional 8 software, virtual practicum activities can be arranged in the form of simulations.

In overcoming the above problems, we need an appropriate media used in the learning process, so that it can lead to an interaction in the learning. One of the learning media that can be used is multimedia-based learning media. Multimedia-based learning media is a medium for conveying information from teachers to students consisting of hardware, software, and other devices such as televisions, video monitors, and optical disc systems (Suyanto, 2003). As for what distinguishes between researchers conducted

with previous researchers is the problem of animation and audio-video. So it is hoped that this learning media can increase the achievement value of these students.

METHOD

The development model used is the V model or commonly called the verification and validation model. Model V is a development of the Waterfall model. Model V stands for Model Validation or Verification (Windi, 2013). In contrast to other models, in model V the testing process is much more complex because it is divided into several more detailed sections. The system development process includes requirements analysis (requirements analysis), requirements specification (requirements specifications), design specifications (design specifications), and program specifications (program specifications) (Windi, 2013).

Model V is a sequential approach, starting from the system requirements level and then moving on to the analysis, design, coding, testing or verification, and maintenance stages. This V model is also called the waterfall development model, because it consists of a step-by-step sequence (Buchori, 2017). The following is a flowchart of the stages of the V model.
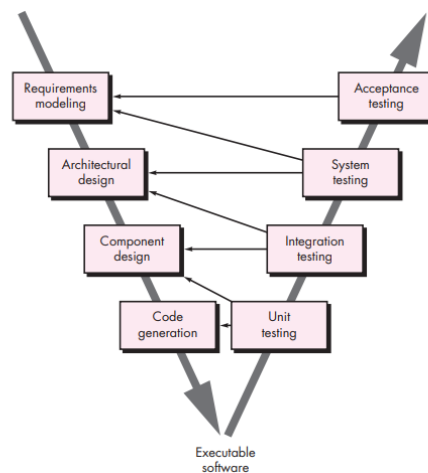

Figure 1. Development Model V (Pressman, 2010)

Model V on the left shows the phases of moving down to implement the requirements specification, find the basic problem, and find a solution in a progressive, more detailed and technical manner. After the program code is generated, the next phase moves up on the right side of the V model and runs several different tests which are used to validate each model phase on the left side of the completed V model (Pressman, 2010). Model V is the development process of the Waterfall model relationship. The difference from this V model, this model relates to each other like a zig-zag sideways.

Research Design & Procedures

The Model V development procedure (Pressman, 2010) was carried out in several stages. These stages are as follows:
1. Modeling requirements

This is the first phase that involves an intensive communication process with the customer to understand the system requirements properly.

2. Architectural design

After having a clear and detailed product, in this section is a complete architectural specification of the place. A complete design design will have complete hardware and communication details as well. Data transfer and communication between modules internally and externally is clearly understood in this phase.

3. Component design

This phase consists of a design component that focuses on determining the implementation of the requirements in the architectural framework.

4. Code generation

This phase is the last stage of the compiler or imputing, code generation intermediate representation of the source program whose output is the equivalent target program.

5. Acceptance testing

Acceptance testing relates to the requirements modeling phase and involves testing the product in the user's environment. This phase uncovers compatibility issues with other systems available in the user's environment.

6. System testing

System testing is related to the architectural design phase and the requirements modeling phase. At this stage, device compatibility issues are revealed by system testing.

7. Integration testing

Integration testing is related to the architectural design phase and component design phase, which is carried out to test the coexistence and communication of modules internally in the system.

8. Unit testing

Unit testing is designed in the module design phase which is run on code that was written during this validation phase. Unit testing is testing at the code level and helps eliminate bugs at an early stage.

Population and Sample

The population in this study were students majoring in electric power installation, SMK Negeri 2 Serang City. The sample in this study was 30 students, class X majoring in electric power installation, who took the subjects taken were Simulation and Digital Communication in class X in the 2022-2023 academic year.

Data Collection and Instrument

Data collection is the method used in collecting research data. The collection of non-test data in this study was observation, interviews and questionnaires. The questionnaire on non-test data collection used is a closed questionnaire, then from the answers to the questionnaire used is a direct questionnaire and seen from its form is included in the checklist category, the questionnaire respondents, namely: 3 lecturers as media experts, 2 teachers and 1 lecturer as material experts, 3 lecturers as design experts, and 30 questionnaires for students as users. Questionnaires that have been

answered by respondents are then calculated using the established assessment provisions.

Data Analysis

The data analysis technique used in this study is a mixed analysis technique in which there are qualitative and quantitative data. This data analysis analyzes the feasibility of developing Macromedia Flash learning from the results of filling out questionnaires by material experts, design experts, media experts and user experts on the development of Macromedia Flash learning in Simulation and Digital subjects. The results of the analysis of the data obtained are used as a reference in improving the development of Macromedia Flash learning. Change the average score obtained into a qualitative value in accordance with the assessment criteria in Table 1 to determine the feasibility value of the Macromedia Flash learning media by validators and students.

Table 1. Guidelines for Modifying the Average Score into Categories

No.	Average	Category Qualitative
1.	3,26-4,00	Very Good
2.	2,51-3,25	Well
3.	1,76-2,50	Not Good
4.	1,00-1,75	Not Good

RESULT AND DISCUSSION

The research results obtained through this development research are in the form of learning media products based on macromedia flash which are used to support learning in SMK in the subjects of simulation and digital communication in class X of the electrical installation engineering study program. This learning media has several menus, namely: (1) KI & KD (Core Competencies and Basic Competencies), (2) Learning Objectives, (3) Materials, (4) Evaluation, (5) Videos, (6) Bibliography and Profiles. In developing this learning media, a development procedure is carried out which includes the following stages: requirements analysis (requirements analysis), requirements specification (requirements specifications), design specifications (design specifications), and program specifications (program specifications) (Yanto, D. T. P, 2019).

This data is used to find out the learning styles of students at SMKN 2 Serang City, which are known through the results of filling out checklists and multiple choice questionnaires, both of which are filled in directly by the students themselves. The results of the analysis discussed in Figure 1 show that the results of the multiple choice questionnaire analysis use student learning styles. Based on the results of image analysis, the following results are obtained.
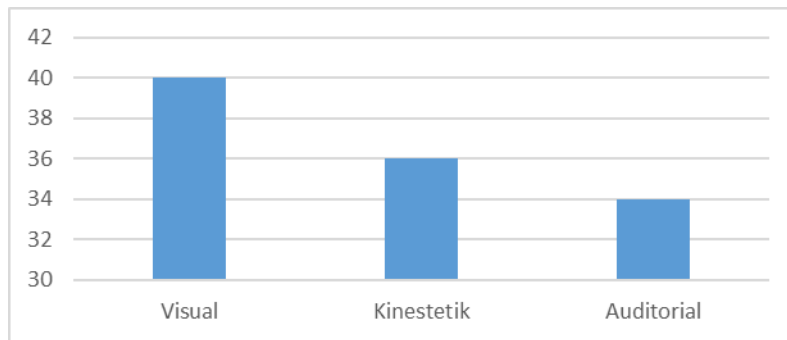
Figure 2. Percentage of Learners' Learning Styles

Based on the data obtained from the results of filling out the questionnaire which was filled out by 50 students, it can be concluded that as many as 40% of students have a visual learning style that tends to focus on what students observe both through drawing/demonstrating and reading. 36% of students have a kinesthetic learning style and 34% of students have an auditory learning style.

The profile page which describes the menu and navigation on the profile page is briefly described as follows.
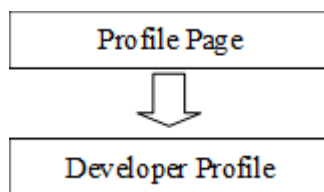

Figure 3. Block Diagram of Learning Media Profile Pages

The storyboard contains a brief description of the flow of macromedia flash-based learning media from the beginning to the end of the program. The designed storyboard consists of layer names, visual design, and navigation. The following are the results of the visual design of several interactive learning multimedia pages, namely the opening page, main menu page, KI and KD pages, as well as material pages designed through the powerpoint application.

Figure 4. Learning Media Storyboard Based on Macromedia Flash

At this stage the revision of the test results is carried out after the interactive learning multimedia is evaluated by material experts and media experts. Suggestions and inputs that have been given by experts are used as study material to improve interactive learning multimedia products that have been made. Suggestions for product improvement include the aspects of writing from the material aspect. Improvements to the test results were also carried out based on suggestions for product improvement from small group trials. Suggestions for improvement from aspects of writing such as foreign languages that are not italicized, there is a presentation of material descriptions in small fonts making it difficult for students to read the material, the color of the writing is too many colors and there is still an error in placing the back button at the beginning of the material page later, the display is still tilted due to background pixel size error in the multimedia (Juliarni. C. D. R, 2022).

The corrective steps taken were to correct sentences in foreign languages into italics, to enlarge small fonts again with the aim of making it easier for students to understand the material that is already available in interactive multimedia learning, the color of the letters can be changed for the better, and the back button. on the start page the material is removed because it is not needed and the pixels are changed to the original size W = 1024 H = 768 Pixels. One of the contributions of learning media based on Macromedia Flash 8 to learning is to make learning more interactive by applying learning methods. One of the learning methods that are suitable for use with macromedia flash is the Contextual Teaching and Learning approach. Contextual learning is the integration of knowledge into real-life applications. This is a framework in which students are facilitated in connecting what they learn to the real world. Contextual learning is an educational philosophy that believes that learning can be enhanced by connecting material to life and work contexts that students may know about (Trisnawati, 2015).

Products that have been designed in macromedia flash 8 and have been revised based on input from material experts, media experts, and students are packaged in a 720 Mb Compact Disk (CD). It contains interactive learning multimedia files with specifications in the form of a flash file (.swf) with a size of 1.031 MB, while in the form of an application it is 2.575 MB. Screen Dimensions 550 x 400 pixels. Dissemination of learning media products aimed at students majoring in Electrical Installation Engineering class X SMKN 2 Serang City so that students can obtain information, raise awareness, receive and ultimately utilize information related to the simulation subjects and digital communication. Distribution is done by giving interactive learning Multimedia CDs to each student, after being used for testing and improving the product so that the product can be taken home to be used in learning media for students. Data on the results of media expert assessments of products based on aspects of visual communication, software, and benefits that have been converted into categories can be seen in the following table.

Table 2. Media Expert Assessment Results Data

No.	Aspect	Validator			Mean Score	Category
		Media Expert 1	Media Expert 2	Media Expert 3		
1	Visual Communication	42	46	45	44,34	Very Good
2	*Software*	17	16	17	16,67	Very Good
3	Benefit	20	21	24	21,67	Very Good
	Total Score	79	83	86	82,67	Very Good

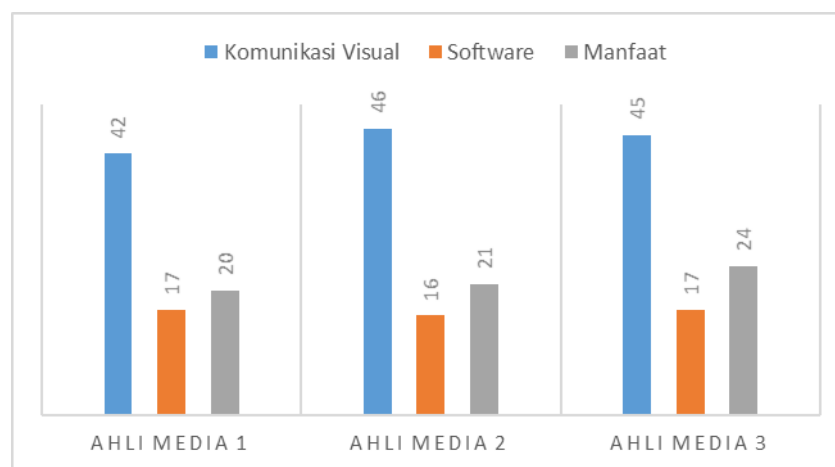Based on table 2 above so that it is depicted in the graph as follows:

Figure 5. Media Expert Validation Test Results.

From Figure 5 it can be explained that the results of the media test consisting of 3 media experts from the visual communication aspect obtained an average score of 42 ("very feasible" category), the software aspect obtained an average score of 16.33 ("very feasible" category), and the benefit aspect was obtained the average score is 21.12 ("very decent" category). So overall it can be said that macromedia flash-based learning media developed based on the assessment of media experts is included in the "very feasible" category to be used as interactive learning media.

The data on the results of the material expert's assessment of the product based on the substance aspect of the learning design material, and the benefits that have been converted into categories can be seen in the following table. According to Priyanto (2011) Macromedia Flash is a program for creating animations and professional web applications. Macromedia Flash has changed its name to Adobe Flash, this acquisition could also be a sign that the prospects for making animation using Flash will be better. This macromedia output software is a program for designing animated graphics that is very popular and widely used by graphic designers. In addition, this application can also be used to load animated logos, movies, games, making navigation on websites, banners, animated buttons, interactive menus, interactive form fields, screen servers, and making websites or making other web applications.

Table 3. Data of Material Expert Assessment Results

No	Aspect	Validator			Mean Score	Category
		Media Expert 1	Media Expert 2	Media Expert 3		
1	Material Substance	15	15	15	15	Very Good
2	Learning Design	30	30	29	29,67	Very Good
3	Benefit	16	16	15	15,67	Very Good
	Total Score	61	61	59	60,33	Very Good

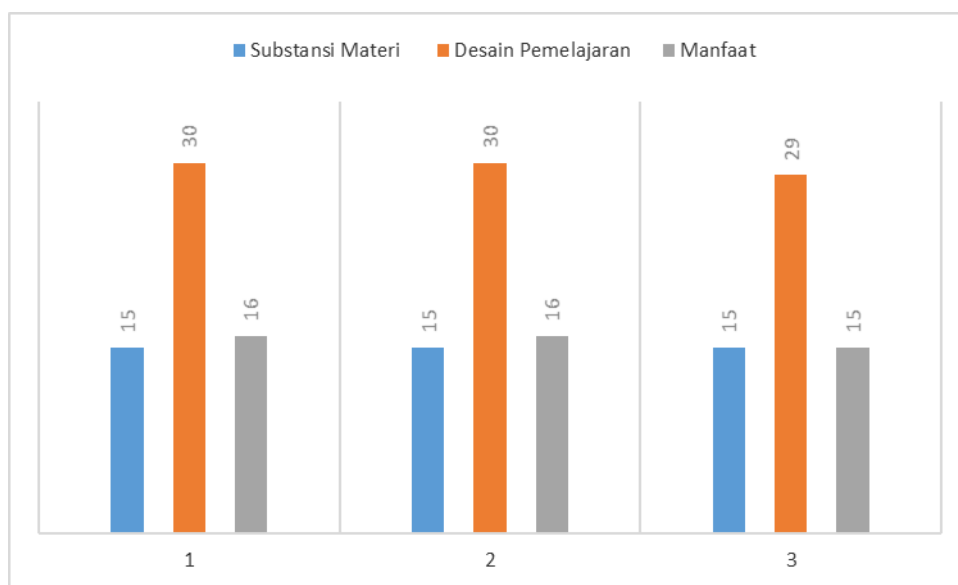Based on table 3 above, it is described as follows:

Figure 6. Material Expert Validation Test Results

From Figure 6 above, it can be explained that the results of the assessment of three material experts from the aspect of the substance of the material obtained an average score of 15 (category "very feasible"), the learning design aspect obtained an average score of 29.67 (category "very feasible") and the benefit aspect obtained an average a score of 15.67 ("very decent" category). While the average total score of the three aspects is 60.33 ("very decent" category). So overall it can be said that macromedia learning media that have been developed based on the assessment of material experts are included in the "very feasible" category to be used as learning media in simulation subjects and digital communication.

Student assessment responses to macromedia flash learning media were obtained from data from small group and field trials. The student assessment response questionnaire contains a product assessment reviewed from several aspects, namely: learning design aspects, visual communication aspects, software aspects, and benefits aspects. Based on the results of the assessment response data in the small group trial, the following frequency distribution table can be arranged. Based on research that has been done, using the Independent Sample T-test sig value. (2-Tailed) less than 0.05 which was 0.00. The average N-gain of experimental class critical skills of 0.76belonged to the

high category, while in the control class of 0.61 it was included in the medium category. Based on the effect size test obtained results of 1.39 showed that the use of a problem-based electronic worksheet with a problem-based learning model was effective to increase the creativity of students (I Dewa Putu Nyeneng, Chandra Ertikanto, Agus Suyatna, I Komang Astawan, 2022)

Learning in the digital era requires innovation with digital nuances so that students are able to understand the concept of lessons and also they can keep up with the times (Ali, 2018; Irwanto, 2020). One of the uses of technology in the field of education is the use of computer-based media through macromedia flash software. Macromedia flash is an animation application software that can be used for the web (Munir, 2012).

Table 4. Frequency Distribution of Small Group Trial Results

Category	Score	Frekuensi	Persentase (%)
VeryGood	$68{,}00 < X \le 84{,}00$	8	80
Good	$52{,}50 < X \le 68{,}25$	2	20
Pretty Good	$36{,}75 < X \le 52{,}50$	0	0
Not Good	$21{,}00 < X \le 36{,}75$	0	0
	Amount	10	100

Based on table 4 above, the frequency distribution of the total score of students in small group trials can be presented in the following diagram.
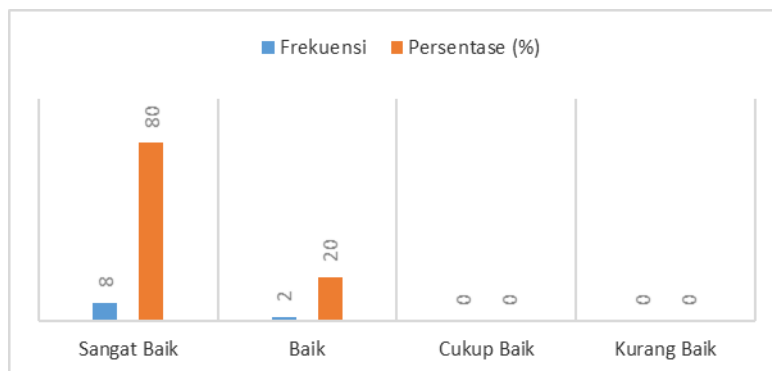

Figure 7. Frequency Distribution of Small Group Trial Results

From the diagram above, it is known that 80% of students in the small group trial stated that the macromedia flash-based learning media was in the "very good" category as learning media. While the other 20% of students rated the product in the "good" category. According to Sakti et al (2012) learning media using Macromedia Flash can increase students' interest in learning. So that learning and learning activities using animation are expected to attract students' interest in learning, thus students will find it easier to understand the concept of learning, so that it can have an effect on improving their learning outcomes. Umam & Yudi (2016), Irwanto (2021) prove that a student's learning outcomes are affected by the media. The existence of a media is not a coincidence in improving student student outcomes, but due to differences in the treatment given to each class, so it can be concluded that the use of Macromedia Flash can have a positive effect on student learning outcomes (Irwanto, I, dkk. 2022).

CONCLUSION

Based on the results of the research and discussion of research on the development of macromedia-based learning media, it can be concluded that the developed macromedia flash-based learning media for simulation and digital communication subjects in Vocational High Schools is feasible to be used as learning media in Vocational High Schools.

The average score obtained as a whole aspect of media experts was 3.58 in the very good category, material experts with a score of 3.62 in the very good category, and the student response score to macromedia flash-based learning media was 3.89 very well. good category. good. So that learning media based on Macromedia Flash 8 shows very feasible to be used as a learning medium in simulation and digital communication subjects in SMK.

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