

Light Vehicle Learning Media for Vocational School

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Abstract: The purpose of this research is to design light vehicle engineering learning media for Vocational High Schools. Learning media developed using the Blender 3D software and Adobe Flash CS 5.5. The research method used in this study is Multimedia Development Life Cycle which has six stages, namely Design, Obtaining Content Material, Assembly, Testing and finally Distribution. The results of this media development research are multimedia based learning media applications with 18 MB memory, 1280x720 pixel resolution and compatible with the Windows operating system. This application can be used in Vocational High Schools to help the teaching and learning process in Light Vehicle Engineering subjects.

1 INTRODUCTION

The learning system in Indonesia mostly used conventional learning systems which are commonly called pure lectures or lectures by using white board aids (Yusri et al, 2015), which are concentrated with an instructional atmosphere and felt incompatible with the rapid development of science and technology. Conventional learning systems are less flexible in accommodating competency material development because educators must adapt intensively to the material (Johnson et al, 2016). This kind of event is reasonable, because in the learning process, an educator faces many students that have different type of personality, potential, background, as well as different learning problems (Boud et al, 2014). Teacher also experienced in terms thus students' differences in receiving and understanding the material, of their respective absorptive abilities. Some are quick to accept and understand the material presented, some are slow or slower, and do not rule out the possibility that some of them cannot understand at all (Williams, 2018)

The educator efforts to innovate in teaching are needed to overcome these various students' "learning styles", educators are required not only to use one method of teaching but also combined teaching methods so that at least they can accommodate various students' "learning styles"

(O'Flaherty and Phillips, 2015). Educators creativity of in teaching is needed for example by using the teaching method that supported with computer-based learning media (Arkorful and Abaidoo, 2015).

Vocational High Schools (SMK) are designed to produce middle-class workers who are ready to compete globally (Cantor, 2017), but the common problem faced by students is that there are still quite a few who have not been able to achieve satisfactory learning outcomes. There are many factors that caused student' learning outcomes to fail in the academic field, these different factors are low levels of intelligence, lack of motivation to learn, less effective learning methods, lack of frequency and amount of study time, lack of learning media or teaching materials, low level of discipline, etc.

Based on preliminary research at SMK Negeri 2 Manado, specifically the Department of Light Vehicle Engineering Expertise Programs, students tend to prefer to practice in the workshop than theoretical learning process in the classroom. In other words, students' interest in taking classes in the classroom was lower compared to the interest in learning in the workshop. With this condition, it is suspected that the knowledge absorption in the class will be less than optimal and it affects the students' ability to follow the practice in the workshop.

In addition, students who have a high understanding in the classroom may not also be able to take part in the workshop. The lack of media

variation in the learning material presentations causes students feeling tired and bored of learning in class. Similar with the lack of teaching materials in the form of interactive learning media for light vehicle engineering subjects at SMK Negeri 2 Manado. To solve the problem, several researchers have suggested the following strategies like using e-learning (Tuna et all, 2018) and education game (Mewengkang et all). For this reason, it is necessary to develop light vehicle engineering learning media that can attract students to study more in class.

2 METHOD

The research method used in this study is the Multimedia Development Life Cycle. This development method consists of six stages, namely Concept, Design, Obtaining Content Material, Assembly, Testing, and Distribution as shown in Figure 1 (Sutopo, 2009).

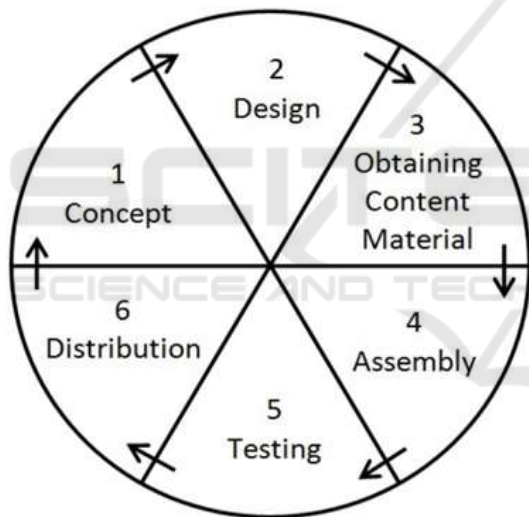


Figure 1: Multimedia development life cycle.

This lightweight interactive learning media was developed using the Adobe Flash CS5 and Blender 3D to create models and animations in this learning media.

3 RESEARCH RESULT

The following explanation of the development of learning media applications that will be developed, namely:

At the Concept stage, the design of the multimedia-based light vehicle vehicle engineering

learning application will be made based on personal computers (PC) with executable format (.exe). Table 1 shows descriptions of this application concept.

Table 1: Concept phase.

Research Title	Vehicle Vehicle Engineering Development Learning media
Application name	Lightweight Vehicle Engineering Learning Media
User	Vocational High Schools students
Application contents	1) Cooling System; 2) Lubrication System; 3) Ignition System; 4) 4 stroke car engine system.
Application Form	Extensions Format (.exe)
Images	Using image files in jpg and png format
Audio	There is audio buttons and music in mp3 format and maw
Animation	There are animations on loading apps and buttons when pressed
Video	There are videos in the app with mp4 format
Interaction	Interactive media on the application are in simulations and quizzes

The second stage is Design, is the application design phase by researchers storyboards and navigation structures.

In the third stage, Obtaining Content Material, researchers collect material or materials with text, images, animation, video, audio, etc. These materials collecting are from books, browsing the internet and others. The following materials are: 1) Script. Scripts collected by researchers in the form of commands or programming languages that are compiled so the application that will be developed can be run on the platform that has been determined in this study. The programming language used is Actionsript 3.0 for Adobe Flash CS 5.5 software; 2) For images on the application, the researcher takes pictures from the internet and creates several image files himself; 3) For animations contained in the application the researcher makes his own such as button animation and application loading; 4) Audio collection in the application for voice button when entered the application; 5) For the video that will be included in the application, the researcher makes it himself with the 3d Blender, and 6) For the

collection of material the researcher collects data from research in school by collecting material in the form of "RPP" and syllabus for Lightweight Vehicle Engineering materials.

In the Assembly stage, researcher used software and hardware with specifications as follows: 1) Blender 3d version 2.78, used as a software for modeling engine, car, and animation models that will be included in the application; 2) Adobe Photoshop CS4 used to create textures on 3D objects, background design, button design and more; 3) Adobe Flash CS 5.5 is used as an engine or main software to build this application; 4) Microsoft Visio 2016 is used as software to create application storyboards.

To build this application researchers use the following hardware: 1) AMD APU E2-2000 dual-core 1.75 GHz processor; 2) AMD Radeon HD 7340 graphics; 3) 4 GB DDR3; 4) 500GB HDD; 5) 14.0" WXGA, HD Color Shine LED 1366 x 768 Pixels; 6) Mouse, functions as an interaction tool for users and important interaction tool to build this application; 7) Keyboard, serves to write material content in applications and also generally as an important interaction tool to build this application and 8) Active Speaker, serves to listen to the sound in the Monitor 14" monitor, serves as a media interface (interface) or a link between users with the computer so that the preview of the program can be seen by researchers.

Application creation begins with making characters in the application, then creating another model, then combining all the files that have been collected, arranging from image files, text, 3d models, animation, and music. All files are integrated into the Adobe Flash CS 5.5 program.

Figure 2 shows the process of making a car model in the 3D blender software which will become a introduction video of cooling systems, lubricating systems and ignition systems.



Figure 2: Making car model.

After all the models and the video rendering process were completed, the researcher imported all the videos, images, sounds, and included for each sub-material. After going through several stages of production by doing the engine with Adobe Flash, the following is a display of the results of the learning media after being produced into a stand alone application.

Figure 3 is a preview of Lightweight Vehicle Learning Learning Media. The main menu is made according to the design of the storyboard as in Image 3. There are 7 buttons on the main menu, namely: 1) SK & KD; 2) Indicators; 3) Material; 4) Evaluation; 5) Profile; 6). Instructions and 7) Exit.



Figure 3: Main menu preview.

Main menu preview material is made according to the design of the storyboard as in Image 4. There are 7 buttons on the main menu, namely: 1) Cooling System 2. Lubrication System 3) Ignition System 4) Car Engine System 5) Profile 6) Instructions 7) Exit. For the Material Menu preview can be seen in Figure 4.



Figure 4: Material menu preview.

Simulation Display made according to the design of the storyboards as in Figure 5. There are 11 buttons on the main menu, namely: 1) Settings; 2)

Instructions 3) Profile; 4) Exit; 5) Back; 6) Material; 7) Video; 8) Simulation; 9) Play; 10) Pause, and 11) Stop.

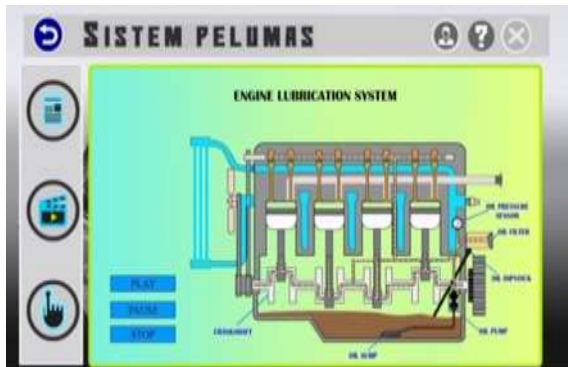


Figure 5: Application simulation preview.

The fourth stage is Testing. After the application is complete, the next step is to test the system and user test where the system testing aims to find out whether the learning media application is in accordance with the overall design and function or not. The testing phase is carried out after the manufacturing stage and all materials have been included. Testing is done using Black Box Testing, this Black box method is testing the program based on the function of the program. The researcher tests each button to ensure that the application that has been made is in accordance with the design.

The sixth stage is distribution. This stage is the last stage in the Multimedia Development Life Cycle (MDLC) method. This stage is the stage of procurement and dissemination of applications that have been developed by researchers. Applications that have undergone the build process in the form of an .exe file with settings in the Adobe Flash software, then the application that has been built will be inserted into compact disk (CD).

The result of this study is interactive learning media product with the title "Learning of Light Vehicle Engineering Media". In the process, the experts tried to use and examine the learning media to test the application functions, giving comments and feedbacks related to the functions. App experts will test the learning media based on the media, while for the material experts will test the learning media based on the material contained in the learning media so that the resulting product is truly worth to use.

After doing Alpha Testing by app experts and material experts, Beta Testing was carried out by students as respondents to evaluate the reactions of students who used Light Vehicle Engineering

learning media. This test involved 7 students of class XI students of the Light Vehicle Engineering Program in Manado Vocational High School. The test was conducted on Friday, June 18th 2018 in the Manado 2 Vocational Classroom room.

While testing, students are asked to use the app, study the material as a whole and work on evaluations. After that, students are asked to fill out a blackbox testing form for students.

As a product of development, this learning app has advantages and disadvantages. The advantage of this learning media is that it uses 3-dimensional animation that would attracts students to learn. The lack of learning media only addresses one competency standard and one basic competence only.

4 CONCLUSIONS

Designing lightweight vehicle engineering learning media using MDLC 6, can be used in vocational schools in Indonesia. The concept stage produces goals, types, and concepts of media, learning materials, users oriented and objectives. The design stage produces a storyboard media. At the material collection stage, researcher collected material in the form of text, images, animation, audio, videos and so on. The building app stage produces learning media in accordance with the storyboard that has been designed. In the testing phase, the researcher conducted a media trial with 2 stages, Alpha Testing (app expert and material expert) and Beta Testing (student / respondent). And at the distribution stage produces interactive learning media in the form of *.exe files that packaged in the form of Compact Disk (CD).

Research that has been carried out is a development research with the aim of producing products and testing level of feasibility. Researcher hopes that there will be more development research carried out to find out the effect of products on students, namely the increase in students' knowledge and understanding. In addition, learning media is also better tested the level of effectiveness in learning activities.

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