DEVELOPMENT OF LEARNING MEDIA AIRCRAFT COMPONENT TURNING (LATHE MACHINING) CLASS XI IN SMKN 12 BANDUNG

Al Amri Fajar Maulana[1] , Iskandar Ikbal [2]

[1,2] Teknik Informatika – Universitas Komputer Indonesia
Jl. Dipatiukur 112-114 Bandung
E-mail : cmonamri@gmail.com[1] , Ikbal5710110014@gmail.com [2]

ABSTRACT

SMKN 12 Bandung is a school that has 6 vocational, one of which is aircraft engine engineering. The engineering study that discusses *turning aircraft component* material on an understanding of the parts of lathe, fixtures lathe and lathing process. The conventional learning method used in SMKN 12 Bandung still has some problems. Based on the interview with Mr. Agus S S. Pd as aircraft machining technique teacher said that there are still many students who lack *turning* the subject matter of aircraft components due to time constraints in the delivery of materials and the limitations of practical tools, causing many students are not competent in the subject *aircraft component turning.*

Based on the problems that have been described, students need the help of learning media which is accompanied by simulation. Learning media is expected to help students in studying these subjects and can also help as a practical tool through the tutorial and simulation of the operation of the lathe and can help students in improving their skills. The method used in the development of this application is luther sutopo where the stage includes the concept, design, material collection, design and testing.
Based on the results of the research conducted, it can be concluded that this application is a media learning tools to solve the lack of practical tools and can help students in enhancing the value of competence in the subject aircraft component turning.

Keywords: Development Learning Media *Aircraft turning component*

1. INTRODUCTION

1.1 Background

SMKN 12 Bandung is located at Jl. Pajajaran No.92, Pamoyanan, Cicendo Bandung and has 6 vocations, one of which is Aircraft Engine Engineering, where one of them learns Aircraft Component Turning. Aircraft Component Turning is one of the subjects that cover topics on understanding the components - components lathes, equipment lathes and lathe process. Based on the curriculum of 2013, at SMKN 12 Bandung students must understand, apply, and analyze factual, conceptual, and procedural knowledge about lathe material.

Aircraft Component Turning is one of the core subjects in the school curriculum SMK 12 Bandung. Study subjects should Aircraft Component Turning is fun and ease, because of these subjects students can acquire knowledge about a wide range of science Aircraft Component Turning. Practicum is a part of teaching aimed at getting students to test and operate lathe. At practicum lathes learners will learn how to operate lathe and lathe techniques. Practicum is needed for students because many theories of Aircraft Component Turning material that is difficult to describe just with speech and writing.

Based on the results of observations made in SMK 12 Bandung there are two problems, namely from teachers and from students, teachers still explain the material by using the slide presentation method so that students' understanding of the material a lot less. This is evident from the values obtained by the students lack of criteria for minimum completeness (KKM) applicable in SMKN 12 Bandung is 70 while that obtained from data on the final value, the average value of the materials Aircraft Component Turning to class XI / PPU-1 is 69 And XI / PPU-2 is 68. This is reinforced by the questionnaire data to 50 students at SMKN 12 Bandung to support student's statement stating that 50% of students have difficulties to understand the material and 70% of students want instructional media that can help Students are more understanding and understand what is explained by the teacher. Thus the final replication value is still below the expected standard. This indicates that the students still lack understanding on the material that has been submitted.

The time it takes teachers to deliver material Aircraft Component Turning who need more time than that specified by the school, which is 1 hour lesson (45 minutes) for the material and the 2 hour lesson (90 minutes). This is caused by the limitations of practical tools are available on *the Aircraft Component Turning* materials as much as 6 pieces of machinery. While the students of class XI-PPU each

class is an average of 36 people, while the machine is available only 6 pieces so each machine will be used by 6 people in each practicum. In practice, it is expected that each student tries to do his own practice so that each student can better understand how to operate the lathe properly. From the time provided for the practicum that is 90 minutes divided by each student to operate the machine so that the time available for each student 15 minutes while at least takes 20 minutes to complete the practice of this lathe that causes students who do not practice ..

Based on existing problems, required a learning system that can support the learning process of students in order to understand the material presented by the teacher. The system can help students to not feel bored in learning the material *Aircraft Component Turning* (machining lathe) as well as the system as a support tool lab and can be used as a medium of learning at SMK 12 Bandung, by building media interactive learning using *Computer Assisted Instructional* (CAI), which is used for the demo tutorial on turning and simulation methods used for the evaluation process, with the above presentation we conducted research premises entitled ***"AIRCRAFT COMPONENT* LEARNING MEDIA DEVELOPMENT *TURNING* (LATHE MACHINING) CLASS XI iN SMK 12 BANDUNG".**

1.2 Formulation of Problem

Based on the background mentioned above, it can be formulated the problem, among others

1. Students have difficulties to understand the practicum material so that the value earned is below the minimum passing criteria (KKM).
2. Limitations of practicum tools available at SMKN 12 Bandung so that not all students get a turn to operate the machine.

1.3 Purpose and Objectives

Based on the results of the background description of the problem, the purpose of this research is to build learning media Aircraft Component Turning (Lathe Machining) at SMKN 12 Bandung.

The goals to be achieved in building this learning media are as follows:

1. Build applications Aircraft Component Turning instructional media so that it can help students to understand the material Aircraft Component Turning.
2. Build media applications Aircraft Component Turning learning so that all students can try to operate a lathe in simulation.

2. CONTENT OF RESEARCH

2.1 Computer Assisted Learning

Computer-assisted learning is a tool used in teaching and learning because it can make learning more effective and efficient. The development of technology, especially in the field of Information Technology is increasingly rapid and increasingly intense competition that requires educators to be more innovative in optimizing the learning process. For that we need a Computer Assisted Learning System [2].

2.2 Instructional Media

One of the new innovations that can be created as a learning tool that is interactive learning media that utilizes computer technology as a means of tools to use it. Interactive learning media can be effective in delivering material to students because students are active in running interactive learning media is to obtain the information contained in it. In addition, interactive learning media can be created in the form of animation that is interesting so that students do not feel bored in receiving the material.

Learning media in which there are elements of interactive multimedia can be used as a support tool in teaching and learning process. Interactive multimedia is a new technology with great potential to change the way learning, how to get information and how to entertain. The use of multimedia technology to the learning process is an interactive one to help overcome the problem of student learning, because by using multimedia technology (such as interactive CD), students are able to learn independently, easier, comfortable, and learn according to their ability without external constraints [5] .

2.3 Multimedia Based Learning

Multimedia can be interpreted as the use of computers to create and combine text, graphics, audio, animation by combining links. In this definition is contained some important multimedia components that must have a computer that coordinates what is seen and heard, which interact with us, there must be a link that connects us with information, there must be a navigation tool that allows us, multimedia provides a place to us to collect, Process, and communicate our own information and ideas [5].

Multimedia has several types as a delivery medium such as: interactive Web-based Multimedia, Movie-based Multimedia, and Interactive CD-based Multimedia. Multimedia includes media that is easily understood by any circle of media brochures because multimedia is a combination of text, sound, images, animation and video [5].

2.4 Questionnaire

A questionnaire is an information-gathering technique that allows analysts to examine the attitudes, beliefs, behaviors, and characteristics of some key people within the organization that can be affected by the proposed system or by an existing system. Using a questionnaire, the analyst attempts to

measure what is found in the interview, but also to determine how broad or limited the sentiments are expressed in an interview.

2.5 Likert Scale

The data scale used for the measurement of independent variable is likert scale. Likert scale is the scale used to measure attitudes, opinions and perceptions of a person or group of people about social phenomena. With Likert scale, then the variable to be measured is translated into indicator variable. Then the indicator is used as a starting point to arrange the items of the instrument that can be a statement or question [6]. The data has been collected through questionnaires, then processed into quantitative form

2.6 System Analys

System Analysis is a decomposition stage of a system that determines the identification, purpose and design. Stages of analysis of this system also plays an important role because if there is a mistake in doing pengonsepan will lead to class in the next stage, for it required accuracy and accuracy to produce a good system and in accordance with needs.

2.6.1 System Development Objectives

The purpose of system development should be determined from the beginning because it will have a big effect on the next stage and in the test phase can be evaluated whether the purpose of system development has been achieved or not, so that can be used as reference in subsequent research.

Based on the problems studied in SMKN 12 Bandung, the objectives to be achieved in this research are:

1. Build applications Aircraft Component Turning instructional media so that it can help students to understand the material Aircraft Component Turning.Membangun media applications Aircraft Component Turning learning so that all students can try to operate a lathe in simulation.
2. Build media applications Aircraft Component Turning learning so that all students can try to operate a lathe in simulation.

2.6.2 Analysis of Current System

Analysis of ongoing systems is an activity to analyze the work procedures that occur to existing systems today. Ongoing procedures in teaching activities at SMKN 12 Bandung.

Flowmap of aircraft engineering practicum activities can be seen in figure 1

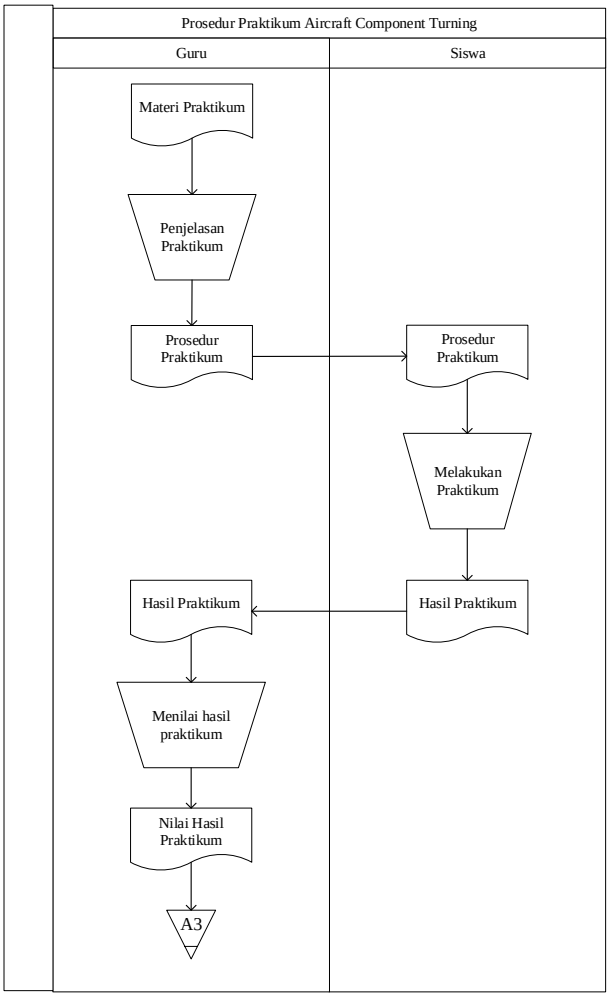


Figure 1 Current Procedure

2.7 System Description

Applications that will be built based on client-server, this application serves as a media learning aircraft component turning (lathe machining). In using this application users use the computer as a tool to run the application of learning media aircraft component turning (lathe machining). The architecture of learning media system aircraft component turning can be seen in figure 2

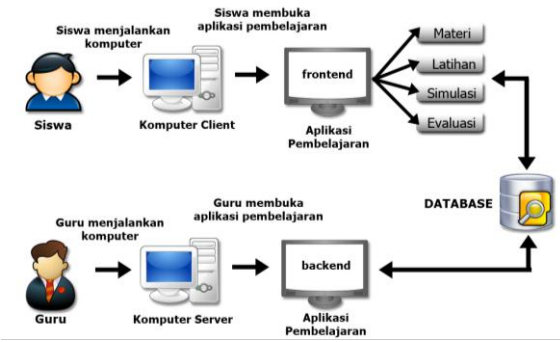


Figure 2 General Application Architecture

2.8 Analysis of Learning Methods

Interactive learning method is a method undertaken to create an interactive atmosphere between students and teachers so that reciprocity arises between students and teachers. The method used in this study is Computer Assited Instruction (CAI) which is a learning method that uses computer media with the concept of Tutorial, Exercise and Simulation.

1. Tutorial

   The concept of tutorial will be used in developing the application of learning media of aircraft component turning to the user, the flow of material in the application of learning media of aircraft component turning is as follows:

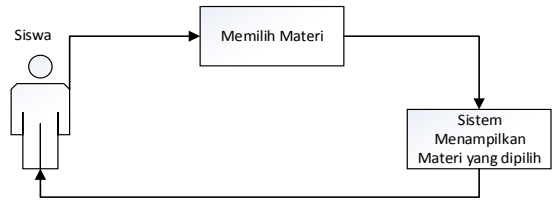


Figure 3 Tutorial Flow

2. Drill and Practice

   The concept of drill and practice is used to train or test the students by displaying a series of exams, if the student is already familiar to the overall material provided or not. Trials conducted in the form of theoretical exams and lab tests.

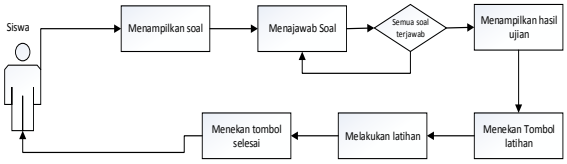


Figure 4 Drill and Practice Flow

3. Simulation

   The simulation concept is used to test the ability of the users of the material learned through the description of the situation in accordance with the real world. The concept of simulation in teaching media applications Turning Aircraft Component.

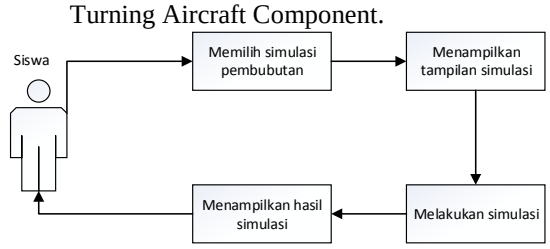


Figure 5 Simulation Flow

2.9 Software Requirements Specification

Software requirements specification is done based on the needs of aircraft component learning application of turning. Software requirements specifications are divided into two parts: SKPL-F (Requirements for Functional Software Requirements) and SKPL-NF (Non-Functional Software Requirements Specification). Specification of software requirements in this study can be seen in tables 1 and 2

Tabel 1 Functional SKPL

Kode	Deskripsi Kebutuhan
SKPL-F-01	Application can login
SKPL-F-02	Application can display material
SKPL-F-03	Application can display exercise
SKPL-F-04	Application can display simulation
SKPL-F-05	Application can display evaluation
SKPL-F-06	Application can manage student data
SKPL-F-07	Application can manage exercise data
SKPL-F-08	Application can manage evaluation
SKPL-F-09	Application can logout

Tabel 2 Non-Functional SKPL

Kode	Deskripsi Sistem
SKPL-NF-01	The system is built based on Client - Server
SKPL-NF-02	The app displays the data as per the user's requirement

2.10 System Design

Design is part of a software development methodology that must be done after going through the stages of analysis. In this section will explain the design of the system to be proposed.

2.10.1 Menu Structure Design

Menu Structure is a common form of a program design to facilitate users in running computer programs. The following is the menu structure design Instructional Media Applications Aircraft Component Turning (Lathe Machining).

2.10.1.1 Students Menu Structure (Front End)

Pupils menu structure as the front end can be seen in Figure 6

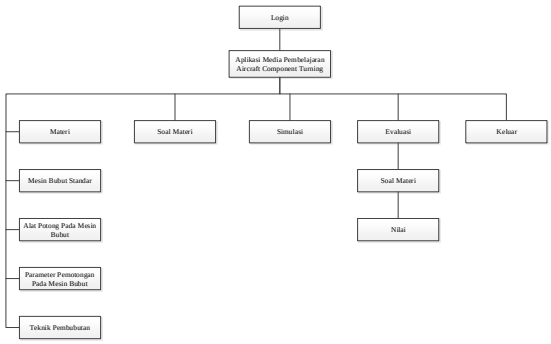


Figure 6 Student Menu Structure

2.10.1.2 Master Menu Structure (Back End)

The menu structure of teachers as the back end can be seen in Figure 7

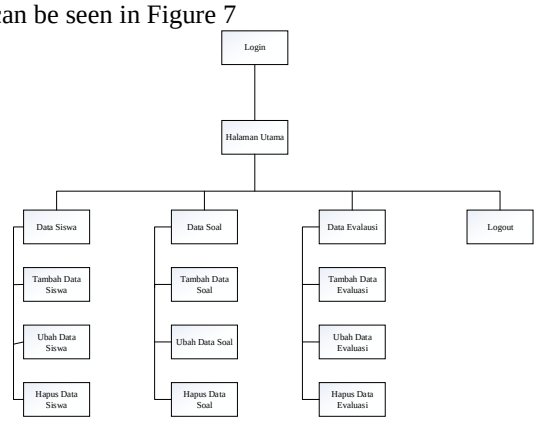


Figure 7 Master Menu Structure

2.11 System Implementation

Implementation of the system is the stage to translate the design based on the results of the analysis. The purpose of implementation is to confirm the program that has been designed on the system actors so that users can provide input to the system developers. Implementation of the system describes the needs of hardware and software used.

2.11.1 Hardware Implementation Used

The hardware used to run the Learning Media Applications Aircraft Component Turning (Lathe Machining) can be seen in Table 3

Table 3 Hadware Used

No	Perangkat Keras	Spesifikasi
1	Processor	Dual Core 1,6Ghz
2	Monitor	Resolution 1024x768 p
3	Graphic Card	VGA 512
4	Memory	Minimum 1Gb
5	Mouse	Standard
6	Harddisk	Free space 500mb

2.11.2 Software Implementation Used

The software used to run the Aircraft Component Turning Learning Media Application can be seen in table 4

Table 4 Software Used

No	Perangkat Lunak	Spesifikasi
1	Operating System	Windows 7
2	Unity	5
3	Blender	2.7.2
4	Mozzila Firefox	53.0.3 (32-bit)

2.11.3 Application Implementation

Learning Multimedia Applications Aircraft Component Turning does not require installation, just double-click on this application but it must be remembered that on windows operating system must be installed Unity 5 and xampp, so the application can run. If Unity 5 and xampp are not installed, then this application can't run.

2.11.4 Interface Implementation

Interface implementation is the expectation of interface design. The interface is the view of the application where the user will interact directly with the application.

2.11.4.1 Login Interface

At the login menu displays text input username, password, login button and a quit button. Display login interface can be seen in figure 8

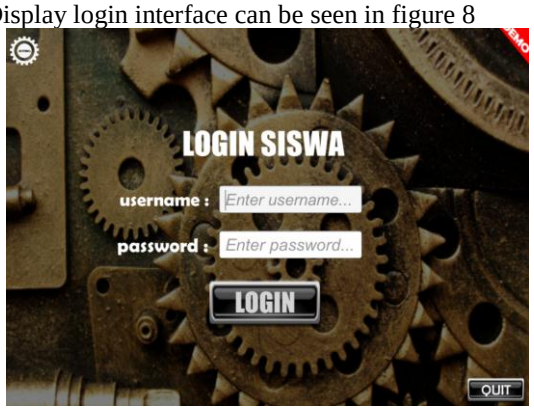


Figure 8 Login Interface

2.11.4.2 Home Interface

On the home menu there is the main material menu, exercise, simulation and evaluation. The interface of the home can be seen in Figure 9



Figure 9 Home Interface

2.11.4.3 Main Material Interface

On the main material menu there are material menu choices: standard lathe, lathe cutting tools, cutting parameters, and lathe techniques. The main material menu interface display can be seen in Figure 10

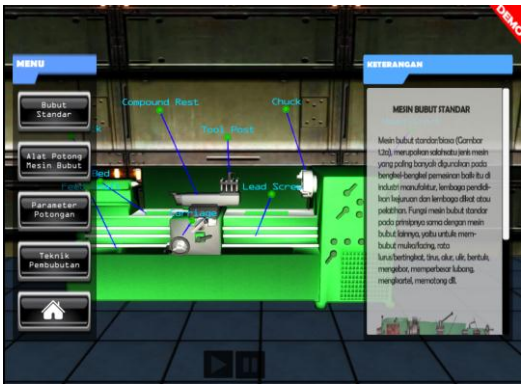


Figure 10 Main Material Interface

2.11.4.4 Exercise Interface

On the exercise menu displays the problem as well as answers and score results. The interface of the exercise can be seen in Figure 11

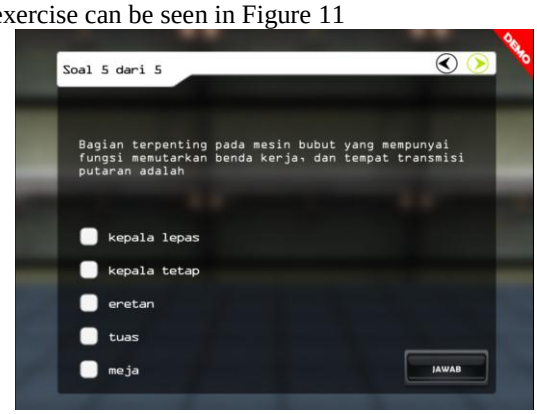


Figure 11 Exercise Interface

2.11.4.5 Simulation Interface

On the simulation menu there are menu options that rotate the spindle, automatic control, manual control, chiseling, installation of workpiece and flat process. The simulated interface display can be seen in Figure 12

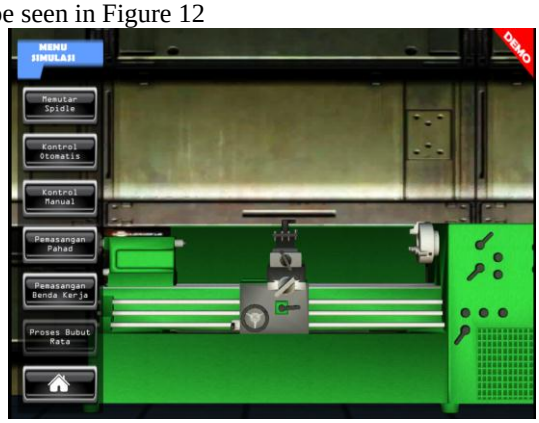


Figure 12 Simulation Interface

2.11.4.6 Evaluation Interface

On the evaluation menu displays the questions along with answers that have been updated and the results of the score. The interface of the exercise can be seen in Figure 13

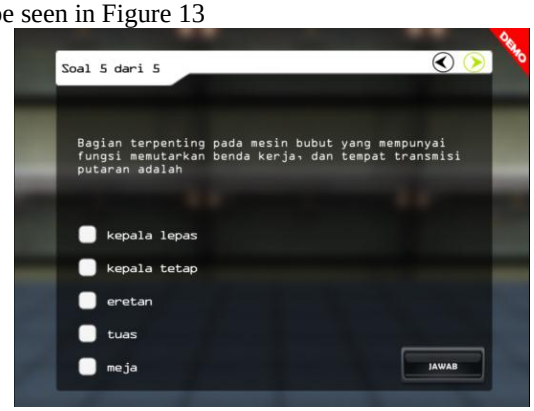


Figure 13 Evaluation Interface

2.11.5 Cases and Test Results

The following is a case for testing software that has been built using the Black Box method based on pre-made test scenarios.

1. Key Functionality Testing

Table 5 Functionality Testing

No	Test Item	Test Results	Test Type
1	Login	Valid Data	Accepted
2	Home	Display Home Page	Diterima
3	Main Material	Display a List of main material	Accepted
4	Exercise	Display Exercise Menu	Accepted
5	Simulation	Display simulation menu	Accepted
6	Evaluation	Display evaluation menu	Accepted
7	Logout	Sign out from application	Accepted

2. Testing Data Input login

Cases and Results of test data (True)			
Data input	Hope	Observation	Result
Username: 201511 Password: ak123	Show main page	Show main page	Accepted
Cases and Results of test data (False)			
Data input	Hope	Observation	Result
Username : Password :	Show message failed login	Show message failed login	Accepted

3 FINALE

3.1 Conclusions

Based on the results of system implementation and testing conducted, the conclusion of the final project entitled "Development of Multimedia Applications Aircraft Component Turning (Lathe Machinery) For Class XI at SMKN 12 Bandung Aircraft Engineering Machines" is as follows:

1. Multimedia Applications Aircraft Component Turning (Lathe Machining) For Class XI at SMK 12 which has been built to help students of class X in improving the understanding of the subject matter of turning aircraft component. It is concluded based on the result of pretest and posttest given to 72 students and students with the result of percentage increase of the average value of 5.7% and from the questionnaire with the percentage of 85% which states agree from the questions asked.
2. Multimedia Applications Aircraft Component Turning (Lathe Machining) For Class XI at SMK 12 which has been built to help teachers in the learning process, especially in simulating the operation of the lathe. It can be concluded based on the result of interview to the teacher of bpk Agus S as the subject matter aircraft subject aircraft teacher.

3.2 Suggestions

In Aircraft Development Component Turning (Lathe Machining) For Class XI at SMK 12 that has been built is still far from perfect and there are still many shortcomings. Therefore, further development and refinement is needed to meet the needs of the growing user. The suggestions on the development of this learning media for the future are as follows:

1. Add more motion animations, to make it more interesting
2. The addition of elements of interaction with the user, so that users more actively to the learning application.
3. The addition of a more dynamic material element so that all students from grades X through XII can use this application.

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