DEVELOPMENT OF PHYSICS LEARNING APPLICATION FOR 11TH GRADERS AT SMKN 1 CIMAHI

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ABSTRACT

In broad scope, physics is the knowledge of nature. At SMKN 1 Cimahi especially in physics subjects, they are still using lectures and discussion as teaching methods. By using these methods, learning process becomes less interesting and interactive. Therefore, the solution offered to solve this problem is by making interactive learning application for physics subjects.

Development method used to create this learning media application is a luther sutopo method that consists of several steps which are concept, designing, collecting material, and testing. For learning process, it will use Computer Assisted Instruction (CAI), where tutorial method used for explaining learning material, meanwhile simulation method used for explaining formula and law of physics.

Based on the results of research conducted, using learning media desktop-based for learn physics can help to overcome the limitations of conventional methods such as lectures and discussion also increase student interest in the learning process.

Keywords: Simulation, Interactive, Media Education, Physics

1. INTRODUCTION

SMKN 1 Cimahi is one of the Vocational High School in the city of Cimahi, located on Jl. Mahar Martanegara 48 RT 03/08 District of South Cimahi, Cimahi - West Java 40533. This school has 9 departments who all studied science, one of the lessons learned is physics. All majors study physics because these subjects relate to their daily lives.

Physics is a part of natural science that is identical to the events and phenomena of nature so it is important to be studied, understood and analyzed. The entry of a physics lesson in national examinations adds to the sense of anxiety for some students who are not ready for the exam. Unpreparedness of students can be started from the assumption that physics is hard to understand because many formulas and material that many and complicated to learn.

SMKN 1 Cimahi media that is still in use today is through the methods of text materials (modules) and verbal (lecture). In one class of class XI the number of its students as much as 810, a random sample was conducted using questionnaires in class XI Department of Electronics and Communication class A and B, which amounted to 50 students get a result that is less than 65% of students get the results that physics has difficulty in understanding the materials provided by the teacher. This is because the existing KKM results showed a low complexity. Delivery methods is less varied class if the teacher only provides text and spoken, many of the symptoms of science that requires the simulation to learn the students to understand the material given by the teacher.

With the research that has been done there is a problem, namely how to help all students in understanding the physics formula and so interested in the subjects of physics. Comes the solution is to build an interactive learning media utilizing today's technology is expected to be more easily understood by students for computer-assisted physical phenomena that are difficult to be visualized to students. Learning media is made with the material, evaluation and some simulations, it is intended that students can learn independently while the teacher can assist in the teaching process in class and give the results of their evaluation. Because this learning media are simulated this is very helpful in the application of the concepts of physics, and therefore proposed a system of interactive teaching physics at SMKN 1 Cimahi.

1.1 Objectives

Given the problems derived from the formulation of the problem, so the purpose of this research is to build their interactive learning media applications of physics in SMKN 1 Cimahi that could overcome the existing problems.

1.2 Software Development Method

The method used for this stage of the method of construction of Multimedia Applications Sutopo covering the steps that *concept*, *design*, *material collecting*, *assembly*, *testing* and *distribution* as shown below:

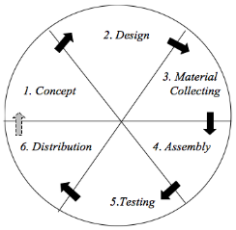


Figure 1. Method of Multimedia Application Development [Sutopo]

1.3 CAI *(computer Assisted instruction)*

Criswell in Munir, defining CAI (computer Assisted instruction) as the use of computers in teaching material delivered to actively engage learners and allow feedback. Here is an example that is:

1. Tutorial: introducing new subject matter to the students and then followed up with training and practice. These programs generally provide the initial test and final test with respect to the material presented. The program is also used for the enrichment of learning or helping students who are not present in the tertentu.program lesson tutorial is also used as *a review* of previous lessons delivered in order to check their understanding and retention of concepts.
2. *drills and* Practice:The computer is used as a tool to train Siwa to work on the problems existing practice in the application. Exercise by way of practice done repeatedly within a certain period to gain the skills and dexterity of theoretical knowledge.
3. *Simulation:* real-life situations are presented to the students, outlining the device conditions are interrelated. Then the students make decisions and determine the consequences of the decision he made, such as political issues, family and so on. Computer-Based Learning is *individualized learning* (individual learning), and *mastery learning* (mastery learning). Computer-based learning carried out in the computer lab in the school.

1.4 Multimedia

Multimedia if the terms of the language consists of two words, namely multi and media. Multi means many or more than one, while the media is the plural of medium, which means means the container or apparatus. The term itself can be interpreted as a multimedia data transmission and manipulation of all forms of information in the form of text, images, video, audio, numbers or words in a computer world where the information is processed shape in the form of digital data. And here is a picture of a multimedia system.

1. **Text**
   Text is the delivery of data elements common and simplest because it requires little space in storage when compared to other elements.
2. ***Audio***
   Sound is an element of delivering enough data interactive, as users can obtain information simply by using the sense of hearing alone. For example, songs, instrument-instrument, audio formats such as WAV, MIDI and MP3.
3. **picture**
   In generalimage means an image or raster (halfone drawings), such as photos. The use of the image will make multimedia more attention and can reduce boredom compared with the text .. Here is an image storage format.

1.5 Interactive Multimedia

Interactive Multimedia is a multimedia equipped with a controller that can be operated by the user, so the user can choose what is desired for further processing. Examples of interactive multimedia are: multimedia interactive learning, gaming applications, and others.

1.6 Computer Network

Computer Network is a system that involves a series of two or more computing devices as well as devices - devices are being created or designed to work together in order to be able to communicate, access information, request and provide the service or services between a computer with the other

1.7 Client Server

client serveris a model that distinguishes connectivity on the network computer functions as a client and a server. This architecture puts a computer as a server. This server is assigned to provide services to other terminals are connected in the network system or called his client. server can also be commissioned to provide file sharing services (file server), printer (printer server), lines of communication (communication server).

In this architecture model, the client is not able to function as a server, but the server can serve as a client (non-dedicated server). The working principle is very simple in architecture, where the server will wait for a request from a client, process and deliver the results to the client, while the client sends a request to the server, waiting for the process and see the visualization of the results process.

1.8 Likert

scale that can be used to measure attitudes, opinions, and perceptions of a person or group of people about a symptom or educational phenomena. Likert scale is a psychometric scale commonly used in questionnaires, and is the most widely used scale in the form of survey research.

With Likert Scale, variables to be measured are translated into the indicator variables. The indicator then used as a starting point to construct items

instruments which can be either a question or a statement. Answer every item instrument that uses a Likert scale has a gradation from very positive to very negative

2. RESEARCH CONTENTS

2.1 System Description

In the design of this system will be built an interactive multimedia applications in which there are materials physics. Applications built using the concept tutorials, simulations and practice concepts. Features that exist in the application to be built include the subject matter of physics for 1 year. The concept consists of theoretical physics tutorial. The concept of a simulation consists of the implementation of the physics lessons. If the user selects one of the concept, the system will show the concept of the user. If not, then the user can select the application usage instructions ..

2.2 Description Concepts Built

Applications of learning physics is an application that can be used to assist teachers in delivering the learning materials in class, can be seen in Table 1.

Table 1 Description Concepts Built Applications

The Building Elements	Description
Title	Media ApplicationPhysics Education Class XI In SMKN 1 Cimahi.
Users	Teachers and Students for grade XI of SMKN 1 Cimahi
Figures	Figure contained in the application which is built in the form of an example of a physics lesson
Animation	Animation in an application that was built is a flash animation
Interactivity	Interactivity in interactive multimedia applications are built is the key to the displacement of a scene from one another button to do the simulation as well as drag and drop objects in the simulation.

To produce an interactive multimedia application that is used to convey messages (information and skills) with visual media. Here is a visual concept application of interactive multimedia based learning media.

Interactive multimedia Supporting factors that will be used as follows:

1. Factor

Mediabased technology and computer owned by the SMK 1 Cimahi is one factor supporting the implementation of multimedia-based teaching and learning activities in laboratory simulations. In addition, the SMKN 1 Cimahi provide a projector that can support teaching and learning activities in class.

2. Environmental Factors

SMKN 1 Cimahi located on Jl. Mahar Martanegara No. 48B Cimahi an educational institution, so that it supports the achievement of learning goals physics.

2.3 Analysis of Interactive Learning Methods

interactive learning method is a method that is done to create an interactive atmosphere between teachers with students so there is reciprocity between teachers and students. The method used in this research is the Computer Assisted Instruction (CAI), which is a learning method that uses computer media. Methods of Computer Assisted Instruction (CAI) is used in the development of this application only three concepts, namely:

2.3.1 Tutorial

tutorial program, introducing new subject matter to the students and then followed up with training and practice. These programs generally provide the initial test and final test with respect to the material presented. The program is also used for the enrichment of learning or helping students who are not present in the tertentu.program lesson tutorial is also used as *a review* of previous lessons delivered in order to check their understanding and retention of concepts-konsep.Konsep tutorial will be used in the development of interactive multimedia learning applications and simulations to deliver material to students in the form of text, animation, and visual. Flow delivery of content in interactive multimedia learning applications are as follows.



Figure 2. Submission Material Flow

2.3.2 Simulation

real-life situations are presented to the students, outlining the device conditions are interrelated. Then the students make decisions and determine the consequences of the decision he made, such as political issues, family and so on. Computer-Based Learning is *individualized learning* (individual learning), and *mastery learning* (mastery learning). Computer-based learning carried out in the computer lab in the school. The concept of simulation is used to test the ability of users to the material being studied through a picture of the situation in accordance with

the real world. The concept of simulation in physics teaching media applications can be seen in the following figure



Figure 3. The delivery Flow Simulation

2.3.3 *Drill and pratice*

Computers are used as a tool to train Siwa to work on the problems existing practice in the application. Exercise by way of practice done repeatedly within a certain period to gain the skills and dexterity of theoretical knowledge.

2.3.4 *Games*

Basically, this type of PBK appropriate when applied to the students who love to play. In fact, if designed properly as a means of playing and learning, it will further enhance students' motivation.

Based on the type of game learning goals are divided into two types, as follows:

- Intrinsic Games*(IntrinsicGames)*is studying the rules of the game and skill in a game.
- Extrinsic game*(extrinsicGames)*that the game only as a supplementary device as a learning facility and motivating students.

2.4 Implementation Interface

Multimedia Interactive Learning Application requires no installation, simply by *double-clicking* on this application but it must be remembered that on a Windows operating system must be installed Adobe Flash Player, so that the application can be run. If Adobe Flash Player is not installed, this application can not run. Interface implementation is penarapan of interface design. The interface is a display of the application in which the user will interact directly with the application.

2.4.1 Interface ImplementationForm Student Login



Figure 4.Student Login Form Interface

2.4.2 Interface ImplementationApplication Menu



Figure 5. InterfaceApplication Menu

2.4.3 Implementation Interface MenuMaterial
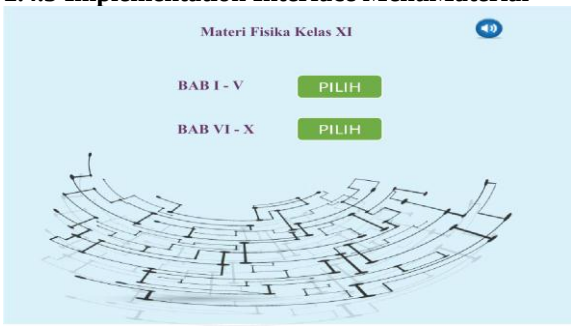


Figure 6.Material Interface Menu

Material 2.4.4 Interface Implementation Options Chapter I - V
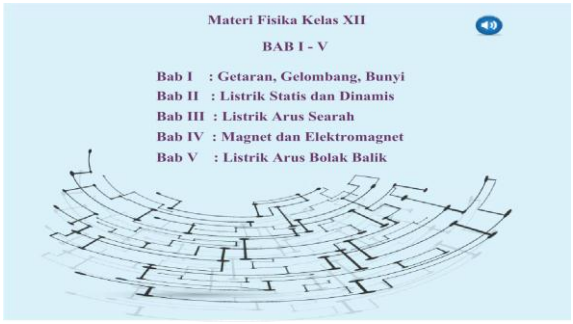


Figure 7. interface material options CHAPTER I - V

2.4.5 Implementation interface material Vibrations, Waves, sound

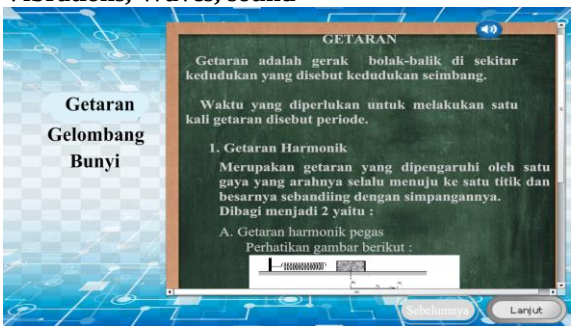


Figure 8. interface material Vibrations, Waves, Beep

2.4.6 interface Implementation Menu Content Static and Dynamic



Figure 9. Interface Material menu options Static and Dynamic

2.4.7 Content Menu Interface Implementation ListrikArusSearah

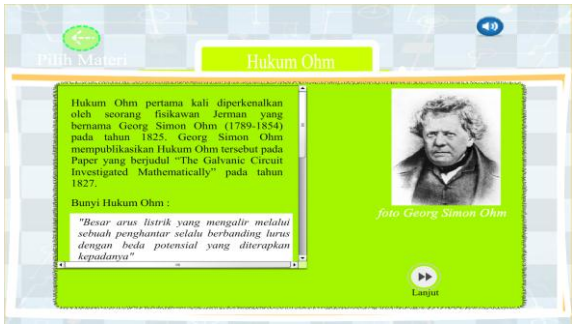


Figure 10. Menu Interface MaterialDirect Current Electrical

2.4.8 Interface Implementation Magnetic materials and electromagnets

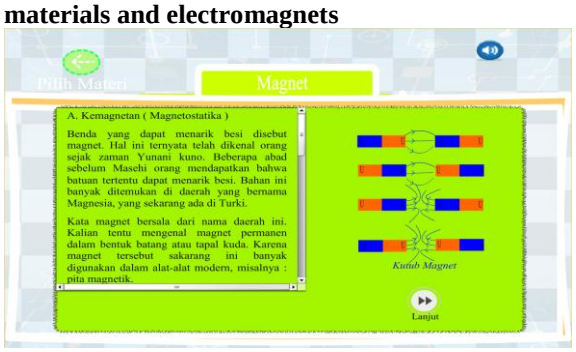


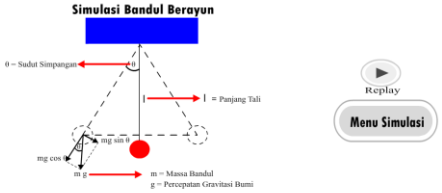
Figure 11. Interface Material Magnet and Electromagnetic

Simulation 2.4.9 Implementation Interface Menu



Figure 12. Simulation Interface Menu

2.4.10 Simulation Interface ImplementationVibration



Interface Figure 13.Vibration Simulation

2.4.11SimulationInterface ImplementationMagnetic Field

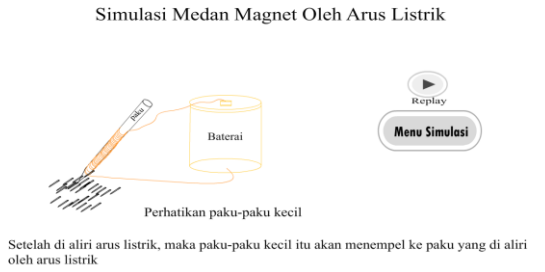
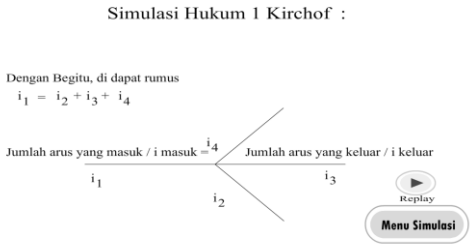


Figure 14. Interface Magnetic Field Simulation

Interface Implementation 2.4.12 Kirchoff's Law simulation



interface simulation Figure 15. Kirchoff's Law

04.02.13 Optical simulation interface Implementation

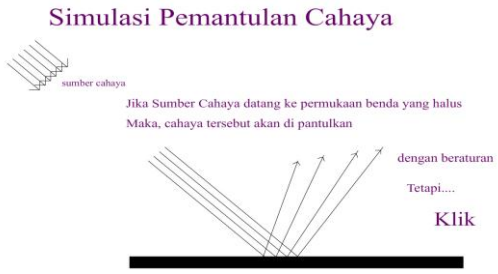


Figure 16. Optical simulation interface

simulation interface Implementation 2.4.14 Bohr Atom Model

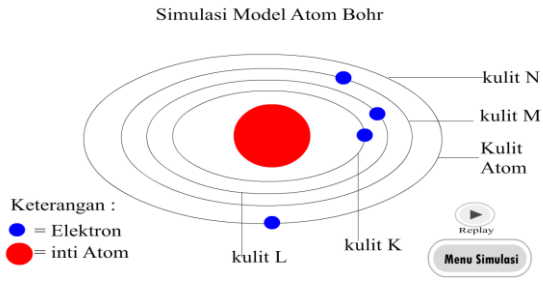


Figure 17. Optical simulation interface

simulation interface Implementation 2.4.15 Electrostatic Discharge



Figure 18. interface simulation Electric Charge

2.4.19Implementasi interfaceExercise

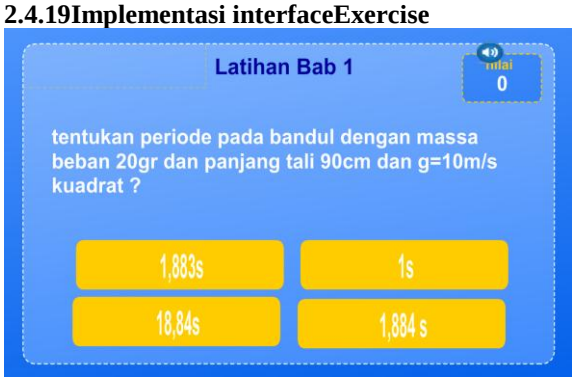


Figure 19. interface Exercise

2.4.20 interface ImplementationEvaluation

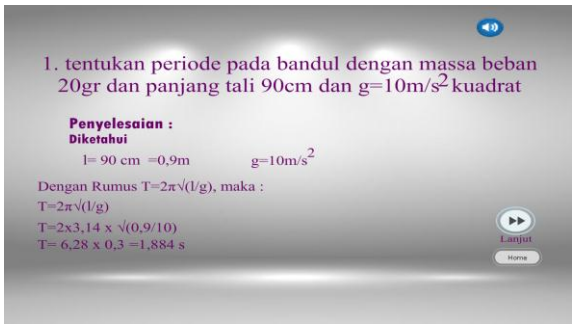


Figure 20. Evaluation interface

2.5 Testing

Testing is the cornerstone of the system is carried out to find flaws or errors in the software being tested. The test is intended to determine the software that created already meet the appropriate criteria. Tests conducted by way of alpha that is usingtesting methods *Black box* and Beta testing is the way the system was tested by conducting interviews and giving questionnaires to users.

2.5.1 *Blackbox* Test

In functional testing phase used is intended to test the new system is a *black box*testing.testing *Black box* focuses on functional requirements of software that consists of a test plan and test case results.

2.5.2 Beta Test

Beta testing is testing conducted objectively where testing is done directly to the respondent by means of questionnaire or interview potential users of software that is built.

2.5.3 Interviews

Interviews have been conducted to teachers SMKN 1 Cimahi Asep Nuryadin S.Pd Tedi relating to the Application of Physics Learning Media, produces the interview as follows:

1. Does this application can provide convenience in studying physics?
   Answer: I hope to help in the learning of physics for students to get an alternative learning media than previously conventional.

2. Does this application can be used to give the material to the students SMKN 1 Cimahi?
   Answer: This application can be used to provide the subject matter physics because it is in accordance with the material in the syllabus.

3. Does this application will be used by the teacher?
   Answer: Yes if there is already this application will be used.

4. Are there any difficulties in the use of this application?
   Answer: This app is easy to use.

5. Are there any suggestions or feedback for this application?
   Answer: He made learning media has been quite helpful in learning in class. For advice on this application in the simulation to be more interesting again.

2.5.4 Questionnaire

Beta testing conducted by questionnaire to 50 students for this application using a Likert scale, from the results of the questionnaire will be calculated for later assessment conclusions can be drawn from the users of the application. Here is a sampling calculation formula:

n: number of samples
N: Population
E:of tolerance limits
Calculationquestionnaire

1. Is this learning media applications can facilitate in understanding the physics?

Hasil					
Kategori Jawaban	Sangat Tidak Setuju	Tidak Setuju	Ragu-ragu	Setuju	Sangat Setuju
Sample	50	50	50	50	50
Point	0	0	14	11	25
Jumlah	(0 x 1) + (0 x 2) + (14 X 3) + (11x 4) + (25 x 5) = 211				
Hasil	211:50 = 4,22				

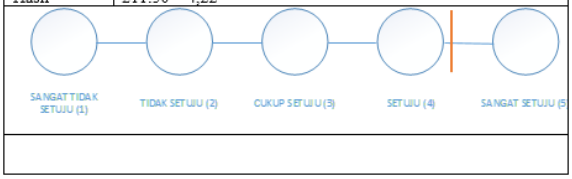


Figure 21.Results Questionnaire

2.5.5 Conclusion Testing

Based on the percentage of responses on the questionnaire that has been done to students who have been beta testing it can be concluded that the interface on this application is attractive and easy to understand and operate. Overall can petrify teachers and students in learning activities because it has a value exceeding agreed.

3. CONCLUSION

Based on the results obtained in this thesis, it can be concluded as follows:

1. Applications of Physics Learning Media can be a support tool for learning so that all students can easily understand the physics, it is seen from the attitude of the respondents attested by the average - average point of beta testing results exceed agreed limits (4), which is a boundary point in the category of a positive attitude for this application.

2. Physics Learning Media application can be a support tool to overcome the problem of the lack of interest of the students will be the subject of physics. This is shown by the average - average point of beta testing results exceed the agreed limit (4), which is the limit score in the category of a very positive attitude.

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