PEMBANGUNAN MEDIA PEMBELAJARAN DAN SIMULASI ELECTRICAL BODY SEBAGAI PENUNJANG PRAKTIKUM OTOMOTIF (STUDI KASUS SMK MEDIKACOM BANDUNG)

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ABSTRACT

Light Vehicle Technic (TKR) is engaged in the automotive field. Electrical Body is a competence material. Learning methods in vocational MedikaCom Bandung has been using manual supporting media by lecture method, there are some students who lack knowledge of electrical drafting body, the inavailability of interactive learning media that depicts visually. Media of practicum use a panel that has been created by teachers, when it is limited so it takes more time and students who do not follow the procedure cause damage to the media. Based on these problems, we need media that are expected to help students and teachers.

Based on the problems outlined, they require a computer based learning media to facilitate students and teachers do their teaching and learning process, that is by learning media accompanied by the simulation. Learning media is made by using Computer Assisted Instruction (CAI) learning media is expected to help students understand the materials, install electrical circuit body and reduce damage to the media.

Based on the results of research and testing, they can be concluded that the media learning and electrical simulation of this body which can help students and teachers in the learning process.

***Keywords**: Instructional Media, Electrical Body, simulation, electrical*

1. INTRODUCTION

SMK MedikaCom Bandung is a vocational school that has many departments, one of them is the Light Vehicle Engineering (TKR) which is engaged in the automotive field. Automotive is the study of the engines of motor vehicles such as cars and motorcycles. Automotive also has a wide variety of disciplines that is more specific about the components of the system contained within vehicle. Electrical body is a matter of competence.

Based on observations and interviews for teachers and students in class XI SMK MedikaCom Bandung with courses in Lightweight Vehicle Engineering expertise, it can be concluded that some students have difficulty in understanding learning materials electrical body. The difficulties faced by the students are in learning process when teachers only explain through lectures using companion module and they cannot explain the material visually so that students become saturated and confused when they learning in the classroom. Inavailability of interactive learning media such as animations and simulations illustrated visually to students before doing practice. Other impacts on exam results, many students are getting less value.

Media as supporting practice in workshops created by teachers of SMK MedikaCom are simply designed to facilitate students in conducting practice. Media used by teachers to do practice at the workshop. The device is made in addition to ease in carrying practice also to reduce the risk of damage when using the car. But media available in the workshop are not many, there are only 3 units available. Before practice, students are divided into several group learning. One group consists of 3 students. Programs TKR XI class is divided into two classes, namely class XI-A as many as 23 students and class XI-B as many as 22 students. The duration of the practice for is 4 hours of lessons. The number of students who wants to try the practice must be interchangeably with other students, so when the students who are working without procedures or SOP can cause damage to the props. This limitation can cause less effective in practice.

Thus one best way to overcome these problems is to create an interactive learning media accompanied by simulations that can display information through pictures, sound, color and motion. This learning media composed of matter, simulation and evaluation questions with methods Computer Assisted Instruction (CAI). Media packed in multimedia learning is expected to create a learning better , not monotonous and not saturate environment, can assist students in improving the students' understanding within Multimedia Based Learning.

1.1 Multimedia Based Learning

Multimedia Based Learning is a multimedia computer that can control more than one type of media that is not dependent on the time (discrete) and media-dependent with time. Images and text are

examples of discrete media (ie media that does not depend on time while the audio and video is dependent on the time, as a consequence of the media walked with time [1].

1.2 Media Learning

Media Learning In lessons is usually called learning media, which plays a role in conveying messages of learning, that is, media of learning material to learners or educators who make learners do do the learning [2].

Categories of instructional media and forms - forms of media in learning [3].

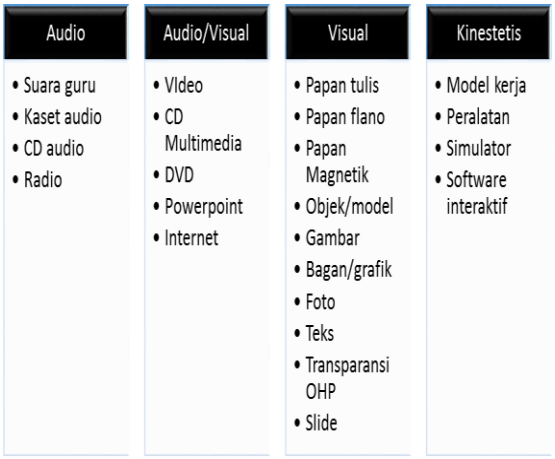


Figure 1. Forms Media Learning

1.3 Computer Assisted Instruction Method (CAI)

CAI (Computer Assisted Instruction) is a computer role as an extra assisstance in learning, utilization includes the presentation of the information content of the subject matter, exercise, or both. CAI supports learning and training but not the main delivery of the subject matter.

The format of the presentation of the message and the information in the above tutorial CAI consists of preprogrammed, intelligence tutorial, drill and practice, and simulation.

a. Fixed tutorial

Fixed tutorial is a set of both static and dynamic show which is the first programmed. Sequentially, a small set of information is shown followed by the question. The students' answers are analyzed by a computer (as compared to the possibilities of answers that have been programmed by the teacher / designer), and based on the results of the analysis of the appropriate feedback.

b. tutorial intelligence

Tutorial different intelligence tutorial computer preprogrammed for the answers to the questions of students' resulting from artificial intelligence, not previous programed answers prepared by designer lesson. Thus, there is a dialogue from time to time between the student and the computer. Neither the students nor the computer can ask questions or give answers

c. Drill and practice

Drill and practice used with the assumption are a concept, or rules, or procedures which have been taught to students. The program leads students with a series of examples to improve proficiency using skills. The most important thing is to provide constant reinforcement of the correct answer.

d. Simulations

Simulation on the computer provides the opportunity to learn in a dynamic, interactive, and private individuals. With simulation, complex work environment can be styled to resemble the real world. The success of the simulation is influenced by three factors, namely scenario, the base model, and a layer of teaching. The scenario should reflect real life. She determine what happened and how it happened, who the character is, what objects are involved, what is the role of students, and how the students deal with the simulation. The basic model is a mathematical formula or rule of "if-then" reflecting the relationship of cause and effect in the real-life experience. Layers of learning is learning the tactics and strategies used to optimize learning and motivation [4].

1.4 Simulation

Simulation is a program which involves students in issues similar to the actual situation, but without the real risks. Through the simulation program, the students are invited to make the right decisions from available several alternative solutions. Any decision taken will be a certain impact.

1.5 Electrical Body

Electrical Body is the installation of a variety of lighting circuits on the vehicle. The body electrical circuit, including a series of city lights, turning signal circuit and hazard lights, head lights series, a series of brake lights, reverse light circuit, the circuit horn and windshield wiper circuit

2. CONTENT OF RESEARCH

2.1 Building Analysis of Media Learning

Media Education and Body Electrical simulation are learning media containing the material therein Electrical assembly on four-wheeled vehicles. Learning media is indicated for class XI students majoring in Engineering Lightweight vehicle with the following objectives:

1. *Make immediate visual media so it does not let students have to wait*
2. *Provide convenience to the teacher to explain visually*

3. *Create an atmosphere of learning activities for the better, not monotonous and does not saturate*
4. *Assist students in improving mastery of the material*
5. *Reduce damage to the media*

2.2 System Architecture

System Architecture Learning Media is built based desktop, learning media serves as a medium of learning techniques electical light vehicles in the material body. In using this learning media users use the computer as a liaison between users with learning media. Learning Media electrical system architecture body can be seen in Figure 2..

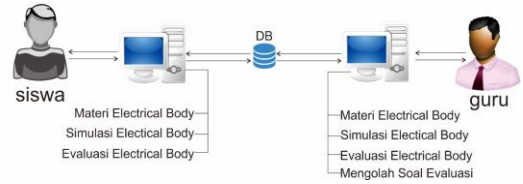


Figure 2. System Architecture

2.3 Analysis Software Requirements

The software is used in a system are directives given to the hardware in order to interact with each other between the two. Software needed to access media learning and simulation of electrical body are as follows:

1. *Operatin System Windows 7*
2. *Mysql*
3. *XAMPP*
4. *Adobe Flash*
5. *Adobe Flash Player*

2.4 Hardware Requirement Analysis

In order to let this learning media run properly, then it takes the appropriate hardware to application needs. The minimum hardware specifications needed for accessing media learning and simulation of electrical body is as follows:

1. *Processor : Dual Core*
2. *Monitor : Monitor with resolution 1024x768 pixel*
3. *VGA : 512 MB*
4. *Hardisk : Free Space Minimum 2GB*
5. *Memory : 1GB*
6. *Mouse : standard*
7. *Speaker : Standard*

2.5 Analysis of Users' Need

The user of learning media is intended for teachers and students of SMK MedikaCom Bandung as a tool in the teaching and learning process.

2.6 Functional Needs Analysis

Analysis of the functional needs of instructional media and electrical simulation body is comprised of Use Case and Class Diagrams.

2.6.1 *Use Case*



Figure 3. Use Case Diagram

2.6.2 *Class Diagram*

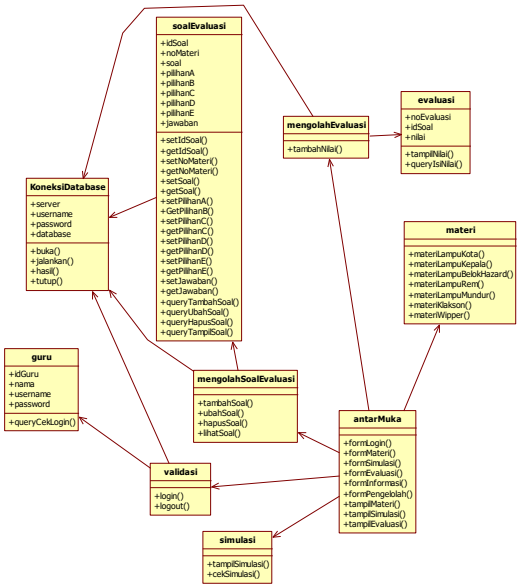


Figure 4. Class Diagram

2.7 System Design

The system design is a part of a software development methodology that is done after the analysis stage to give a detailed overview. At this stage it can be described the design of the menu structure, interfaces, and the semantic network used in the development of instructional media.

2.8 Menu Structure Design

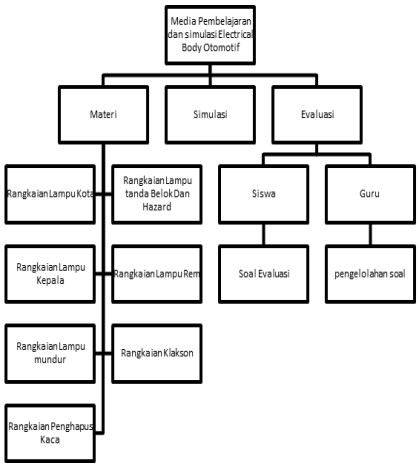
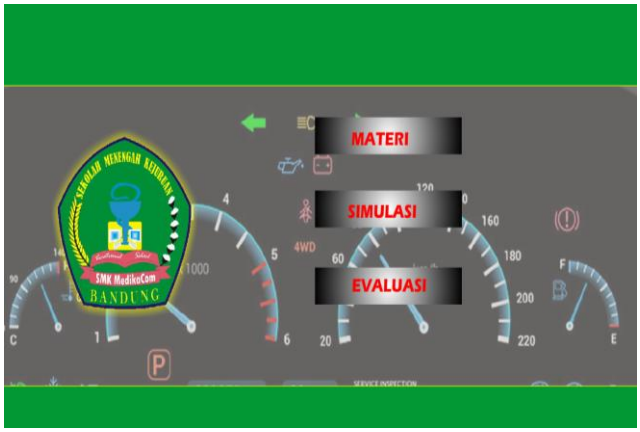


Figure 5. Menu Structure Design

2.9 Implementation Interface

on the implementation of this interface will implement a program interface that has been constructed.

2.9.1 *Implementation interface Menu Utama*



Gambar 6. Implementation interface Menu Utama

2.9.2 *Implementation interface Menu Materi*



Gambar 7. Implementation interface Menu Materi



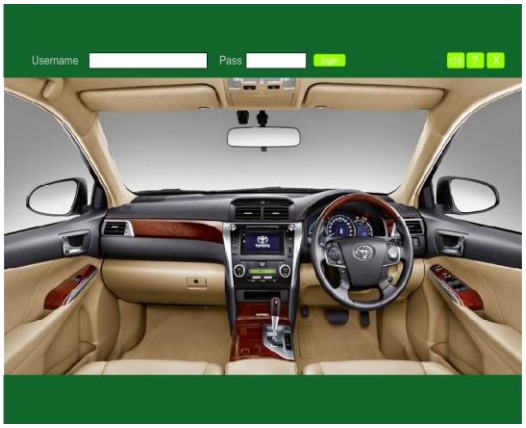
Gambar 8. Implementasi Antarmuka Menu Materi

2.9.3 *Implementation interface Menu Simulasi*



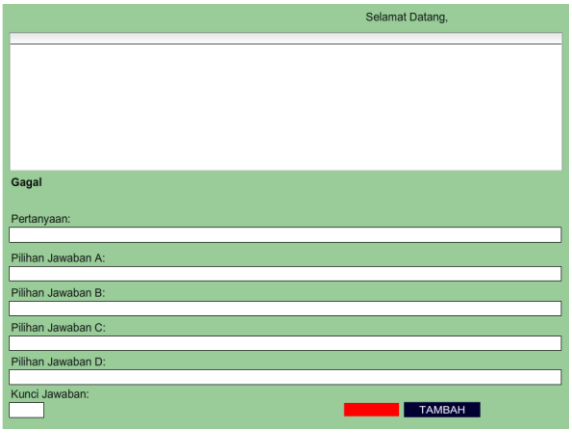
Gambar 9. Implementation interface Menu Simulasi

2.9.4 *Impementasi Antarmuka Menu Evaluasi*



Gambar 10. Implementation interface Evaluasi

2.9.5 *Implementation interface Menu Pengelolah Soal*



Gambar 11. Implementation interface Menu Pengelolah Soal

2.10 Testing Systems

System testing done of Black Box testing and beta testing.

2.10.1 *Black Box Plan Testing*

Plan testing will be done by using the black box can be seen in the following table.

Table 1. Plan Testing

PENGUJIAN MEDIA PEMBELAJARAN ELECTRICAL BODY			
NO	Komponen yang diuji	Skenario Pengujian	Hasil yang diharapkan
1	MENU UTAMA	Memilih tombol "MATERI"	Black box
		Memilih tombol "SIMULASI"	Black box
		Memilih tombol "EVALUASI"	Black box
2	MATERI	Memilih tombol "Rangkaian Lampu Kota"	Black box
		Memilih tombol "Rangkaian Lampu Kepala"	Black box
		Memilih tombol "Rangkaian Lampu Tanda Belok dan Hazard"	Black box
		Memilih tombol "Rangkaian Lampu Rem"	Black box
		Memilih tombol "Rangkaian Lampu Mundur"	Black box
		Memilih tombol "Rangkaian Klakson"	Black box
		Memilih tombol "Rangkaian Pembersih Kaca"	Black box
		Memilih icon keluar/kembali	Black box
		Memilih tombol "selanjutnya"	Black box
		Memilih tombol "sebelumnya"	Black box
3	SIMULASI	Memilih tombol "Rangkaian Lampu Kota"	Black box
		Memilih tombol "rangkaian lampu kepala"	Black box
		Memilih tombol "rangkaian lampu tanda belok dan hazard"	Black box
		Memilih tombol "rangkaian lampu rem"	Black box
		Memilih tombol " rangkaian lampu mundur"	Black box
		Memilih tombol "rangkaian klakson"	Black box
		Memilih tombol "kembali"	Black box
4	EVALUASI	Memilih tombol "masuk"	Black box
		Memilih tombol "kembali"	Black box

2.10.2 *Black Box Testing Result*

Based on the testing plan, the results of blackbox testing on pmebelajaran media is as follows:

Table 2. Testing Result

PENGUJIAN MEDIA PEMBELAJARAN ELECTRICAL BODY			
NO	Komponen yang diuji	Skenario Pengujian	Hasil yang diharapkan
1	MENU UTAMA	Memilih tombol "MATERI"	[√] Berhasil [ ] Tidak Berhasil
		Memilih tombol "SIMULASI"	[√] Berhasil [ ] Tidak Berhasil
		Memilih tombol "EVALUASI"	[√] Berhasil [ ] Tidak Berhasil
2	MATERI	Memilih tombol "Rangkaian Lampu Kota"	[√] Berhasil [ ] Tidak Berhasil
		Memilih tombol "Rangkaian Lampu Kepala"	[√] Berhasil [ ] Tidak Berhasil
		Memilih tombol "Rangkaian Lampu Tanda Belok dan Hazard"	[√] Berhasil [ ] Tidak Berhasil
		Memilih tombol "Rangkaian Lampu Rem"	[√] Berhasil [ ] Tidak Berhasil
		Memilih tombol "Rangkaian Lampu Mundur"	[√] Berhasil [ ] Tidak Berhasil
		Memilih tombol "Rangkaian Klakson"	[√] Berhasil [ ] Tidak
			Berhasil
		Memilih tombol "Rangkaian Pembersih Kaca"	[√] Berhasil [ ] Tidak Berhasil
		Memilih icon keluar/kembali	[√] Berhasil [ ] Tidak Berhasil
		Memilih tombol "selanjutnya"	[√] Berhasil [ ] Tidak Berhasil
		Memilih tombol "sebelumnya"	[√] Berhasil [ ] Tidak Berhasil
3	SIMULASI	Memilih tombol "Rangkaian Lampu Kota"	[√] Berhasil [ ] Tidak Berhasil
		Memilih tombol "rangkaian lampu kepala"	[√] Berhasil [ ] Tidak Berhasil
		Memilih tombol "rangkaian lampu tanda belok dan hazard"	[√] Berhasil [ ] Tidak Berhasil
		Memilih tombol "rangkaian lampu rem"	[√] Berhasil [ ] Tidak Berhasil
		Memilih tombol " rangkaian lampu mundur"	[√] Berhasil [ ] Tidak Berhasil
		Memilih tombol "rangkaian klakson"	[√] Berhasil [ ] Tidak
			Berhasil
		Memilih tombol "kembali"	[√] Berhasil [ ] Tidak Berhasil
4	EVALUASI	Memilih tombol "masuk"	[√] Berhasil [ ] Tidak Berhasil
		Memilih tombol "kembali"	[√] Berhasil [ ] Tidak Berhasil

2.10.3 *beta testing*

Beta testing is testing conducted objectively. Beta testing is done for the user satisfaction with the content of user friendly point requirement for subsequent distribution to users. Beta testing is done by providing observations format to 45 students and interviews with teachers.

Table 3. Point Rate

Jawaban	***Point Penilaian***
Sangat Setuju	*5*
Setuju	*4*
Kurang Setuju	*3*
Tidak Setuju	*2*
Sangat Tidak Setuju	*1*

Here for value presentation of each - each answer Likert scale questionnaire used formula as follows:

$$P = \frac{S}{Skor\ Ideal} \times 100\%$$

Information :
P: Value presentation is sought
S: The number of times multiplied by a fixed score answer
Ideal Score: highest value multiplied by the number of samples
The highest value: 5
Number of samples: 40
Ideal Score: 5 x 40 = 200

Table 4. Results Answers

RESPONDEN	*SOAL*					
	1	*2*	*3*	*4*	*5*	*6*
1	*ST*	*ST*	*CS*	*CS*	*SS*	*SS*
2	*SS*	*ST*	*SS*	*CS*	*SS*	*SS*
3	*SS*	*SS*	*ST*	*SS*	*SS*	*SS*
4	*SS*	*ST*	*SS*	*ST*	*SS*	*SS*
5	*SS*	*ST*	*ST*	*ST*	*SS*	*ST*
6	*SS*	*SS*	*ST*	*ST*	*ST*	*ST*
7	*SS*	*SS*	*ST*	*SS*	*SS*	*SS*
8	*SS*	*SS*	*ST*	*SS*	*SS*	*SS*
9	*SS*	*SS*	*ST*	*SS*	*SS*	*SS*
10	*SS*	*SS*	*ST*	*SS*	*SS*	*SS*
11	*ST*	*ST*	*ST*	*ST*	*SS*	*CS*
12	*SS*	*ST*	*ST*	*ST*	*SS*	*ST*
13	*SS*	*ST*	*ST*	*ST*	*SS*	*ST*
14	*SS*	*ST*	*ST*	*ST*	*ST*	*ST*
15	*ST*	*ST*	*CS*	*SS*	*CS*	*ST*
16	*ST*	*CS*	*CS*	*CS*	*SS*	*ST*
17	*ST*	*CS*	*CS*	*SS*	*CS*	*ST*
18	*ST*	*CS*	*CS*	*CS*	*ST*	*ST*
19	*CS*	*ST*	*CS*	*SS*	*SS*	*ST*
20	*CS*	*ST*	*ST*	*CS*	*ST*	*ST*
21	*SS*	*ST*	*ST*	*ST*	*SS*	*ST*
22	*SS*	*ST*	*CS*	*ST*	*SS*	*ST*
23	*ST*	*SS*	*SS*	*ST*	*SS*	*ST*
24	*SS*	*ST*	*ST*	*ST*	*SS*	*ST*
25	*CS*	*ST*	*CS*	*CS*	*ST*	*CS*
26	*SS*	*SS*	*ST*	*ST*	*SS*	*ST*
27	*ST*	*SS*	*SS*	*CS*	*SS*	*TS*
28	*SS*	*SS*	*ST*	*CS*	*ST*	*ST*
29	*ST*	*SS*	*ST*	*CS*	*SS*	*ST*
30	*SS*	*SS*	*ST*	*ST*	*SS*	*ST*
31	*SS*	*SS*	*SS*	*SS*	*SS*	*CS*
32	*SS*	*SS*	*SS*	*SS*	*SS*	*SS*
33	*ST*	*SS*	*ST*	*ST*	*SS*	*ST*
34	*SS*	*ST*	*CS*	*CS*	*ST*	*ST*
35	*SS*	*ST*	*CS*	*ST*	*SS*	*ST*
36	*ST*	*ST*	*ST*	*CS*	*ST*	*ST*
37	*ST*	*CS*	*CS*	*ST*	*ST*	*CS*
38	*SS*	*CS*	*CS*	*CS*	*ST*	*CS*
39	*SS*	*CS*	*ST*	*CS*	*CS*	*ST*
40	*ST*	*ST*	*ST*	*ST*	*ST*	*ST*

3. CLOSING

3.1 Conclusion

The results obtained from studies conducted in the preparation of this paper as well as referring to the purpose of research, it can be concluded:

1. *This learning media can help students to learn electrical body*
2. *This learning media can help teachers explain the electrical material body*
3. *This learning media can help carry out the lab*
4. *This learning media can reduce the damage to the media.*

3.2 Advice

Based on the positive results achieved so far, that the media learning and simulation of electrical body have a few suggestions from the SMK MedikaCom Bandung to complete this learning media, among others:
1. The material is made to be more complex and more encompassing overall automotive materials
2. Media more interactive learning

3. Adding the material - the material for other subjects such as mathematics, physics, chemistry

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