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Development of physics learning software / Nurlina Aimi
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UNIVERSITI TEKNIKAL MALAYSIA MELAKA
FACULTY OF ELECTRICAL ENGINEERING (FKE)

FINAL YEAR PROJECT
TECHNICAL REPORT


DEVELOPMENT OF PHYSICS LEARNING SOFTWARE

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Bachelor of Mechatronics Engineering

July 2012

“I hereby declare that I have read through this report entitle “Development of Physics Learning Software” and found that it has comply the partial fulfilment for awarding the degree of Bachelor of Mechatronics Engineering”

Signature : 

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Date : 

DEVELOPMENT OF PHYSICS LEARNING SOFTWARE

NURLINA AIMI BT RAMILY

A report submitted in partial fulfilment of the requirements for the degree of

Bachelor of Mechatronic Engineering

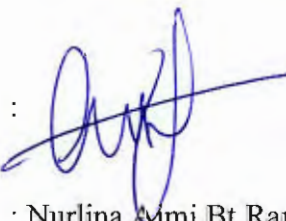
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2011 / 2012

I declare that this report entitle “Development of Physics Learning Software” is the result of my own research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature

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: 26/06/2012

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May Allah S.W.T. reward you all for what the thing that you all had done.

Amin.

ABSTRACT

Nowadays, student more prefers to 'Google' the information rather than go to the library for searching the thick reference books. Read the book may not be an interesting habit among students. In addition, the limitation of time and transportation make it harder to cater the information in order to understand the subject. By knowing this fact that computer can give the benefit in teaching and learning session in education institution, this system is created as a platform to provide portable, interpret, simple and supporting run-time environment. Thus, E-Learning Physics is created using multimedia approach and it provide an interactive environment for student to physics subject. The main purpose of this project is to be the good assistance to enhance user physics knowledge and achieve better understanding. This E-Learning contents note with related example, quizzes, simple related game and concept illustrations which combined together with animation, graphic and interactive sound system. This system is developed by using software Visual Basic 6.0 for main interface and Adobe Flash combined with Java while creating the related games. All this software is chosen because they can produce interesting interface for story board and graphic to provide good interaction between users and system. The system only covers for several important chapters such as velocity, acceleration, free body diagram, Ohm's Laws and other more and only includes the basic formula analysis for chosen important topic. Thus, by having this system student can understand the basic concept of Physics subject more effectively before they can go to more advance subject later correlated to this concept of physics.

ABSTRAK

Pada masa sekarang, pelajar lebih gemar mengakses maklumat-maklumat di Internet berbanding ke perpustakaan untuk mencari buku-buku rujukan yang tebal dan padat. Membaca kemungkinan bukanlah suatu kebiasaan dikalangan pelajar. Tambahan pula, kekangan masa dan pengangkutan membuatkan proses pencarian maklumat menjadi terbatas dalam memahami konsep sesuatu matapelajaran. Seperti sedia maklum bahawa komputer dapat memberi manfaat dalam sesi pengajaran dan pembelajaran di dalam sesuatu institusi pengajian, sistem ini telah diwujudkan sebagai satu landasan untuk menyediakan suatu sistem yang mudah digunakan, ringkas dan menepati struktur keperluan masa. Maka perisian "*E-Learning Physics*" dicipta menggunakan pendekatan multimedia dan menyediakan suasana yang interaktif untuk sesi pembelajaran matapelajaran Fizik kepada para pelajar. Tujuan utama projek ini adalah untuk menjadi satu agen bantuan untuk meningkatkan pengetahuan Fizik dan mencapai pemahaman yang lebih baik. "*E-Learning Physics*" ini mengandungi nota-nota, latihan tubi berkonsepkan kuiz, beberapa permainan Fizik yang ringkas dan ilustrasi konsep berkaitan di mana semua elemen ini akan digabungkan bersama animasi, grafik dan sistem bunyi yang interaktif. Sistem ini dibangunkan dengan menggunakan perisian Visual Basic 6.0 sebagai pengantara muka manakala perisian Adobe Flash dan aplikasi Java untuk menghasilkan slot permainan dan konsep ilustrasi. Kesemua perisian ini dipilih kerana ia mampu menghasilkan pengantara muka yang menarik untuk paparan projek dan grafik dalam menyediakan interaksi yang baik di antara pengguna dan sistem. Sistem ini hanya meliputi beberapa bab penting seperti halaju, pecutan, rajah jasad bebas, Hukum Ohm dan lain-lain lagi serta sistem ini hanya mengandungi rumus-rumus asas untuk topik yang terpilih. Oleh itu, dengan adanya sistem ini pelajar akan dapat memahami konsep-konsep asas dalam Fizik dengan lebih berkesan sebelum mereka pergi lebih jauh kepada matapelajaran yang lebih rumit berkaitan dengan konsep Fizik.

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CHAPTER 1

INTRODUCTION

This chapter discuss an overview of the project background, activities and goals containing a common description of what is expected to be done within the project and will prior to the implementation process for the targeted goal. It will include the primary focus, a list of key reasons for launch, a very common description of how to perform this project and plain explanation of the desired outcomes.

1.1 What is Physic?

Physics is the scientific study of matter and energy and how they interact with other [13]. From the research done, the energy is actually can take from the motion, light, electricity, radiation, gravity and just about anything.

By knowing this fact, Physic Syllabus conducted in UTeM is arranged orderly to make the student learn as much as possible about these matter and energy. Physic also deals with matter on scales ranging from sub-atomic particles to star and even entire galaxies. For example the particle that makes up the atom and the particles that makes up those particles.

Physic is a subject based on fact and science evidence. Thus, all the scientific laws provided is refer to the result of experiments and observation of the natural world. In the simple word, physic work as an experimental science, utilize the scientific method to formulate and test the hypotheses that are based on natural world observation. It usually expressed in the mathematic language which can then be used to predict other phenomena.

1.2 Project Background

Physics concept is the basic knowledge that compulsory to be well-known by the student especially from Mechatronic courses because they will need to apply most of the same concept again in their future study on “*Static and Mechanic*” at second year, “*Dynamic and Mechanism*” at third year and “*Thermodynamics and Heat Transfer*” at fourth year.

By looking into few of teaching and learning process conducted in the class nowadays quite bored. May be the student do not understand what are their lecturer talking about or the lecturer itself may conduct the class dull way. In addition, physic subject was involves with so many concepts and formula and making the student more confuse if it does not elaborate with the right way.

In considering these matters, this project is builds to ensure that the learner will be confident that they will achieved something from this Physics E-Learning. It is created by combining several engineering software such as Visual Basic 6.0, Adobe Flash and Java to grabs the student focus by pushing them to explore the contents of E-Learning.

“Information, instruction, education, training, communication, collaboration and knowledge sharing.”

(Tom Kelly, Cisco System, 2000)[1]

1.3 Problem Statements

From survey that have been conducted among the student whose taking Physic subject, most of them said the major problem is there are a lots of formula to be memorise and need to use for solving only one question. Physic problem is complex and involve many step of calculation. While manual calculation is the tough way to solve the question and most of the reference books did not show the exact step to solving the problem. As the student, basic concepts of the calculation are the most important consideration making them stress to pushing themselves for understanding the question.

Other than that is about the technique of teaching process. Most of the student becomes sleepy during the class hour by facing so many black and white words projected in the front with stand alone person whose might not capable to monitor every single student due to the big amount of student in the class. The lecturer may be teach too fast and the voice that is incredibly slow hinders the student at the back to hearing the information and making the student lagging in education day by day.

The reference book expensive and students do not have much time to go to library to get the note. Reference book contains too much words without separate the important and unimportant information hard to help the student understand the really method to solving the question.

Thus, this project should be developed and used in UTeM. By using this learning software student can learn effectively based on their capability level to adapt the knowledge because the learning process will be controlled by the student itself individually with the system.

1.4 Project Objectives

Main objective of this project is to help the student and also the lecturers to make their learning and teaching Physics easier. Other objectives to be accomplished in the end of this project are shown below:

- a) To make the system that applying a friendly-user concept where the user can earn benefit by using this system.
- b) To provide the concept of interactive learning model by combine the sounds, animation and interesting picture.
- c) To present the note and tutorial in the best way of graphic mode and create entertainment by playing the related physic games.
- d) To show and elaborate the entire step to solve the related Physics question.
- e) To demonstrate several concept that indefinable with words with follows the rights path of Physics concept.

1.5 Project Scopes

The scopes of this project are focused on:

- a) All the notes and quizzes created using Visual Basic 6.0 software are in interesting graphic interface to attract student.
- b) The games designed using Java application while the demo/illustration is by using Adobe Flash.
- c) This E-Learning involved simple concept without involved complex problem because this system will guide only basic Physics syllabus to the user.
- d) This system included note according to 5 chapters, quizzes, demo and 3 simple games.
- e) This system compiled and burn into CD for UTeM student who taking the Physic or other related subject.

CHAPTER 2

LITERATURE REVIEW

Literature review is in depth evaluation of previous research. It is actually the summary and synopsis the same topic or at least the related article belongs to the research to be done. All the important aspect will be summarized together and come out the reasons why me is pursuing this particular research program.

2.1 Introduction

In order to build this Physics E-Learning, research had been made among six (6) previous E-Learning to studying the concept use, their method, making the best comparison and then implement in this Physic E-Learning. Research is done by comparing E-Learning from UTeM only by referring <http://www.utem.edu.my/fke/Resources>. All the aspect will be compared to determine the advantages and disadvantages for each E-Learning and try to add the best improvement into this system. The selected aspect as below:

- a) E-Learning subject
- b) Home/Main page
- c) Button
- d) Sound System
- e) Level of Friendly users
- f) Entertainment

2.2 First research - “Computer Aid Education Photovoltaic System (CAEPVS1)”.

CAEPVS 1 is design by by *Wan Nosarina Wan Hasaan, B010410114* in 2008 for complete her degree in UTeM [2]. This system use Macromedia Flash Player 6.0 as its interface and focus on design for subject related to power system course which is all about Photovoltaic System. Based on research done, this project provided very good sound system to users. It seems like capable to attract student rather making them bored. The sound system also can be mute option if the user is person who did not comfortable to study with noisy environment.

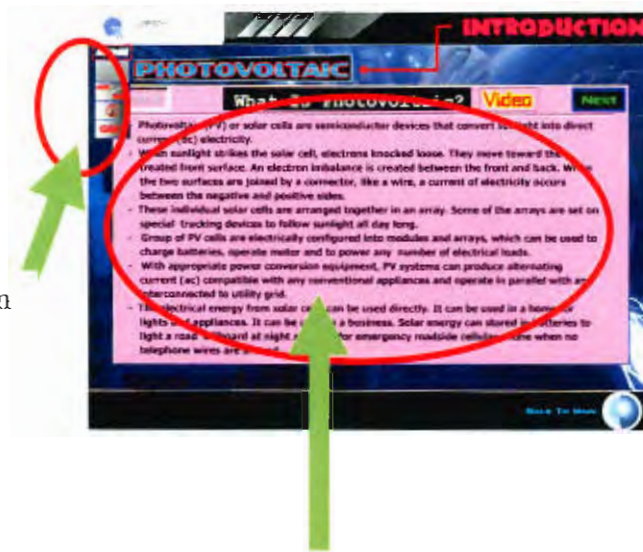
CAEPVS 1 is design to relate the theory with the practical with demonstration added to illustrate every concept involves in that subtopic. The notes are given first and then will follow by the animation example. This idea will build high understanding level among the users and automatically avoid users to imagine the wrong concept.

However, there are also disadvantages that can be identified such as *CAEPVS 1* colour usage that is unsuitable. The wording and background colour usage too bright and the makes student hard to be read by users. In addition, the background is too crowded with many thing and animation. The menu button uses and word also too small and not created using interesting model. All the button use in this system is too simple and passive type. Too many word compresses in one screen. If note used is too complex, student may being more confuse and at the end they didn't want to use the learning system in their study more.

This system is not friendly users at all because hard to understand and follow the flow of system. Furthermore, this system not provided the manual users to guide student and no glossary to give the meaning for some confusing term belongs to the subject.

It also don't have entertainment slot such as games, experiments and others. Entertainment is significant because it can act as the medium to release the user stress after pushing themselves in learning process. The system is less tutorial and exercises. It only contains one (1) exercise. Furthermore student are not able to check either their answer is correct or not. Either not provides the solution manual at all. This weakness will make the leaner to repeat the same mistake later on.

Menu option too small.



Too many words in one screen, too small and hard to read.



Figure 2.1: Evidence Research 1

2.3 Second research – “My Intelligent Electric Cost System (MyIECS)”.

MyIECS is design by *Jurifa B010510069* in 2008 for complete his degree study in UTeM [3]. Different with project before which is this learning software use Visual Basic as system interface (101 VB.NET). The system is actually all about to calculate the electric consumption and the costing for that amount of used. Below show its advantages:

The system presented in very simple way and every sequence is arranged orderly. This make the user can stage-manage the system freely and comfortable. The wording style had designed using standard form making easy to understand the information.

Button is design in icon model which is each icon illustrate the process to done. Student can directly understand by only look on the icon without need to read the instruction. The font size use to state out the note and information are nicely compress into the simple terms and making the student able to gained the knowledge easily. These ideas coincide with the purpose of E-Learning concept which is less word more information.

This system also display the current time and date to the users. This aspect are strengthens of this system which are allow the student to keep on eye how long his/her contribution to their study using the program.

The disadvantage that can be identified is the system left too much useless space on the main page. This space is empty without any function and makes the intro page looks unusual. This empty space actually must be used appropriately and suppose to be must be add on with something animation or general information about the research topic to make the system looks professional.

Other than that, this system was designed with no interactive sound system at all even for the button. The system just operate in very quietly and passive environment. This weakness must be taken very seriously by designers because the major purpose to making this type of learning path is to attract the student to gain knowledge, thus the creativity and interesting idea must be implemented together.

Furthermore, this system doesn't provide any tutorial or exercise to testing how many percent that the learners gained after review this learning software. This slot also be refer as the platform to designer to evaluate either this software is successful to help the student or not. If the user doesn't learn anything, there must be wrong somewhere.

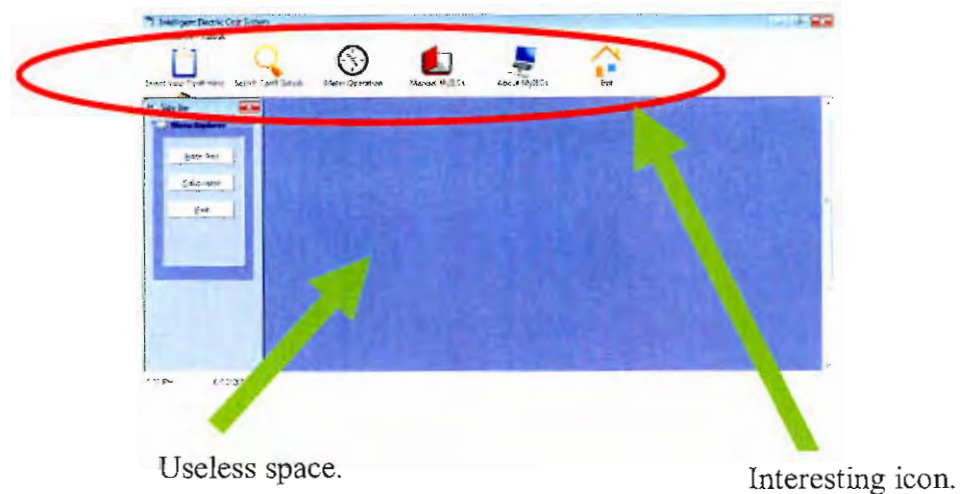


Figure 2.2 : Evidence Research 2

2.4 Other Research

1. *"E-Pembelajaran Harmonik Dalam Sistem Kuasa"* [4].
2. *"An Interactive Learning on AC Power Transformer (i-LAPT)"* [5].
3. *"E-Learning on MCB and MCCB"* [6].
4. *"E-Learning on Earthing System"* [7].

Every project above has their advantages and disadvantages. From the literature review below, there are a few improvements will be implemented into this Physic E-Learning such as lively sound added, interactive and active button usage, add on entertainment slot, wordless, match the wording colour and background properly, add on current time and date, and use appropriate animation.

Thus to make it differentiate clearly, all the selected aspect to be compared among all six (6) past E-Learning had been tabled as follow:

Table 2.1 – E-Learning Comparison Table

Criteria	E-Learning Project					
	<i>CAEPVS 1</i>	<i>E-Pembelajaran Harmonik Dalam Sistem Kuasa</i>	<i>MyIECS</i>	<i>i-LAPT</i>	<i>E-Learning on MCB and MCCB</i>	<i>E-Learning on Earthing System</i>
Designer	Wan Norsarina Wan Hassan, 2008 (B010410114)	Zainal Arif	Jurifa, 2008 (B010510069)	Gabriel Jatu, 2006 (B010210012)	Shuhadah Binti Zakariah, 2008 (B010510149)	Mohd Fahmi Bin Faudzi, 2008 (B010510069)
Interface used	Macromedia Flash Player 6.0	Macromedia Flash Player 8.0	Visual Basic (101 VB.net)	Macromedia Flash Player 7.0	Adobe Flash 6.0	Adobe Flash Player 10.0
Design Subject	Photovoltaic System	Harmonik Sistem Kuasa	Electric cost system	AC Power Transformer	MCB & MCCB	Earthing Sytem in Low Voltage
Main Page	Unsuitable colour, too crowded, shown current time	Too simple, not interesting	Simple, useless space	Interesting, suitable colour usage	Too simple, not interesting	Simple, interesting, good colour usage
Button	Menu option too small and not interesting	Uninteresting button usage	Illustrate button with special icon	Interesting button usage	Uninteresting button usage	Simple but nice button
Sound System	Good and have mute option	No sound system at all	No sound system at all	No sound system at all	Good	No sound system at all
Level of “Friendly”	Medium	Good	Good	Good	Good	Very Good

User"	-Hard to understand the system flow.	-Easy to assembly	-Easy to assembly	-Easy to assembly	-Easy to assembly	-Very easy to follow the system flow
Theory	Yes	No	No	Yes	No	No
Illustration	No	No	No	No	No	No
Game	No	No	Yes	Suitable writing size	Suitable writing size	No
Glossary	Word too small and too many word	Suitable writing size	Suitable writing size	Suitable writing size	Suitable writing size	Suitable writing size
Font Used	Less exercise and cannot check the answer	Less question but have properly solution	No tutorial	Have a lot of question set and provide properly solution.	Less exercise and no properly solution	Less exercise and only theory no calculation exercises.
Tutorial/E	English	Bahasa Melayu	English	English	English	English
xercise	No	No	Yes	No	No	No
Language						
Manual						
Users						