

E-LEARNING ON RESIDUAL CURRENT DEVICES

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BEKP

2009

“ I hereby declare that I have read through this report entitle “*E-Learning On Residual Current Devices (RCD)*” and found that it has comply the partial fulfilment for awarding the degree of Bachelor of Electrical Engineering (Industrial Power)”

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Date : 11th May 2009

E-LEARNING ON RESIDUAL CURRENT DEVICES (RCD)

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**A report submitted in partial fulfillment of the requirements for the degree of Electrical
Engineering**

Faculty of Electrical Engineering

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2009

“ I declare that this report entitle “*E-Learning On Residual Current Devices (RCD)*” 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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Date : 11th May 2009

To my beloved mother and brothers

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ABSTRACT

This project aims to design a courseware of Residual Current Devices (RCD). This project can be used by student or lecturer as a teaching and learning equipment. The user can explore this courseware with only a click. Electronic learning on RCD was developed by using Macromedia Flash 8 Software. This courseware discuss about the introduction about RCD, components and principles operation of an RCD, types of RCD, application of RCD, rules and regulations, limitation, sensitivity, RCD testing, nuisance-tripping, example types for RCD and tutorial. The survey results of the awareness of e-learning among final year students of Faculty of Electrical Engineering (FKE), Universiti Teknikal Malaysia Melaka (UTeM) and the effective of the awareness has been analysed. Most of them have followed electronic learning and very comfortable with it. The analysis for the price of RCD among the electrical shops around Malacca also has done.

ABSTRAK

Projek ini bertujuan merekabentuk satu perisian kursus berkenaan Pemutus Arus Baki (PAB). Projek ini boleh digunakan oleh pelajar atau pensyarah sebagai alat bantuan mengajar dan pembelajaran. Pengguna boleh meneroka perisian kursus ini hanya dengan satu klik sahaja. Pembelajaran elektronik untuk PAB ini menggunakan Perisian Flash Macromedia 8. Perisian kursus ini membincangkan tentang pengenalan PAB, komponen dan prinsip operasi PAB, jenis-jenis PAB, aplikasi PAB, peraturan dan pengawalan, had, kepekaan, ujian terhadap PAB, gangguan, contoh jenis-jenis PAB dan tutorial. Hasil kajian kesedaran tentang pembelajaran elektronik dikalangan pelajar tahun akhir Fakulti Kejuruteraan Elektrik (FKE), Universiti Teknikal Malaysia Melaka (UTeM) dan telah dianalisis. Kebanyakan daripada mereka pernah mengikut pembelajaran secara elektronik dan amat selesa menggunakannya. Analisis juga turut dilakukan terhadap harga PAB di kedai-kedai elektrik sekitar Melaka.

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CHAPTER 1

INTRODUCTION

1.1 Background

Nowadays, technology is very advanced compare 10 years ago. The same thing happened to learning process. Study by book is a second choice because of technology, student prefer study by surfing internet.

E-learning (or electronic learning) is a one type of education where the medium of instruction is computer technology. This is also one of the new technologies among the student nowadays. E- Learning furnishes user with the self-paced modules, knowledge of the internet and computer skills, an opportunity to become independent and self reliant, flexibility of time-tabling and scheduling. E-Learning is important because there is simple note and attractive technology while the users gain knowledge.

This project used an E-Learning on Residual Current Devices (RCD) is one of the latest learning system using e-Learning approach in Faculty of Electrical Engineering (FKE), Universiti Teknikal Malaysia Melaka (UTeM). This project is to make the study about RCD attractive and interactive.

The attractive is definition as having power to arouse interest [1]. In this project, the animation is the major attraction because it shows the real situation happens such as the healthy operation of RCD, the fault operation of RCD and the fatal shock if the earth leakage happen without the RCD protection. The animation for fatal shock shows the human with a skeleton when the current flowing through the body.

The interactive is capable of acting on or influencing each other [2]. In this project the user can answer some question in the tutorial and the answer will be given. Furthermore, the user also can answer the animation situation either the RCD will trip or not.

1.2 Problem Statements

First of all, the problem statement is to increase consistency among reader when learning is captured and delivered by technology. The manual learning process just one way interaction study. Sometimes this learning process make the student feel bored and sleepy. The result, student will take a long period to finish their study for one subject. So, this courseware was built to help the student enjoy their study about RCD without feel sleepy and bored. They also could finish and understand about RCD just in a few minutes.

Then, the second problem statement is study through the book sometimes unclear. Study through the book is unclear because sometimes student cannot imagine what happened actually. Its mean, the book just can tell us about the principle and operation for the RCD by the operation circuit but the circuit is just a pictures. The reader cannot relate between the knowledge about the operation in real situation. In the e-Learning, the user can understand and see the operation for the RCD because the operation of RCD will be solving by animation in the e-Learning.

The third problem statement is to applicate an interactive and attractive way in study about RCD by using Macromedia Flash 8 Software. Study through the book is manual learning process which is one way interaction study. E-Learning is two way studies which mean the user can give the answer and the system will tell either the answer is true or false quickly. The user also can repeat the animation for the RCD operation frequently. So, this courseware was using Macromedia Flash 8 Software to make the study about RCD more fun and easy to understand.

1.3 Project Objectives

- Design an e-Learning for RCD in a simple, interactive and attractive using Macromedia Flash 8 Software.

- Make a survey among final year students of Faculty of Electrical Engineering (FKE), Universiti Teknikal Malaysia Melaka (UTeM).
- The analysis for the price of RCD among the electrical shops around Malacca also must be survey and analysis.

1.4 Project Scopes

This project was cover about nine subtopics that related to the RCD. First of all, the user was given briefly knowledge about RCD in the introduction about RCD. Then, the user was slowly understand more about RCD such as the components and the principles operation of RCD, the types and example type of RCD, application and specification, nuisance-tripping and RCD testing. The user will know more about RCD when they going through this e-Learning project on RCD in attractive and interactive way with an animation, related videos and also a simple explanation.

At the end of the session, the user will be testing how much they gain the knowledge after going through this e-Learning on Residual Current Devices (RCD).

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

E-Learning on Residual Current Devices (RCD) is a new technology of learning which programmable system and the domain is Macromedia Flash 8 Software. This software will make the learning through e-Learning interactive and attractive by sound effects (musical), audio instructions (linguistic), simple example with animation, and the tutorial about the topic.

Macromedia Flash 8 is software which can include animation and look like similar to Power Point but differ in the presentation. On the surface, a presentation created in Flash might not seem all that different from one done in Power Point. Both can include animation, graphics, and even video. Both also can work on a timer that advances the “slides” automatically, or can be driven by button/mouse clicks [3]. But a fundamental difference between Flash and Power Point lies not in how the programs final products look and behave [3]. Rather, the difference lies in how the programs allow you to approach the act of creation. Power Point requires the user to develop a few master slides, allowing choosing colour, graphical elements, and many more but running into infinity [3]. Flash, on the other hand, requires the user to do a lot of pencil and paper planning which unlimited.

2.2 Domain

The domain for this project is aim for education and learning using technology. Based on the domain that has been selected and this project was related to the syllabus of engineering subject especially for Electrical Engineering students.

2.3 Previous Project

The existing example is a one of the research and references that must to make a case study in finding what the advantages and disadvantages which are related to this project. Here have four example e-Learning in a different interface.

2.3.1 Example 1: Sistem Tiga Fasa [4]

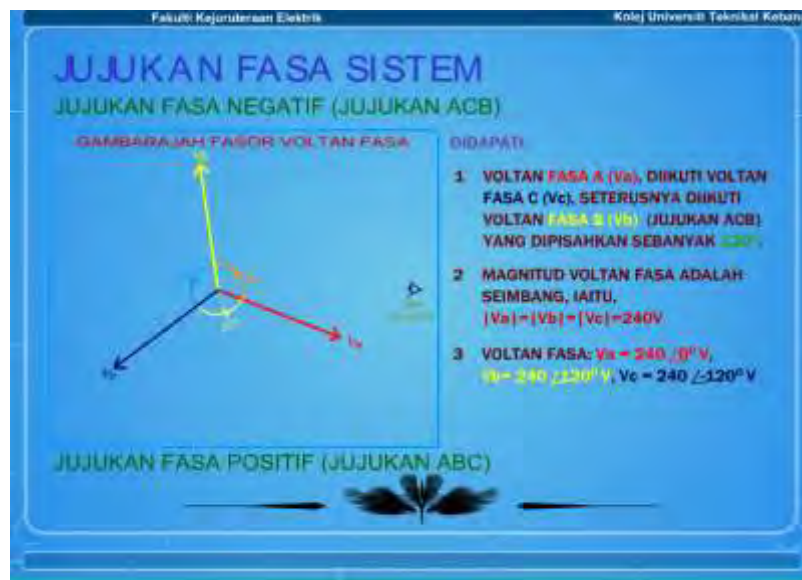


Figure 2.3.1: Jujukan Fasa Sistem

This example of e-Learning is about the „*Sistem Tiga Fasa*“ by Prof Dr Marizan Sulaiman, Zainuddin Mat Isa and Mrs Azrita Alias. It was briefly about the topic by the diagram, colourful word and also includes the calculation for impedances. The user can include the value their self to get the result. This example is interactive but not so attractive. Furthermore, the colour for the background not attractive the user.

2.3.2 Example 2 : Generating AC Voltage [5]

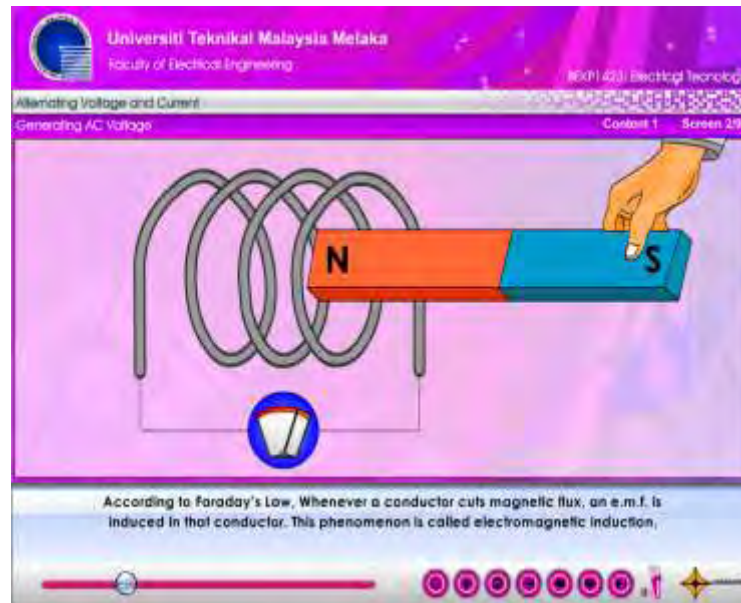


Figure 2.3.2: Generating AC Voltage

This example “Generating AC Voltage” was uploading by Mrs Aida Fazliana Bt Abdul Kadir in website for e-Learning classroom. This example is very interactive and attractive which also include voice. The voice is female voice which was very clear and the user can easily understand about what was her talking about. Furthermore, this example also includes the tutorial and simple and attractive animation. But the problem is the loading for this e-Learning sometimes take a few moments to go other slide to another slide.

2.3.3 Example 3 : Kecekapan Tenaga [6]



Figure 2.3.3: Tarif Berdasarkan Permintaan Kuasa

This third example is about „*Kecekapan Tenaga*“ by Prof Dr Marizan Sulaiman and Mr Zainuddin Mat Isa. This example of e-Learning was briefly about the topic by the diagram, colourful word and also includes the calculation for the electrical tariff for user house. The user can include the value their self to get the result. This example interactive but not attractive because of the background’s colour.

2.3.4 Example 4 : An Interactive Learning On AC Power Transformer [7]



Figure 2.3.4: The Main Page

This last example is about „An Interactive Learning On AC Power Transformer“ by Mrs Aida Fazliana Abdul Kadir and Mr Gabriel Jatu. This example of e-Learning is very colourful and simple to understand while gain knowledge. This example also includes simple experiments to make user easy to understand the topic discuss. Besides that, this example also has the tutorial to make sure the user understand after going through this page.

2.4 Conclusion

As a conclusion, this literature review phase will determine the research and fact finding that related for the project that will be develop. On this literature review chapter it will focus on what the research that will be done. This will help to design this project by following each phase. This project also will become more interactive and attractive compare to the examples above, by using a simple and easy word to be understand by the user, colourful and attractive page to make user do not feel bored, easy example and also will include the tutorial to make sure the user understand about this project.

CHAPTER 3

THEORITICAL BACKGROUND

3.1 Introduction

A residual current device is, first and foremost, a safety device. A residual current device or earth leakage circuit breaker is known by many acronyms throughout the world. The main factor in determining the name is the end use and the environment in which the product is to be installed. Some of the most common acronyms are [8]:

- RCD - Residual Current Device (New Zealand/Australia/Europe)
- ELCB - Earth Leakage Circuit Breaker (New Zealand/Australia and Asia)
- RCBO - Residual Current Circuit Breaker with integral over-current protection (Europe)
- RCCB - Residual Current Circuit Breaker (Europe)
- GFCI - Ground Fault Circuit Interrupters (USA/Canada)

A Residual Current Device (RCD) is same functionality as the [ground fault circuit interrupter](#), is a circuit protection device which disconnects the load ("trips") if the [current](#) flowing out in the live wire exceeds the current returning in the neutral by a given amount (typically 30mA, 100mA, 300mA, depending on the device). This imbalance in the return current (the residual current) is leaking to earth, which could indicate a fault in the circuit or a person receiving an electric shock (to earth) [9]. On a circuit protected by an RCD, if a fault causes electricity to flow from the active conductor to earth through a person's body, the RCD will automatically disconnect the electricity supply, avoiding the risk of a potentially fatal shock [10]. It isolates or initiates a tripping signal to isolate a low voltage supply to protected circuits, socket-outlets or equipment in the event of a current flow to earth which exceeds a predetermined level [11].