COMPUTER AIDED EDUCATION ON SPECIAL TRANSFORMER AS INTERACTIVE APPROACH IN POWER ENGINEERING EDUCATION

AIDA FAZLIANA ABDUL KADIR
JURIFA MAT LAZI
AIN AIN NUR HANAFI
MOHD HAFIZ ZAINUDDIN

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Computer Aided Education on Special Transformer as Interactive Approach in Power Engineering Education

Aida Fazliana Abdul Kadir, Jurifa Mat Lazi, Ain Ain Nur Hanafi, Mohd Hafiz Zainuddin
Faculty of Electrical Engineering
Universiti Teknikal Malaysia Melaka (UTeM)
75450 Ayer Keroh, Melaka, Malaysia
fazliana@utem.edu.my, jurifa@utem.edu.my, ainain@utem.edu.my, mohdhafiz.zainuddin@gmail.com

Abstract - **Due to the popularity of the internet, e-learning has become a new method of learning in recent years. Through the internet, users can freely absorb new knowledge without the restriction of time and place. With this method, there is no need for books because the references materials can be downloaded. The usage of books as reference might be boring and may not attract certain students to study in a long period. Hence, e-learning might be option method to overcome the problem. E-learning provides interactive graphic, animation and interaction between users and the program itself. This paper proposed the usage of e-learning in power engineering education environment. The Computer Aided Education on Special Transformer (CAEOST) software has been developed to provide information about the equipments used in power engineering such as autotransformer, current transformer and voltage transformer. This software has covered the basic operation, applications, tutorial and also virtual lab of the special transformers in interactive and attractive approaches. The usage of interactive animations graphic, buttons and the user friendly approaches attracted users to use the e-learning and able to understand the content easily.**

Keywords: Interactive, attractive, e-learning, user friendly.

I. INTRODUCTION

E-learning has become one of most concerned path for people to acquire knowledge. More and more universities have invested a huge amount of resources to implement their e-learning platform or environment. Many developed countries have reserved big proportion of education funds to support their e-learning strategies in enhancing the teaching and learning process. Under these circumstances, more and more researchers and industrial developers show great interest in e-learning research and development [1].

In general, the primary reason why the e-learning approach has attract public attention is due the fact that, its adaptability, the one-on-one individualization capabilities of technology-based instruction, in contrast to one on-many classroom-based instruction. E-learning might approximate and perhaps exceed the effectiveness study in classrooms [2].

To develop an e-learning, developers can use varieties of softwares which suit them the most such as Macromedia and SWiSH Max. In the market today, Macromedia offers several of its softwares to develop an e-learning such as Director, Dreamweaver, Flash and etc. Still, these softwares offer the same objective; to develop a user friendly e-learning.

This paper aims to develop an e-learning program that applicable to power engineering students. Hence, The Computer Aided Education on Special Transformer (CAEOST) software has been developed to provide interactive and attractive information of special transformer. The application of interactive animations graphic, buttons and the user friendly approaches can attract users to use CAEOST software and understand the content deeply.

II. E-LEARNING AND CLASS ENVIRONMENT

E-learning is seen as a future application worldwide as it promotes long life learning by enabling learners to learn anytime and anywhere. It is necessary to understand the role changes for all participants from the traditional teaching classroom to online universal virtual teaching environment. Traditional teaching classrooms involve lecturers/instructors, students/learners, and supporting personnel for administration purpose. E-learning classrooms have no meaning of traditional classrooms instead of various networked-computer platforms. All the activities are transacted by the network, usually the Internet [3].

Likely the lecturers, students, and administration personnel are needed to be involved. It is because e-learning environment is heavily relying on IT technologies; experts or technicians of IT support are definitely needed to facilitate all processes of e-learning [3].

Fig. 1 shows the traditional relationships between lecturers, student and admin personnel for traditional teaching classrooms. While in Figure 2, it shows the relationships between lecturers, student, admin personnel

and technical experts in an e-learning environment. In Fig. 1, lecturers go to the physical classrooms to deliver teaching contents to the students and accept the students' questions during the teaching time. Students also go to the classroom to attend the lectures or tutorials and at the same time ask questions if they puzzled. The admin personnel usually give reasonable support to the classrooms both for students and lecturers, such as student enrolment, assessment items reception and etc [3].
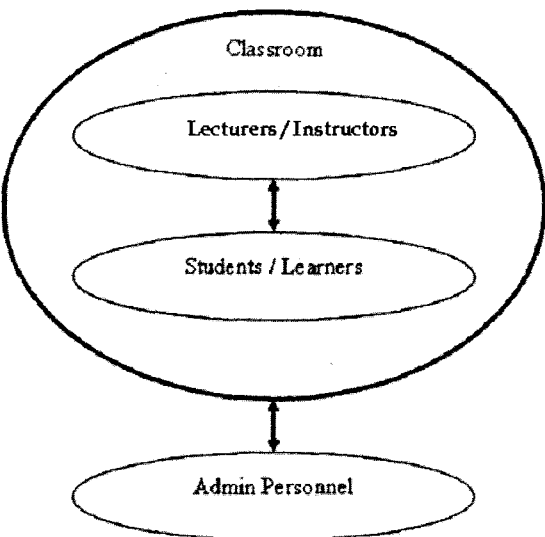
Fig. 1 Relationship between participants of traditional classrooms.

In Fig. 2, the lecturers access a server computer to upload teaching materials, including lecture notes or slides, tutorial questions and answers etc, according to pre-set teaching schedule instead of going to a physical classroom at a fixed time period. It is very flexible for the lecturers to upload the teaching contents upon their convenience.
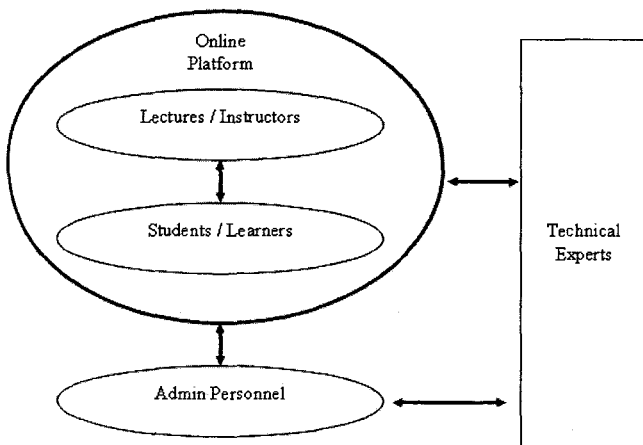

Fig. 2 Relationship between participants of e-learning environment.

The students can also access through server computer to get the teaching contents and involve in online discussion with their instructors upon their own convenience. While the admin personnel, need to act on administration roles of online matters via the online environment. In the e-learning environment, the technical experts give the technical support by building an effective platform and a user-friendly running environment. The technical experts should provide support to the lecturers, students and administration personnel. Thus it is very important for the technical experts to design an effective e-learning environment and platform so that the whole e-learning procedures are smoothly conducted and implemented [3].

An effective e-learning design has to consider the roles of students, lecturers, admin personnel and technical experts. Since the learning process is very dynamic, the design of e-learning environment has to be adjusted according to any changes from all participants during the procedure of e-learning. In order to match with the dynamic e-learning, an effective e-learning design methodology has to be design to support this requirement [3].

III.   DEVELOPING AN E-LEARNING

There are several criteria that should be met in order to develop a good e-learning. In this paper, these criteria are discussed.

A.   Source Information

Before the e-learning development starts, the developers should gather information on the topic or subject related. This can be performed by analysis or survey to the target audience. The information can be for example, the operation of system instead of using words to explain it, graphic animation can be used, which will attract user to understand it with effectively.

B.   Tool to Develop

Suitable tool has to be choose in order to develop the e-learning. The tool that has the feature to add graphics and text will greatly help to achieve the objective of the project. There are many softwares can offer this interactive graphic. Thus choosing the right software will aid in developing the e-learning. One of the software that can be used to develop the e-learning is Macromedia Flash, which is the selected software for this project. This software is easy to use, it helps user to build interactive graphic, animation, and other functions that will be useful for user. Another software that easier for to use is Swish, an upgraded version of Macromedia Flash software. In this software, the text is already animated, so users just choose the suitable animation to implement in their e-learning. Other than those two, Microsoft Power Point also can be used to develop the e-learning, but animations offer by this software is limited and cannot be changed. Microsoft Visual Basic also can help to develop the e-learning, but it is recommended only for advance user. Macromedia Dreamweaver also is one of the options. It often use for develop website, and a simple function can be build by using this software.

406

IV. SOFTWARE DEVELOPMENT

In order to develop e-learning, the work that have to be done must be organized systematically. In this paper, this phase can be use as guideline to develop an e-learning. The steps are:

Step 1: Sketch the content in storyboard.
Step 2: Draw the main frame for the content.
Step 3: Implement the suitable color and graphic to the storyboard.
Step 4: Develop proper animation for the content.
Step 5: Build navigation for the content.
Step 6: Test movie for the storyboard.

Step 1
The first step requires imagination of the final result. In order to start this project, information about the project should be identified. Developer should organize the information to be included in the e-learning. The information must be drawn into simple storyboard so user can easily understand the information given.

Step 2
The second step is to identify the suitable size for the e-learning. The main frame for title or sub title should be drawn first in order to classify region for other information. After the region for main or sub title is recognized, contents for information can be added.

Step 3
Suitable color and graphic implementation to the content of e-learning will give the interactive interface for the e-learning. Developer also can use symbol or anything to represent their content. The purpose of this step is to attract the user to use the e-learning.

Step 4
This step requires creativity of e-learning developer. Animation in the e-learning will attract more attention from user to learn the contents inside. By implementing suitable animation to word or symbol in e-learning, will make the interface of e-learning will looks more attractive and thus easier for user to understand.

Step 5
Navigation in e-learning is important because it will be the key role in change to other content, go to other sub menu, exit program and etc. The button interface for the navigation also shows the creativity of developer in developing their e-learning. Thus to attract user using their e-learning, a striking navigation really help.

Step 6
The final step is to test the scenes of e-learning. This step must be done in order to make sure their e-learning are completely function. The interface, navigation and animation should follow the initial plan of developer. If any problems occur, such as the navigation link won't link to

other content or menu, developer can trace and fix the problem before their e-learning published. The flow chart in Fig. 3 represents each phase for developer to build e-learning.
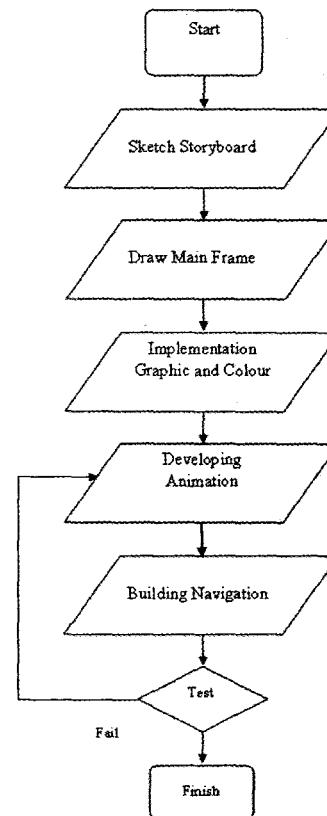

Fig. 3: Software development flowchart

V. CAEOST ON POWER ENGINEERING EDUCATION

The CAEOST (Computer Aided Education on Special Transformer) has been developed in interactive graphical learning. The main objective is to provide knowledge and information about equipments that are used in power system. In this software, the topics covers are autotransformer, current transformer and voltage transformer [4]. Fig. 4 shows the main menu of this CAEOST software. User can navigate the content by click on the content menu.
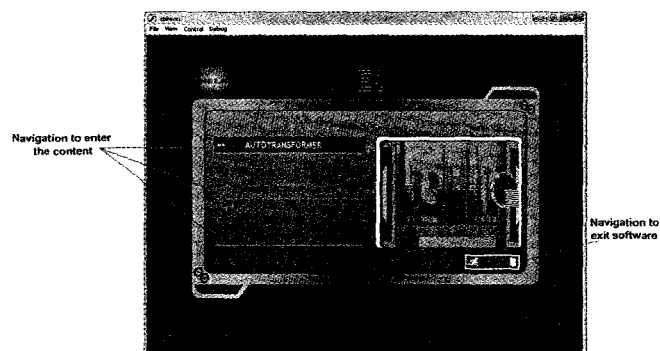

Fig. 4 Main menu of CAEOST

407

This software consists of the application, operation and characteristic of each transformer. Fig. 5 and 6 show the menus for the autotransformer and current transformer.
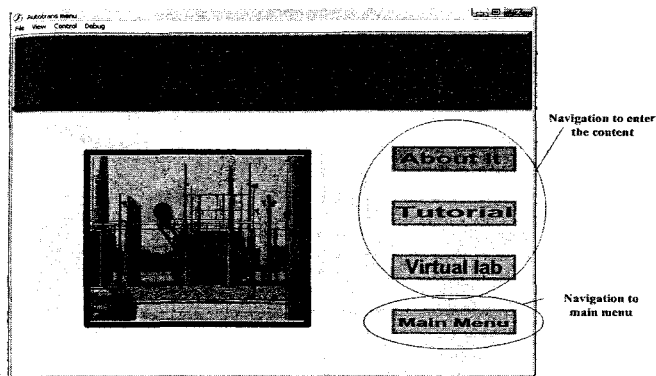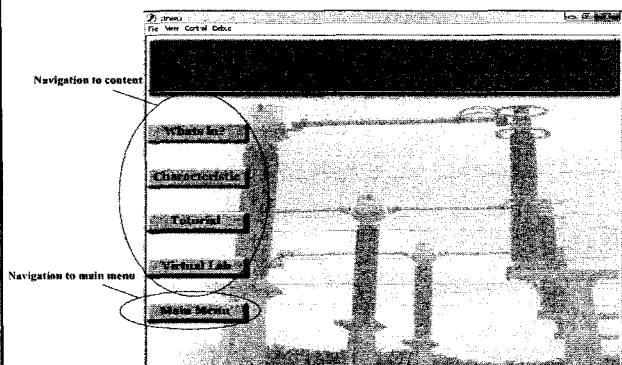

Fig. 5: Menu of autotransformer

Fig. 6 Menu of current transformer

Fig. 7 illustrates the menu for voltage transformer. User can navigate content by click on the content navigation. The interactive feature on this menu is when user rollover mouse pointer on the navigation, the text voltage transformer will move from up to down, this animation seen like the blue graphics is rolling. User also can go back to main menu by clicking the main menu navigation.
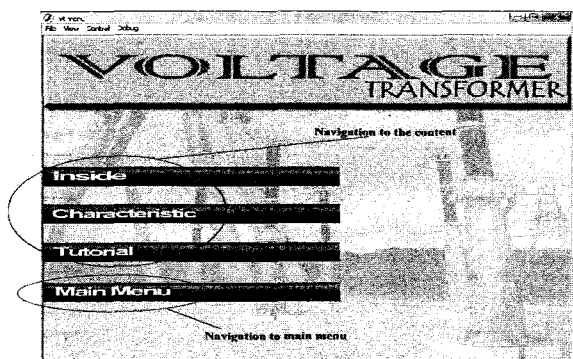
Fig. 7 Menu for voltage transformer

Fig. 8 illustrates that the user can navigate the secondary turn of the autotransformer. When user navigates the secondary turn, multimeters give their reading. User can

check the measurement from multimeter with the calculation from theory at "calculation between primary and secondary". This interactive animation can attract user to use this software thus understand the content inside it.
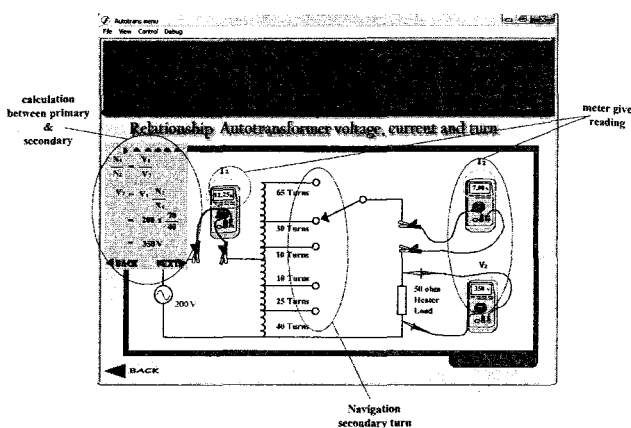

Fig. 8: Interactive content in autotransformer

Fig. 9 shows the interactive animation for current transformer. This window shows the movement of arrow which represents primary and secondary current. Explanations of this operation also have been included. For this interactive circuit, user can easily understand the effect if one of the current transformer polarity have been reversed.
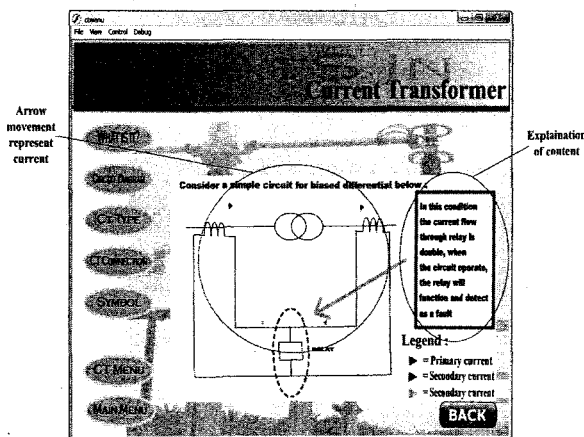

Fig. 9 Interactive circuit in current transformer

The advantage of using this software is the components that created for user is easy to use and the contents is also easy to understand. This software also has tutorial section related to the topics discussed. The tutorial helps the user to test their knowledge about the related topics. In this software, there are three type of methods have been used which are multiple choice; fill in the blank, and self calculation. Fig. 10 – Fig. 12 show the tutorial section related to current transformer topic.
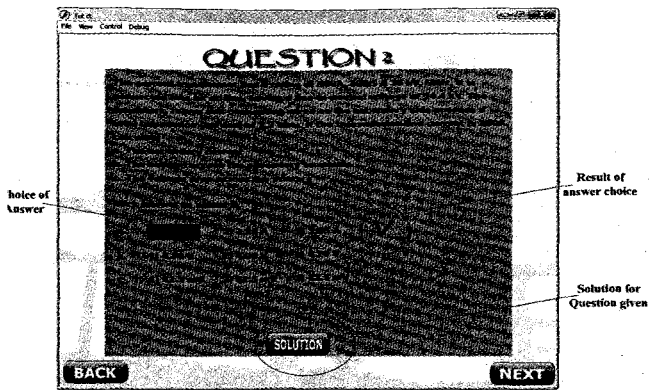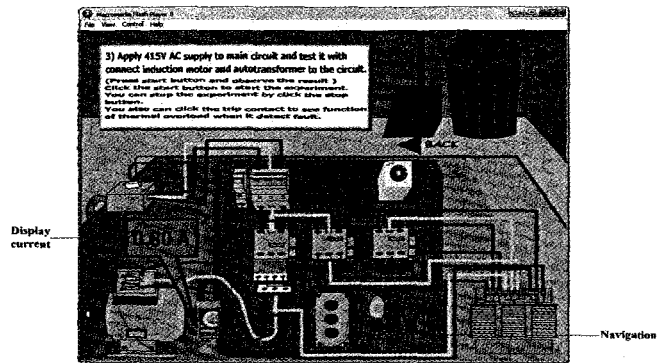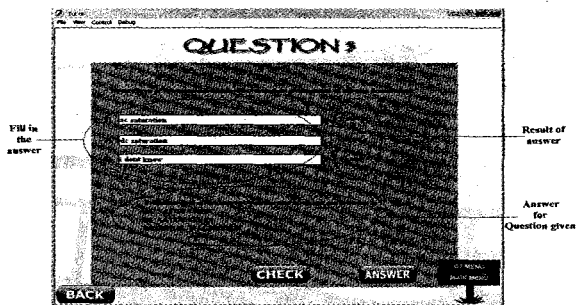
408

Fig. 10 Tutorial session
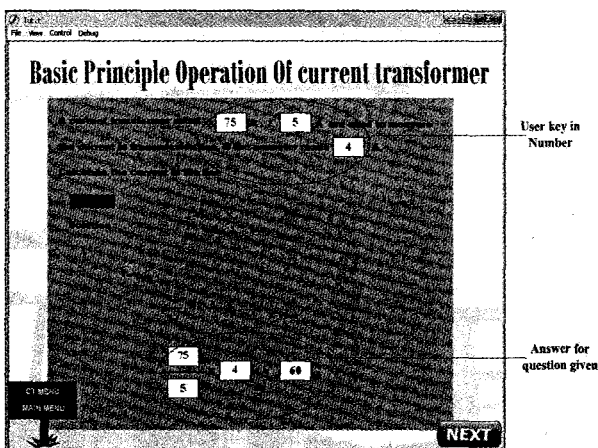

Fig. 11 Fill in the blank question

Fig. 12 Self calculations

Another section provides the virtual lab section. This virtual lab has been developed based on real experiment that has been done by students in the lab [4]. Being designed with reference to the experimentation-based simulation concept; the developed CAEOST system enables the user to have direct experience with all phenomena involved during the operation of special transformers. This helps user to have deeper and long lasting understanding on the basic principles of Special transformer. The autotransformer virtual lab is shown in Fig. 13.

Fig. 13 Virtual lab of autotransformer.

VI. SUMMARY

Teaching and learning process in engineering fields needs a computer application that has natural visual presentation of data and provides complete scenario of phenomena involved in the description of the studied matter. Through this CEAOST, user can easily understand about special transformer. The advantage of using this CEAOST is the user convenient for use because it can be surf anywhere as long as internet connection available. With this advantage of using e-learning as study module, we can replace reference book in the future with an e-learning.

VII. REFERENCES

[1] Phivos Mylonas, Paraskevi Tzouveli, Stefanos Kollias, "Towards a personalized e-learning scheme for teachers" in Proceedings of the IEEE International Conference on Advanced Learning Technologies (ICALT'04)., pg 1-6

[2] Hsin-Chuan Ho, Chao-Tung Yang Chi-Chung Chang "Building an E-learning Platform by Access Grid and Data Grid Technologies" in Proceedings of the 2004 IEEE International Conference on e-Technology, e-Commerce and e-Service (EEE'04)., pg 1-4

[3] Jianming Yong "Workflow-based e-Learning Platform" in The 9th International Conference on Computer Supported Cooperative Work in Design Proceedings., pg 1-6

[4] Ir Md. Nazri Othman, Aminudin Aman, Md Hairul Nizam, *Engineering Practice: Wiring System & Motor Starter* vol 1. Melacca: Penerbit Universiti UTeM, 2007, pp 87-103.

[5] Aida Fazliana, Gabriel Jatu. An Interactive Learning On AC Power Transformer [Online]
http://www.utem.edu.mv/fke//Resources/i-LAPT/I-LAPT/i-lapt.swf

[6] Professor Dr. Marizan, Zainuddin Mat Isa, Azrita Alias. Sistem 3 Fasa [Online]
http://www.kutkm.edu.mv/fke//Resources/Sistem 3 fasa/Sistem3Fasa.html