

Development of iC-COM: Interactive Courseware for Learning Basic Computer System Components

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ABSTRACT

A computer assisted learning approach was developed to enhance course material for students to learn about computer components, through the use of multimedia courseware. Recent advances in software authoring packages have made the production of CD-ROMs an efficient and effective educational strategy. However, there are trade-offs to be made when using CD-ROM multimedia modules vs. more conventional methods. The basic components of a multimedia CD-ROM include an interface, graphics, sound effects, narration and video. This paper reports a development courseware project for basic computer system components. The project aimed at developing interactive learning modules in CD-ROM format to be used by teachers and students. To be effective, the courseware contains all the multimedia elements and maintains a high level of user interactivity.

Keywords

Courseware, CD-ROM, Computer System

1.0 INTRODUCTION

ICT otherwise known as Information and Communication Technology is widely spreading around the world as integral parts not only of teaching but in other aspects of human life as well. In the context of learning ICT may be referred to as a necessary tool for students who desire further learning.

The widespread use of ICT tools in teaching and learning (T&L) has indirectly changed the way the learners interact with the content. In the conventional way, the content is delivered verbally to the students, at the same time providing full human touch. According to Delombaerde (2001), multimedia software, whether distributed via CD-ROM or the internet, provides instructors with the possibility of enhancing or replacing their traditional education

methods through multimedia demonstration and simulation.

An example of application of ICT in T&L is interactive courseware. The idea to develop an interactive courseware for basic computer system course to students is just an alternative on how the information source can be spread to the students interactively using the computers. According to Inglis et al. (2001), interactive courseware is generally understood to be a form of multimedia in which the presentation carried out in the digital form and interaction between the user and the presentation is supported.

The objectives of developing the courseware are stated below:

- i. To provide active learning environment where technology are best exploited in creating dynamic module content.
- ii. To bring in new pedagogic strategy learning of blended learning that would enable both educators and learners to understand the subject.
- iii. To create a powerful and enjoyable educational tool.

2.0 LITERATURE REVIEW

Computing and communication technology continue to make an ever-increasing impact on all aspects of cognition, education and training, from primary to tertiary and in the growing open and distance learning environment.

By using interactive courseware, the concept of computer assisted learning (CAL) is applied. CAL was described in terms of the kind of information flowing between the students and his learning environment, mediated by the computers. Computer and their associated software present great opportunities for motivating students, encouraging

independent learning, and for improving the quality of educational programs (Westwood, 2008).

The courseware was developed as the reasons to include text, slides, videos and photoclips, to include computer simulation model, to maintain the logic and sequence of the existing course structure (Delombaerde, 2001).

Interactive multimedia weaves five basic types of media into the learning environment: text, video, sound, graphics and animation. Since the mode of learning is interactive and not linear, a student or teacher can choose what to investigate next. For example, one does not start on the first page of a linear document and read to the end. According to Vaughan (2006), multimedia elements will provoke radical changes in teaching process during the coming decades, particularly as smart students discover that can go beyond the limits of traditional teaching methods.

3.0 SYSTEMS METHODOLOGY

The most widely used methodology for developing new training programs is called Instructional Systems Design (ISD). It is also known as Instructional Systems Design & Development (ISDD). The ADDIE model or some derivative of it provides designers with the necessary structure for designing any curriculum, regardless of the instructional methods employed (Hodell, 2006). There are more than 100 different ISD models, but almost all are based on the generic "ADDIE" model, which stands for Analysis, Design, Development, Implementation, and Evaluation, as illustrated in the figure below.

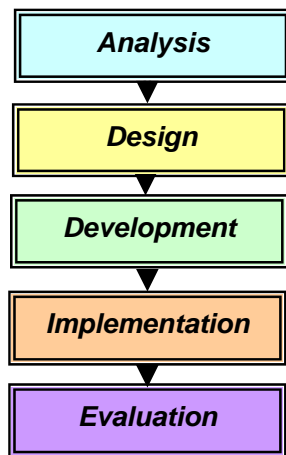


Figure 1: Work flow based on ADDIE model

3.4.1 Analysis

During analysis, the designer identifies the learning problem, the goals and objectives, the audience's

needs, existing knowledge, and any other relevant characteristics. According to Lynch and Roecker (2007), some of the activities in this phase are clarify objectives, agree to the scope, investigate constraints, determine the user, and estimate the cost.

Several software packages were used in the courseware authoring process such as word processor, multimedia tools, and voice recording software. These software were then used to implement the courseware material shown in Figure 2.

The followings are the software packages that were used in iC-COM authoring process:

- i. Adobe Photoshop CS3
- ii. SwishMax 3
- iii. SoundForge 9.0
- iv. Windows Movie Maker

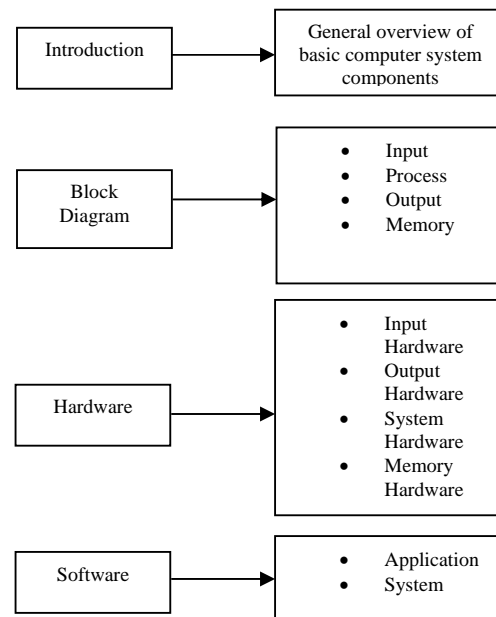


Figure 2: Courseware Material

3.4.2 Design

The design phase involves the complete design of the learning solution. It will address the training methodology, whether training will be administered online, detailed storyboards illustrating the training program and courseware content. During this phase, the following points are taken into account:

- i. The most appropriate media is selected by examining the kinds of skills required to achieve the goal.
- ii. The learning objectives are written and the modules are designed with its corresponding lessons.

- iii. Course content is designed specifically for use with an interactive, electronic medium in the case of online learning as shown in Figure 3.
- iv. The appropriate interactions were determined. They should be creative, innovative, and encourage learners to explore further.
- v. Plan activities that allow for student group work to help construct a supportive social environment.

Since the courseware CD-ROM contains information executed by the courseware itself, the directory structure and file locations were made to aid in the development process. Run-time file mapping consequently matched the directory structure. Installation file is located in the root directory of the CD-ROM for primarily for easy user access (Figure 3). The setup.exe file is the only executable file located in the CD-ROM

3.4.3 Development

This phase concerns with the actual production of the design specifications. It also involves creating or obtaining any media mentioned in the design of the courseware. During the development phase, all audio, video and text are collected, prepared or created (Belanger et al., 2000). This phase sees the creation of storyboards, graphics and programming involved in the development. It involves the following considerations:

- i. Designing according to storyboard specifications
- ii. Programming according to storyboard specifications

In this phase, the conventional course material was reviewed and transform into the flow chart form (Figure 4). The course material was converted into digital format and also the hyperlinks between modules were created. From the flow chart, the program was developed with working modules and main hyperlinks between each sub-menu. The visual layout was then created along with the text and graphics inserted. The program animation was next rendered before the package media elements as well as program was developed. The last stage was performing BETA testing in classroom.

3.4.4 Implementation

This is the phase where the iC-COM is actually administered to the target audience. The delivery environment should be prepared for implementation of iC-COM.

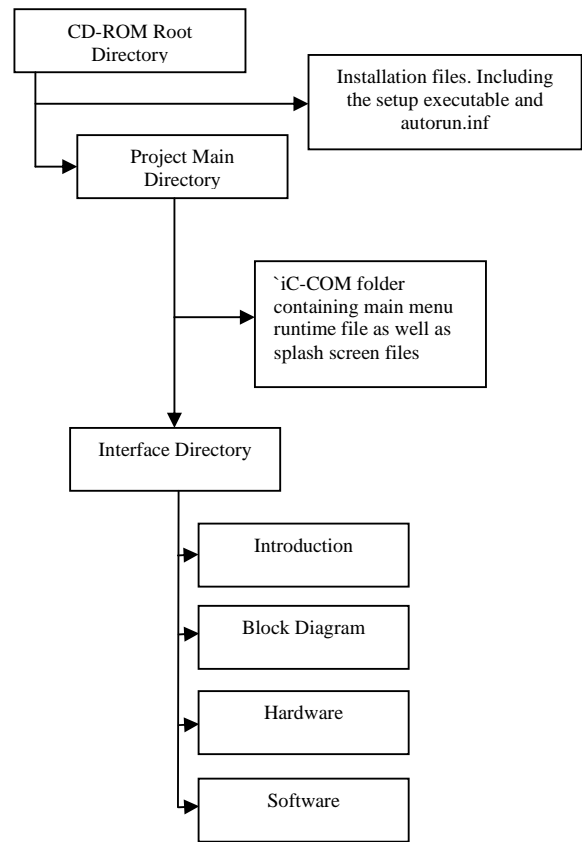


Figure 3: iC-COM Structure

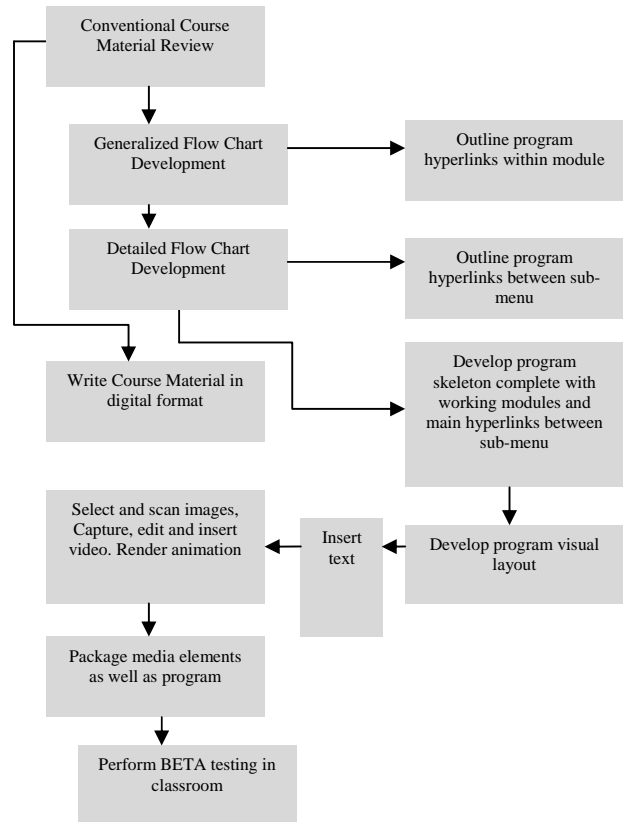


Figure 4: Development scheme

3.4.5 Evaluation

This is the phase which decides whether iC-COM is effective and satisfies the objectives. There are 2 types of evaluation involves: This phase considers feedback from learners. Evaluation is done constantly, both during development and delivery.

i. Formative Evaluation

Formative evaluation is implementing to all phase to ensure the effectiveness of the product.

ii. Summative Evaluation

Summative evaluation takes place at the end stage of the project.

4.0 iC-COM

The main menu of iC-COM consists of 4 sub-menus such as Introduction, Block Diagram, Hardware and Software as shown in Figure 5.



Figure 5: Main menu of iC-COM

Interactive multimedia weaves five basic types of media into the learning environment: text, video, sound, graphics and animation. Since the mode of learning is interactive and not linear, a student or teacher can choose what to investigate next.

Therefore iC-COM was designed to include all the elements. Out of all of the elements, text has the most impact on the quality of the multimedia interaction. Generally, text provides the important information. Text acts as the keystone tying all of the other media elements together. It is well written text that makes a multimedia communication wonderful. Figure 6 shows the screen shot of iC-COM that provide text element.

The second elements in multimedia are graphics. Graphics provide the most creative possibilities for a learning session (Figure 7). They can be photographs, drawings, graphs from a spreadsheet, pictures from CD-ROM, or something pulled from the Internet. The reason for this is that images make use of a massive

range of cortical skills: colour, form, line, dimension, texture, visual rhythm, and especially imagination.



Figure 6: Screen shot of text elements used in iC-COM



Figure 7: The use of graphics elements in iC-COM



Figure 8: Animations in iC-COM

Animation is used to show changes in state over time, or to present information slowly to students so they have time to assimilate it in smaller chunks. Animations, when combined with user input, enable students to view different versions of change over time depending on different variables. Animations are primarily used to demonstrate an idea or illustrate a concept. Figure 8 shows example of animations to illustrate how the projector beam produce image on screen.

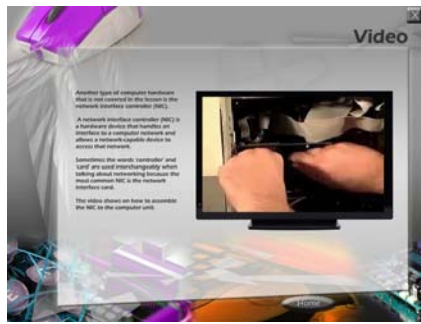


Figure 9: Video to demonstrate how to assemble network card

The other element is video. Video can stimulate interest if it is relevant to the rest of the information on the page, and is not 'overdone'. Video can be used to give examples of phenomena or issues referred to in the text. For example, video to demonstrate how to assemble network card (Figure 9). Along with the video and all the animation in iC-COM, is the audio to improve student's understanding.

5.0 CONCLUSION

The courseware product, if employed as the lecture source, can make the classroom lectures more informative and, at the same time, more exciting by enhancing student participation in classroom discussions. The intention is to have a more active learning environment rather than a passive one. Such enhanced participation by students should result in higher learning curves. A dynamic learning atmosphere can potentially be produced due to the multimedia nature of the courseware package – short video scenes, scanned pictures, and its connection to other software packages.

The different topics of iC-COM has been developed in a brief and precise way with the objective of emphasizing the most important part of learning basic computer system components involved in the detail of characteristics of every computer components. Finally, iC-COM can be an alternative way to improve T&L process and maybe considered as a contribution to improve conventional teaching method. For future enhancement, iC-COM will be integrated into web-based platform.

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