

ORGANIZATION AND GENERATION OF CLASSROOM MULTIMEDIA TECHNICAL INSTRUCTIONAL MATERIAL USING ASYMETRIX MULTIMEDIA TOOLBOOK

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Abstract

Student needs vary from student-to-student. The student's background, general level of intelligence, competence with peripheral disciplines (math and physics for example) and prior experience all factor into his or her ability to comprehend new material.

The use of multimedia computing in the generation of classroom instructional presentations provides an opportunity for preparing material in a format best suited for both the student and the subject. Some topics are easy to explain with just words, some require pictures and diagrams and others can enhanced by use of animation, video and sound.

The material generated to accommodate classroom delivery is prepared in a familiar format and uses graphics, sound and animations. EET student versions include a Chapter/Topic book-like format, an introduction and summary at the beginning and end of each chapter, quiz questions to provide a quick self evaluation of the chapter content and practice problems including answers and detailed solutions.

This paper describes some of the techniques used and the organization of material used in EET courses at Purdue University. It also discusses the authoring tools generated using Asymetrix Toolbook Open Script¹ programming language to aid in the generation of the course material.

Introduction

Assembling the materials required for the dissemination of new multimedia featured content for student use begins with the same process used to construct all student materials. A clear focus on the audience must be maintained throughout the process. The student's previous intellectual and educational experience greatly impact the preparation of classroom materials. This preparation may consist of just a few words for some subjects. Other subjects may be assisted with the addition of pictures and diagrams. We have all heard the saying that "one picture is worth a thousand words". But even with words pictures and diagrams, other subjects require animation, video and sound to clearly use all the senses to obtain the format best suited for the student and subject. These additional tools are used to the degree needed for each sub-topic.

Format

The book format utilized in Multimedia Electronics² and Multimedia Circuits³ electronic books use the standard chapter format illustrated in Figure 1.

Subdivisions below each chapter are called topics. The topics section consists of a chapter introduction followed by the support material for that chapter. Each chapter ends with a summary topic containing either true/false, fill-in-the blank, or multiple choice quiz questions and a problems topic with answers and solutions.

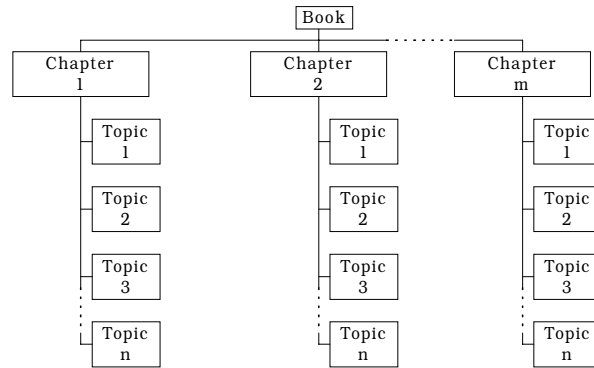


Figure 1. Chapter / Topic Format

Navigational aids in the form of buttons for computer mouse operation are provided. The authors used arrow shaped buttons for Page Change, More buttons in the summary topic to review earlier material and Answer and Solution buttons in the problems topic for student verification of the desired results. Hotwords are magenta, red or blue colored text which, in response to a left mouse click, take the reader to a remedial reference, a more detailed discussion or a sound, video or animation. A complete set of multimedia buttons that look much like those on a commercial VCR control the action of the computer animations.

Book Construction Tools

Asymetrix Toolbook¹ is generally organized as indicated in Figure 2. The Book is at the highest level in the hierarchy and the Object is at the lowest hierarchy level.

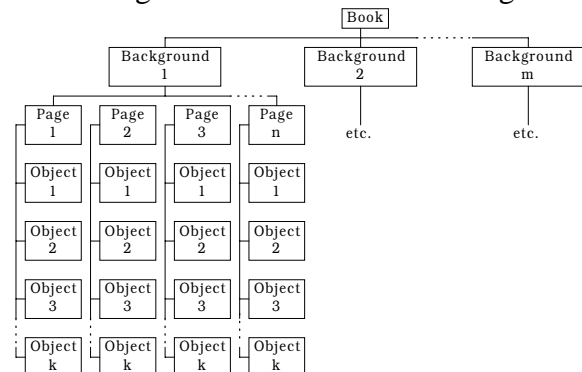


Figure 2. Asymetrix Hierarchy Levels

The multimedia books written by the authors of this paper use three backgrounds named Startup, TOC and Main. The startup background has a few pages and the TOC background has only Table of Contents pages. The Main background contains the bulk of the book with many pages and objects.

Open Script Programming Language

Program control is provided through the use of messages sent in response to events that occur. Some of the messages are a result of mouse actions such as entering an object's boundary or a button click. Other messages occur as a result of internal operations such as a page change or animation step completion.

The programmer simply writes a handler for the message. A handler may be as simple as:

```

to handle mouse enter
  color of self=red
end
  
```

This handler would cause the color of the object to change to red when the mouse enters the boundary of the object. The change would be triggered by the Toolbook message “mouse enter.” Other handlers may be quite complex and require many lines of Open Script code.

Toolbook permits use of the hierarchy scheme to determine where the handler for the message should reside. If, for example, the author wishes something to happen in response to a button click over an object on a page, he places the handler in the script of that object. When Toolbook recognizes the mouse button click, it sends the button click message to the object. The object then responds according to its script. In order for anything else to happen, the object must “forward” the message. This causes the message to go to the next handler up the hierarchy for further action.

Objects on a page would typically be control buttons that are specific to a page, for example, a Problem Answer button. Hotwords are also treated as objects on a page.

The Page level script hierarchy is used in the opening pages to control the fade transition from one page to the next.

Background objects in the author’s books include the Main TOC button, Animation Controls, the Status Bar and the Add Material buttons.

The Background level hierarchy includes script to handle the mouse right button click which causes a return to a previous page. This is useful when navigating to the page from a hotword.

Finally, the book level hierarchy contains the script that responds to the menu items. For example, when the menu item Housekeeping is selected and the sub-menu item New Page is selected, the script handler for the message “NewPageWithPageChangeArrows” causes a new page to be generated using the Main Background as a model that includes the page change arrows.

Book Completion

Several books are now complete and initial Purdue University student feedback is very favorable. Those completed titles include: Multimedia Circuits: DC, Multimedia Circuits: AC, Multimedia Electronics: Diodes, Multimedia Electronics: Transistors, Multimedia Electronics: OPAMPs

Conclusion

The building of any house requires a good foundation. By assembling the construction tools in advance, the author of an electronic book can easily progress through all phases of the authoring construction process. Any repetitive book requirements are easily accomplished using pull-down menus that activate Open Script message handlers.

References:

1. Asymetrix Corp., *Toolbook CBT version*, 110 - 110th Avenue N.E., , Bellevue, WA 98004
2. Hubbard, William H., and Robert D. Murphy, *Multimedia Electronics*, Prentice Hall.
3. Murphy, Robert D., *Multimedia Circuits*, Prentice Hall