Architectural Courseware - A Network Based Multimedia System for Design Education

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Architectural Courseware is an interactive system which allows for the creative access of a course-related multimedia database and the interactive manipulation of that database to enhance design education. This project began as a Teaching Initiative Project supported by the Division of Undergraduate Studies of North Carolina State University. Dr. James Anderson, Dean, and has evolved over two phases. Phase One produced an interactive prototype (see Figure 1) that explored the requirements and technology of multimedia as a support tool for undergraduate education, specifically for an architecture course in the School of Design, The History of Contemporary Architecture.

Phase One was well received by various members of the North Carolina State University: faculty members, the Dean of the School of Design, the directors of the Library and the Computing Center, the Associate Provost for Academic Computing, The Provost, and the Dean of Undergraduate Studies. The Dean of Undergraduate Studies was encouraged by the Associate Provost for University Computing to contribute matching funds for the support of Phase Two of the project. Phase Two focused on a functional implementation of a module of the interactive prototype that could be used by students in the Fall ’94 semester to test the effectiveness of the courseware concept.

The development of Architectural Courseware was undertaken as a design project, not a research initiative. As designers, we were primarily focused on the transformation of the existing into the preferred, rather

Figure 1: Architectural Courseware, an interactive prototype.

than the discovery and interpretation of the new. In this project we took the information used to support the current History of Contemporary Architecture course as source material, translated it into electronic media, and reorganized the materials into a structure that would better meet the diverse learning styles of a broad student population.

Problem Statement

Roger Clark, FAIA, Professor of Architecture at the School of Design, and primary instructor of the course, developed a unique approach to the history of contemporary architecture. He delivers that approach
to his students through the presentation of the record of the physical structures from 1851 to the present in the form of drawings of floor plans, slides of the structures, and interpretive lectures. In the course of the semester students view more than 3200 slides, often two to four at a time, during three contact hours a week. This gives students an average of only 54 seconds of viewing time per slide per semester. The course is packed with information. However such a density encourages the memorization and recognition of slides rather than the understanding of architecture.

After evaluating the format of such an image-based lecture course, we determined that the essential task was to supplement the existing format with capabilities not presently available to students or instructors. The goal of the project was to connect the architectural images to place and time (see Figure 2), integrating contextual and supplementary information and providing new opportunities for students to interact with and transform the course material.

**Figure 2:** Interactive course material.

A major shortfall of the course is the limited direct student access to architectural images inside and outside of the class sessions. Responding to frequent requests by students for slides to be made available to them, teaching assistants offer slide review sessions before exams. Although helpful for test preparation the contribution these reviews make to long term learning can be questioned. Although making original slides available to students is impractical, there are continual requests that slides be made available for personal use.

This feedback suggests the desire for more depth and a somewhat slower pace to the information presented. In response to these issues, Phase One presented a conceptual model of a network-based image delivery system. Phase Two (see Figure 3) attempts to implement such a system for the subset of slides used during the test review process.

**Figure 3:** A network based image delivery system.

Professor Clark selected approximately 400 slides from the original set of 3200 that he felt would be most helpful to students in studying for the tests given over each section of the course. These slides, along with other printed review materials, some additional computer models, and other support information have been digitized and will be available for students to access by properly equipped computers across the campus network in Fall 1994.

Expanding the original prototype into a functional product serves the needs of a varied community of users. Students are eager to gain access to additional study materials. Library staff are interested in examining how they can begin to...
incorporate new technology into their traditional roles as information providers. Instructors and school administrators are looking for ways to develop effective means to share teaching skills within and between departments. Computer support personnel need to test and demonstrate the viability of digital multimedia systems as knowledge delivery tools in education.

Methodology

To begin the process of creating the first prototype for Architectural Courseware we researched the target course's content and methods and developed a formal matrix of design goals and possible methods of achieving them. A plan emerged that governed the prototype's development within the time and budget constraints under which we operated. To move forward with Phase Two, the creation of a functioning prototype for use in a classroom environment, we looked at existing network multimedia technologies and determined which would more closely allow us to realize the goals of the prototype given current university equipment and budgets.

With counsel from the North Carolina State University Computing Center we selected an authoring system that would allow us to create courseware elements in our own lab, store the finished product centrally, and deliver courseware materials to almost any student accessed on campus. The authoring system is a software package called NCSA Mosaic, an Internet information browser and World Wide Web client, developed at the National Center for Supercomputing Applications at the University of Illinois, Urbana-Champaign. Mosaic is provided free of charge to non-commercial users. It is a client-server product. The server is a UNIX system application; there are clients that operate on UNIX, Windows, and Macintosh platforms.

Mosaic presents information to the user as a document made of pages (see Figure 4). The documents are written in a language called HTML (HyperText Mark Up Language). The elements that HTML provides describe audio, video, text, still images, and computer files. To make all of these materials available, we first digitized them on our

Figure 4: Courseware Menu Page

Macintosh, then transferred the computer files to a UNIX system, and then wrote HTML documents to present them to our user community.

Because it is a hypertext system, Mosaic allows the creation of rich interconnections between data items like images and text. Since every media element or piece of text can be connected to anything else through a hyperlink, it is up to the authors to design the hyperlinks to allow students to find their way without being overwhelmed. To accomplish this we tried to collapse the taxonomy of networked pages to a simple structure (see Figure 5). The Mosaic Home Page is the entry point to the system and provides a hyperlink to the Architectural Courseware pages as well as other School of Design information. The Courseware Menu Page (see Figure 4) offers access to the three parts of the Courseware system. The Tutorial Menu provides a selection of various study supplements prepared by the instructor. The Investigation Form allows students to search the Courseware database for specific subject pages. The Catalog Menu provides access to the
Catalog Pages of slide icons. The Subject Pages (see Figure 6) are the repository of the information to be presented by the instructor to his students.

The challenge of the design process was to produce pages that read well on different client platforms, screen sizes, fonts, and color capabilities. The Architectural Courseware materials will be available along with reference notes and index pages on the Mosaic server. In a parallel effort, Professor Clark has received a grant to produce four Photo CD’s, one for each section of the History of Contemporary Architecture course content. Each holds approximately 95 slides. Students will be able to use both systems and evaluate the performance of each as a study aid.

Conclusion

Currently Mosaic presents a challenge to the multimedia document author when it is necessary to deal with large numbers of similar items at the same time (e.g., hundreds of slides in a catalog, multiple index entries, etc.). This necessitates that the author possess both sophisticated word processing and database manipulation skills and fluency in string manipulation with algorithmic compilers.

The ease of generation of a complex set of learning goals is frustrated by syntactical limitations of the hypertext markup environment. In spite of this, as designers, we are excited by access to a new and powerful channel and we are compelled to try to learn the techniques that will be most effective in helping to structure successful messages for digital media. We recognize that the flexibility of computer-based instruction tools allow us to reach both the current student population and future populations within and without the course more effectively. We are able to deliver the same information through many different paths, each designed to support the diverse learning styles found in the student community. It is this opportunity to share standardized knowledge and scholarship in diverse forms that promises to bring the biggest benefits from projects like Architectural Courseware.