DOCUMENT RESUME

ED 400 793 IR 018 147


| | |
|---|---|
| AUTHOR | Henderson, Craig; And Others |
| TITLE | Developing Interactive Instructional Materials: A Model. |
| PUB DATE | 96 |
| NOTE | 6p.; In: Proceedings of the Mid-South Instructional Technology Conference (1st, Murfreesboro, Tennessee, March 31-April 2, 1996); see IR 018 144. |
| PUB TYPE | Reports - Descriptive (141) -- Speeches/Conference Papers (150) |
| EDRS PRICE | MF01/PC01 Plus Postage. |
| DESCRIPTORS | *Computer Software Development; *Computer Uses in Education; *Cost Effectiveness; *Educational Cooperation; Educational Finance; Educational Media; Educational Technology; Efficiency; Higher Education; *Models; Multimedia Instruction; Multimedia Materials; Programming; *Shared Resources and Services; Student Employment |
| IDENTIFIERS | Barriers to Implementation; *Tennessee Technological University |



ABSTRACT

Many colleges and departments at Tennessee Technological University, as well as most other major universities, are progressing toward more interactive instructional materials. The benefits of implementing instructional technology are numerous and diverse. However, because of increasingly austere budgets, a focused and cost-effective approach to implementing multimedia in the classroom is required. A methodology to develop major multimedia projects was conceived through the development of multimedia software for analyzing seismic concepts in civil engineering. The process begins with an idea from a faculty member. A team of experts is assembled who determine objectives and content of the project. Skilled student workers do most of the programming, debugging, and general labor for the project. Benefits of the model include: (1) cooperation among departments; (2) efficiency in programming, with many applications using the same basic building blocks; (3) a centralized location for specialized multimedia equipment and software and trained personnel, so that equipment purchased for one project can be used again for subsequent projects; (4) student workers who are less expensive, and whose participation is beneficial to both the students and the university; (5) a method of reviewing works in progress; and (6) communication across campus and beyond, promoting sharing of ideas and resources between departments. (Author/SWC)

# Developing Interactive Instructional Materials: A Model

**Mid-South Instructional Technology Conference**

Middle Tennessee State University

April 1, 1996

**Dr. Craig Henderson**
Department of Civil and Environmental Engineering

**Jeff Gold**
D. W. Mattson Computer Center

**Billy Tindall**
Educational Technologies Center

**Abstract**

Many colleges and departments at Tennessee Technological University, as well as most other major universities, are progressing toward more interactive instructional materials. Clearly, the benefits of implementing instructional technology are numerous and diverse. However, because of increasingly austere budgets, a focused and cost-effective approach to implementing multimedia in the classroom is required. This paper summarizes a methodology for creating multimedia instructional tools by first initiating a functional model and then expanding the model into other areas.

## UNIVERSITY CHALLENGES

In today's university environment, too many demands are being made for assistance with too little money being spent on equipment and support personnel. However, there is clearly a need to put "technology" into instruction at Tennessee Technological University. In trying to convey difficult and complex concepts -- particularly in engineering and the sciences -- multimedia tools provide a mechanism for augmenting the standard approaches. The concept is to improve teaching and therefore maximize the probability that learning will take place. Recruitment/retention demands are making the need for technology apparent to our clientele (both students and faculty). For example, high school students are more likely to have been exposed to technology before coming to Tech and, when searching for a college, it is becoming common to use the World Wide Web. Furthermore, with decreasing funds, there is not enough personnel or equipment to support duplication of effort in the production and maintenance of educational materials. As a result, there is more demand to justify costs involved in instructional material development. Developing single instructional solutions that aren't applicable to other disciplines are not cost effective and are unacceptable.

## ANSWERING THE CHALLENGES

Many of the new grants available to professors have a technology component. Also, many of the same methods, skills and expertise needed for one project are applicable to many similar projects. This concept was utilized in a partnership between the Department of Civil and Environmental Engineering, the Educational Technologies Center, and the D.W. Matson Computer Center at Tennessee Technological University. These three organizations combined to create an instructional product to be used in the civil engineering classroom to teach classes such as Structural Dynamics, Vibrations, and Seismic Design. The multimedia tool is called an Interactive Seismic Database (ISD) and is intended to allow students to interactively research earthquakes and seismic engineering topics. This tool is also being used as a model for other instructional multimedia tools such as the Computer Science 110 project, intended to interactively test students and thereby reduce faculty load.

## THE MODEL

Concepts in Engineering -- particularly seismic concepts in Civil Engineering -- are very graphically oriented and complex. Students often have difficulty understanding and retaining difficult three-dimensional information when presented in two-dimensional space. The National Science Foundation has provided funds for development of the National Engineering Education Delivery System (NEEDS). This program and others have demonstrated that the use of multimedia techniques consisting of the full range of graphical materials (i.e., interactive software modules, video segments, pictures and graphics, outlines and text) provides an environment most conducive to learning (Saylor 1992 Gay 1994). Thus, an interactive seismic database is being created (funding pending from the National Science Foundation) to store seismic information (e.g., damage photos, seismographs, reconnaissance information, etc.) and convey it more effectively in a classroom environment.

For example, seismic codes have specific provisions regarding geometric or vertical irregularities in buildings. These irregularities might induce torsion in a structure due to unsymmetrical building shapes. The conveying of this concept is very important in the context of seismic design or structural dynamics. Yet it is extremely difficult to convey on a blackboard. The Interactive Seismic Database may be used as a tool by the professor to demonstrate --using actual damage photographs -- the importance of avoiding these geometric or vertical discontinuities in structures. Also, similar structures that responded differently to a seismic event can be studied. Likewise, the students could be assigned the task of using the ISD to investigate damage resulting from torsional forces on irregularly shaped structures and provide methods of construction that could have been used to prevent the damage. In this way the student begins to understand the theory of structural dynamics, the principles behind code restrictions, and the ramifications of their decisions on real buildings.

## CREATING THE MODEL

It should be noted that this model is not just a piece of software. It is a process through which other major multimedia projects will be developed. The process begins with a faculty member who has an idea for such a project. Campus committees composed of faculty and administrators decide if the project is a worthy one and determine its priority based on other on-going projects. Such committees may also assist with funding for the project if it is not externally funded.

The next step is to formulate a team of experts to assist with the project. Faculty experts in the field determine objectives and content. The Academic Computing Support Manager advises on the instructional layout of the project as well as on the file structure, hardware, and software to be used. The Educational Technologies Center then begins the multimedia design of the project. These experts have an on-going dialogue. No one's ideas are tossed out without due consideration by all involved. As portions of the project begin to unfold, skilled student workers in the Educational Technologies Center do most of the actual programming, debugging, and general labor associated with the project.

## BENEFITS OF THE MODEL

This model makes use of existing expertise on campus while allowing outside resources to be utilized. Cooperation among many departments and services within the University is required for most projects. This cooperation helps avoid duplication of personnel and expensive specialized equipment in a financially challenged environment. The team approach, especially with the cooperation of Academic Computing and the EdTech Center, means that there are few points of contact for all projects. Faculty with ideas can contact any of two or three people to get the project initiated.

Using this team-approach lends itself well to efficiency in programming. Many applications will use the same basic building blocks: questions and answers, either multiple choice or written; interactivity in the form of clicking buttons, hot spots, or hypertext; database searches; testing and the scoring of those tests; and branching to other modules or executables. Once these modules are written, only minor changes to the graphical "front end" is needed to use the same module in many applications.

This model also helps as a way of getting the equipment necessary for a project. No single department or unit on campus can afford all the specialized equipment needed (and the trained personnel to use this equipment). The EdTech Center provides a centralized location for these resources, both in equipment and personnel. Funded projects are expected to help purchase equipment needed for a particular project. This equipment is then available for others to use on their projects. This is especially needed with the current budget problems. Most of the EdTech Center's new equipment and software is and will be coming through funded projects.

This is also true for software. Campus units cannot afford specialized software for every application. The EdTech Center offers a centralized resource in the form of this specialized software needed for interactive multimedia projects. AuthorWare, Director, Astound, and several image scanning, enhancing, and converting packages are already available. Funded projects purchase specific software for the Center. This software is then available for use on subsequent projects.

Finding skilled labor for multimedia projects is difficult. There are lots of "gamers" around, but how many of these can actually design a screen layout? Individual departments cannot afford to have trained, expert help. The EdTech Center has experts in scanning, image enhancement and conversion, graphic design, even animation. Funded projects, which often bring in new equipment and software, also bring in funding for student workers. These students are carefully selected, often for specific skills, and are trained to be specialists in certain areas, for example, video and audio taping and editing, special effects, and animation. They are often trained to be experts on particular software as well as on particular pieces of equipment. This is much less expensive than hiring full-time staff, and it is excellent experience for the students, providing them with not only a paycheck, but also highly marketable multimedia skills.

This model also provides a method of reviewing works in progress. The committees are kept up-to-date on the progress of individual projects. Records of expenses and times needed to complete certain portions of a project as well as records of special problems that arise are all kept for reference for other projects.

The model provides communication. The ideas and concepts as well as the progress of the actual project are filtered throughout the campus and beyond. This is possible because the committees are generally campus-wide in nature, being compose of faculty and administrators from all parts of the campus. Their work has both broad input and broad output as well due to network newsgroups, campus publications, and web pages. All of this promotes sharing of resources and ideas between departments instead of the attitude of this-is-mine-and-you-can't-use-it that has been seen in the past.

## SUMMARY AND CONCLUSIONS

In summary, this model, which is both a procedure and product, is good for the University since it efficiently uses equipment, software, and personnel resources; good for the faculty since they can freely express their ideas, share with colleagues, and see their ideas to fruition; good for students in the classroom since they get new and exciting materials presented to them; and good for students in the workplace since they develop (and get paid for developing) highly marketable skills.

# NOTICE

## REPRODUCTION BASIS

- [x] This document is covered by a signed "Reproduction Release (Blanket)" form (on file within the ERIC system), encompassing all or classes of documents from its source organization and, therefore, does not require a "Specific Document" Release form.

- [ ] This document is Federally-funded, or carries its own permission to reproduce, or is otherwise in the public domain and, therefore, may be reproduced by ERIC without a signed Reproduction Release form (either "Specific Document" or "Blanket").