INTEGRATING COMPUTING INTO THE CURRICULUM

Thomas C. Laughner
C. Joseph Williams
Educational Technology Consulting
Office of University Computing
University of Notre Dame

In the past, using computers in the curriculum has been viewed primarily as adjunct to and apart from classroom presentations. With the advent of computer-based presentation software and computer projection systems, computers are becoming a more integral part of presenting material in the classroom. Currently, classrooms properly equipped for computer-based presentations are limited and the problems of setting up portable equipment often discourages faculty from their use. Because of the lack of presentation facilities, university computer centers often may not offer specific support in this area and, as a result, may not consider the implications of computer presentation in the development of courseware materials. When presentation facilities are readily available in classrooms, new ways of thinking about creating independently-usable courseware are possible and, indeed, may be necessary to help teachers make use of presentation facilities and understand the potential of creating more interactive products.

At the University of Notre Dame, a new classroom building, DeBartolo Hall, provides state-of-the-art presentation capabilities. Notre Dame faculty are surrounded by media and computer-based presentation possibilities. In addition to Media-on-Call, an optical-fiber-based system for delivering conventional media forms to all 83 classrooms, DeBartolo Hall also offers many computer-presentation resources. Thirteen classrooms are equipped with specially-built podia housing a videodisc player, CD-ROM drive, and one of four different computer platforms: Sun NeXT, DOS, and Macintosh. All classrooms with a capacity of 50 seats or more have ceiling mounted, large screen color, computer-display-capable projectors and the remainder of the classrooms have access to color or black and white LCD displays for use with overhead projectors which are available in every classroom. Two collaborative classrooms contain 30 DOS/Windows and 30 Macintosh computers for use in hands-on classes. A computer cluster with 78 computers, 10 of which have multimedia capabilities, is available to students, faculty, and staff twenty-four hours a day.

The completion of this state-of-the-art facility comes at a time when the multimedia capabilities of microcomputers are changing the way we use computers and media in the curriculum. This environment is encouraging many faculty immediately to want to use computer technology to help create and enhance their classroom presentations.

Evolving Presentation Materials

With the media and computer presentation capabilities of DeBartolo Hall, an overriding perspective in our support effort for faculty development is the idea that courseware development begins with classroom presentation materials which then can be evolved over time into materials which can be accessed by students independently. This view differs from the usual "movie-making" model of development which, like movie production, says that a complete design, all the required talent, and all media elements must be gathered together and produced within a certain time frame to produce a finished product in some "distributable," hard medium. (Seee figure)

Our "movie mentality" for courseware development may come from the first use of media in the classroom—training films produced during and after World War II. It is also, of course, the model used for commercial products which must be completed in a certain time frame, distributed, and sold to recuperate the production investment. The movie model requires greater effort in up-front planning and production, and the costs of resources and talent is greater over a shorter period of time. There is often less opportunity for testing various design possibilities and usually very little time to test the validity or effect of the final product, if modifications are even possible.

Within a university, an evolutionary model is a more effective method of developing instructional materials, especially if computer-based presentation is emphasized as a starting point. The evolutionary model does not require planning for every design elements at the start. A simple element might be used first (e.g. only digitized images, or the text normally shown in transparencies) adding additional elements (sound, video, animation, etc.) as they are needed or found. Basic navigational interaction, moving from one frame to another, is all that's requiredin this first step. More complex interaction elements can be added later to make the materials independently accessible by students from clusters or networks. (See figure)

The time frame for evolutionary development is essentially open-ended. The nature of the medium (computer presentation) means that the materials may stay in their contantly evolving form—no level of completeness, required by conventional media, is required (except that the materials can be effectively accessed). Costs and production efforts are spread over a period of time decreasing up-front requirements, and testing of various elements and their integration can occur as they are developed and added.

Helping Faculty Develop Educational Technologies

To help faculty begin to use the capabilities of DeBartolo Hall with this attitude of continually evolving computer-based curriculum materials, the Office of University Computing (OUC) at the University of Notre Dame has begun an Educational Technology Consulting effort. Our efforts provide:

• information on how computers and digital media are being used in education,
• demonstrations of educational products and computer software,
• workshops on using computers for classroom presentations and courseware development,
• computer and instructional design consulting to assist in producing computer-based teaching and learning materials,
• access to specialized equipment and computer applications for producing digital images, animation, sound, and video,
• support in requesting special funding to help faculty get started.

Helping Faculty Stay Informed

To help Notre Dame faculty stay abreast of developments, Educational Technology Consulting coordinates a series of presentations, Technology for Academia, focusing on the creative integration of computing resources and technology in academic fields. Teachers and scholars who have produced courseware, designed courses using computer presentations, or who use specific computer applications in their work, are invited to campus to share and discuss their efforts. Another source of information is Imagine: The Apple Computer Education TV Series. This series of five teleconferenced video programs, produced by Apple Computer, Inc., is broadcast from January through May. Provisions are made for viewers to participate in the teleconference and ask questions through telephone connections.

The Office of University Computing also provides news and information related to educational technology issues and events electronically. Announcements of special presentations, information on resources provided by the Office of University Computing, summaries of technical developments, and discussions of educational technology-related issues are made available to faculty, staff, and students.

Helping Faculty Get Started

Purchasing technology-based materials or producing original materials costs money. To help faculty get started, the Office of University Computing and the Educational Media Department have jointly established a fund, called the Jump-Start Educational Technology Grant Program, to help support faculty begin using educational technologies. Small grants are available to help faculty develop innovative classroom presentation projects and courseware materials that involve the use of technology.

Possible uses for these funds might include:

• stipends for undergraduate student aides working with faculty on a project,
• special computer software,
• special content materials (e.g. content resources or developed courseware,
• access to special hardware (e.g., scanners, audio digitizers),
• special services (e.g. video production, slide production, etc.),

Helping Faculty Learn

The Office of University Computing offers hands-on training classes in the use of presentation and authoring software as well as a wide range of classes on computer operation, other software, and computer networks. Student aids, funded through the Jump Start program, work closely with faculty on project development to assist faculty in learning presentation and authoring software using their own content. This approach is especially important to help faculty start their projects and help in their initial learning of the software which eventually they will use to develop and modify their projects on their own. In-progress workshops are also planned to review works in progress and help faculty experience the technical and design decisions required at various stages of project development.

Helping Faculty Locate and Create Materials

Educational Technology Consulting oversees an Educational Technology Lab which has a variety of resources to assist faculty in developing classroom presentations or course materials. The Educational Technology Lab maintains a database of resources at Notre Dame and from other sites around the country to help locate existing courseware for use in a specific discipline. Samples of various courseware are available for review. Books and periodicals related to educational technology are also available.

Capabilities of the Educational Technology Lab include:

- Print scanning and special image manipulation software
- Video (still and motion) digizing, editing and output to tape
- Audio digitizing, sound effects and music library
- Animation software
- Clip resources
- Example products demos
- Templates for authoring and layout
- Existing product searches

The University of Notre Dame's Educational Media Department provides other necessary resources for courseware development. Two of Educational Media's sections, Creative Services and the Video Library, offer production equipment and content resources not available in the Educational Technology Lab. Creative Services helps faculty find or produce photographs, computer graphics, audio, or video. These materials are available for classroom showing in conventional media forms through the DeBartolo Hall's Media-on-Call optical fiber media delivery system and can be digitized to become parts of computer-delivered presentations.

Helping Faculty Shift Perspectives

You can't distribute a movie until all the various elements are in place and put into the final form of film. Once the movie is on film, you can't go back and change a particular part of the movie. The computer changes this paradigm. As with word processing, we have a great deal more flexibility to experiment with different combinations, structures, and elements, only now we are working with more than just words. We can experiment, prototype, compare, and rearrange multimedia elements before committing them to a final form. And, if the computer is the presentation medium, this can be almost an open-ended process of continual refinement and evolution, producing useful products along the way.

Movie Model

Script
Design
Images
Sound
Animation
Video
Navigation
Interaction
Feedback
Analysis
Reporting

Evolution Model

Feedback

Animation

Secondary Text

Primary Text   *Sound*

Images

Navigation

Video