The Meeting of Minds and Machines:
Teaching and Multimedia

For many of us, the computer has dramatically changed the way we do research, as well as the way we write. Searching computerized library databases, using sophisticated programs to analyze large amounts of data, even communicating with colleagues across campus or across the country through electronic mail—all of these are becoming commonplace, if not essential, components of scholarly life. Yet when we step into the classroom, we rely mostly on technology that would have been familiar to the earliest group of Stanford students: blackboards, chalk, textbooks, paper, and pencils.

While an ‘if it ain’t broke don’t fix it’ philosophy seemingly applies to this technology of the classroom, it doesn’t recognize a few ineluctable facts: students are increasingly being trained—in grade schools and high schools—using various kinds of multimedia instruction. They are surrounded by video, are comfortable with interactive multimedia games, and are getting early exposure to the idea of independently exploring information in non-linear ways.

Also, this attitude doesn’t allow us to see the distinct advantages multimedia offers us as teachers. Just as computers let us gather, sort, and communicate information in new ways for our research, technology can help us teach more effectively.

What is Multimedia?

Multimedia is a combination of computer technologies involving texts, images (including video), graphics, and sounds. It usually allows a user to seek information and construct knowledge in a variety of ways, and it frequently relies on problem solving as a basis for understanding—using images and video of real world experience to help illustrate abstract principles or concepts.

For example, Ann Watters, an instructor in the Freshman English Program, has developed “The Art of Persuasion,” a program combining videos of speeches (including examples of Martin Luther King, Jr., John F. Kennedy, Malcolm X, and Hitler, among others) with the texts of these speeches. Students can open a glossary explaining rhetorical terms, or follow the annotated text of a speech and learn the names and uses of various rhetorical devices. They can move from the definition of a term to several video examples by different speakers.

In essence, they can follow their interests and gather information in a way that no textbook could ever make possible.

Marcel Fafchamps, an Assistant Professor of Food Research, developed “African Courseware” for his class on economic development in Africa. Besides providing students with images and texts that challenge their stereotypes of the continent, the program includes a simulation or game in which students become African farmers, and are forced to make difficult decisions about their families’ futures, their crops, marketing, and the environment. According to Fafchamps, “Even though my course is on economic development, the purpose of this courseware is to build an understanding of Africa—so it’s not limited to economics. It’s about all kinds of issues and topics in Africa, including history and agriculture.”

Courseware has been developed to help students learn foreign languages through seeing videotaped examples to imitate or through having to construct dialogue and stories that are incorporated into an already illustrated text. From physics and biology to engineering and English literature, programs are being designed to teach students how to derive principles from or relate general knowledge to problems or data presented in text and images.

Why Use It?

While students can benefit from the kind of self-directed learning encouraged by multimedia, the technology might also be useful in helping you teach a difficult issue or idea. Ann Watters became interested in using computers when she recognized they could help her address a problem; she asked herself “What can I do to solve a problem I have in my teaching? Can technology help me resolve a particular problem or issue? If it can, that’s when I need to bring it in. I don’t bring it in (continued on next page)
just because it’s new or exciting or just because I have a word processor and can use it for something.”

If we think of multimedia as a way of overcoming an obstacle in communicating ideas in our classes, it becomes clear that to determine whether—or when—to use it depends upon our goals for a course. Thinking of the goals and purposes of a course can help you determine if technology will allow you to teach specific information or communicate concepts more effectively. Fafchamps decided to design his “African Courseware” because “I didn’t think I could speak effectively about Africa without showing students pictures of the place.”

The essential principle is to begin with pedagogical aims, and determine precisely what you’re trying to accomplish with your students. If those goals are already being efficiently met in your course, investing time and energy in multimedia development may not be wise—for such development is time-consuming. Or there may be simpler ways of achieving the pedagogical aims you have, using more conventional teaching strategies.

However, multimedia may allow you to present more information—more examples, illustrations, and problems for students to solve. It may take course material that had once been contained in lectures and reshape it so that students see and hear the actual events (historical or physical, for example) that they otherwise would only hear about. Or it might demonstrate concepts that couldn’t easily be demonstrated in a lecture hall or classroom.

What Multimedia Can Do

While multimedia technology can assist us in achieving pedagogical purposes we’ve already determined, it shouldn’t be considered a replacement for teachers or for traditional classroom instruction. In fact, much of the courseware developed is used primarily for work outside the class, as a complement to the instruction that has always taken place. As such, good courseware is developed with basic teaching principles in mind, and especially with an emphasis on making students aware of the process of learning. Because students are actively involved in the construction of knowledge rather than passively taking in information, they must become conscious of how to improve their learning skills while they navigate through new problems.

Marcia Linn, a professor of Mathematics, Science, and Technology Education and the Director of UC Berkeley’s Instructional Technology Program, suggests that thoughtful multimedia courseware, like thoughtful teaching, can achieve three important goals. It can:

- encourage students to think like experts, including getting them to understand problem-solving processes and to critique solutions to problems;
- make thinking visible, so that the process of learning, not just the result, is emphasized;
- scaffold knowledge, building on what students already know, so that they can understand and form general principles from new information.

By designing courseware that encourages students to make predictions and test them in experiments, for example, we help them build a knowledge base in our disciplines. Linn cites an interactive program in physics that requires students to solve problems that in the past might have been the basis for laboratory experiments: “We’ve seen a transformation of the laboratory in physics. It used to be that people mostly went in and did calculations and ran apparatus. Now there’s an alternation between labs that are done using interactive physics courseware and those that are done using apparatus. I think that the faculty have come to believe that this is a very useful way to teach physics ideas and that students are more engaged in the process of making predictions and constructing views of the phenomena when they have this kind of environment than when they work only in the lab.”

Does It Really Work?

Demonstrating that multimedia ‘works’ is a difficult proposition, of course. A recent article in The Chronicle of Higher Education (May 5, 1993) examined claims that using technology can make college teaching and learning more effective and found that while scepticism remains and researchers are still uncertain, faculty members using technology believe it’s improving their students’ learning, and making them more productive.

Most users of multimedia courseware believe that it offers significant advantages to students, especially by motivating them to participate more fully in the course. According to Ann Watters, “The first payoff was getting students more engaged.” She feels that seeing and using real examples of speeches has a greater impact on her students’ understanding of how rhetoric is used. “I’ve found that the papers improved. When I ask students to analyze a persuasive text, their papers tend to be better than they had been before I used the courseware.”

Learning is enhanced because of the immediacy. And students with varying levels of knowledge can approach the materials at their own pace. Also, instructors have found that encouraging students to work together in pairs or groups helps them progress more rapidly and learn essential skills from each other, much as they will be required to do after graduation.

How to Get Started

Embarking upon a multimedia project will require some help, and a familiarity with Stanford’s academic and computing resources, including offices that sometimes seem to change names and functions overnight. Jane Marcus, an academic computing consultant for the Departmental Systems Group of Libraries and Information Resources wryly offers an explanation for this confusing flux: “I have a theory that because technology changes so rapidly, the organizations that support technology have to change quickly as well. It’s difficult (continued on page four)
Institutional Resources and Support for Multimedia Development and Delivery *

Faculty Idea

Development

Center for Teaching and Learning
- Teaching consultation
- Course design assistance
- Help with applying technology to course objectives
Michele Marinovich, CTL
723-2208
ea.mxm@forsythe

Academic Software Development
- Initial technical consulting
- Development planning
- Development support
Barbara Maliska, ASD
725-3153
bjm@jessica

Research & Instructional Technology Support
- Curriculum development lab
- Language lab
- Media Center
Ed McGuigan, RITS
725-1176
edm@jessica

On-Campus Delivery

Office of the Registrar
- Classrooms for computer demonstrations
- Hands-on computer classrooms
- Audio-visual equipment for teaching
Course Scheduling
725-1892
ak.cfc@forsythe

Academic Computing Support
Public Clusters:
- Macs in Tresidder
- Macs and PCs in Meyer
- UNIX workstations in Sweet
Eleanor Brown, ACS
723-0974
eabrown@jessica

Residential Computing
- Residential clusters
- Multimedia stations
Jeff Merriman, ResEd
725-2800
birdland@jessica

Stanford Instructional Television Network
- Professional Television Services
  (pre-production consultation, shooting, editing, pre-mastering)
- Satellite, microwave and digital delivery
- Marketing and distribution of programs
Paul Marco, STN
723-4008
na.mar@forsythe

Off-Campus Delivery

Software Licensing Program
- Licenses software for public computer clusters
- Licenses software for SU distribution and resale
Pat Box
Libraries & Information Resources
723-4428
Software-licensing@leland

Financial Assistance

David Guerrero, OTL
723-0651
davidg@leland

Bing Teaching Initiative Program
Funding for development in:
- Undergraduate teaching
- Curriculum development
- Enhancing undergraduate research
Ellen Woods, H&S
723-9378
woods@leland

* See also About Computing, available by calling 725-3169 or sending email to pubs@sweet
keeping track of who’s doing what at any particular time—difficult for those of us within the organizations and probably impossible for those not in them.”

To help sort out where to go for assistance when considering or planning multimedia courseware, Marcus and her colleagues have organized road maps, like the one on page three, for negotiating Stanford’s array of services. The diagram highlights the most important contacts to consider when taking your first steps toward introducing technology in the design of your courses.

Assistance is available for analyzing the pedagogical elements in your project through the Center for Teaching and Learning. We will help you examine your course objectives and design in order to determine whether a multimedia component is an effective way of addressing intellectual and instructional concerns. We can also assist you in figuring out where to go next, for example to the curriculum development lab in Meyer Library—run by the office of Research and Instructional Technology Support—for access to the range of equipment you may need to produce your courseware. Or you may need to visit Academic Software Development consultants in Sweet Hall to learn what kinds of courseware already exist and for help in developing your own ideas into a product. Financial support for equipment or consultation needs may be available through the Bing Teaching Initiative managed by the Dean’s office in the School of Humanities and Sciences.

Most faculty members who have worked on multimedia courseware have also emphasized the importance of talking with colleagues already engaged in such work. They counsel that it’s wise to build on the ideas of others who have developed successful innovative instruction techniques and tools, even if they’re not in your discipline. According to Marcia Linn, this conversation is an important additional benefit of working with technology: “One of the things that technology is supporting in a way that is very desirable is partnerships across campus—multi-disciplinary interactions that were not as common in the past.”

On the larger level of support, the university is making plans to improve classrooms so that teaching with multimedia will be easier in the future. And institutional support for investing energy in the production of computer courseware has also been expressed through this year’s Faculty Senate resolution supporting the concept of allowing faculty and students to retain copyright for independently produced software and courseware.

To Learn More About Multimedia and the Classroom

About Computing at Stanford: A Guide for Faculty and Students. This booklet, prepared by Academic Computing Support, a group within Libraries and Information Resources, summarizes the computing facilities and services available on campus, including information on academic software development.

Speaking of Computers: a newsletter published quarterly by the Academic Computing Support group of Libraries and Informational Resources. To subscribe, contact eabrown@sweet; it’s also available online, through Folio.

CTL videotapes from the Teaching and Technology faculty seminars including, among others:

- A Technological Overview: Parvati Dev, Director of the SUMMIT Lab at Stanford’s Medical School, examines various types of hardware needed to create and deliver multimedia courseware.
- “The Art of Persuasion” and “African Courseware”: Ann Watters, lecturer in the English Department, and Marcel Fafchamps, Assistant Professor of Food Research, illustrate the courseware they’ve developed.
- “Stay Tooned”: John Barson, Professor of French, explains the development of his foreign language courseware.
- On-campus Resources and Institutional Support: an introduction to the offices and support outlined in the diagram on page three.
- Using Computers to Improve Instruction at Colleges and Universities: Marcia Linn, Professor at UC Berkeley, discusses pedagogical issues at the heart of making effective use of technology in instruction.

CTL’s library of articles and books, including