SPEAKING OF TEACHING

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TECHNOLOGY AND TEACHING

Using Online Technology to Break Classroom Boundaries

All across the Stanford campus, faculty are taking advantage of computer technology to enhance communication with their students. From the School of Medicine to the School of Education, in humanities departments like Art and Music, and in large courses like Anthropology 3 and Biology 31, professors and TAs regularly use e-mail and other forms of networked communication. These networks have transformed the way professors and TAs make assignments, generate discussion, ask students to do research, and disseminate information about their courses, including sections, seminars, and labs. Instructors adapting computer technology to their particular teaching styles and aims have set up home pages for their courses, started newsgroups aimed at encouraging discussion outside the classroom, and provided background for assignments, including linking students to research resources on the Internet.

A survey of several Stanford instructors introducing online technology into their courses reveals they believe both teaching and learning have improved as a result. They report that students are more consistently prepared and more willing to enter into class discussion. With the presentation of background information taken care of through electronic communication, faculty are able to present more complex material and spend more time answering substantive questions during class. Faculty using the case method, for example, are able to summarize student feedback and responses to questions on overheads prepared for the class, thus beginning discussion of cases from a more advanced point than they had been able to in the past.

Using an E-Mail List to Improve Classroom Discussion

An example of a course transformed by the simple addition of an electronic mailing list is Art 280, "Utopia and Reality in Modern Urban Planning," an undergraduate seminar required of urban studies majors. Since 1973 the seminar has been team-taught by Paul Turner, Professor of Art, and Frederic Stout, Lecturer in Urban Studies. A standard assignment of the seminar has long been to have each student formulate a question to open up each week's classroom discussion. When the instructors established a mailing list or "listserv," and required students to post their questions before the class met each week, the pace of discussion soon picked up. When students posting last-minute questions to the newsgroup were able to view the questions already there, they began commenting on them before coming to class. Soon, students were responding to one another's comments on the earliest questions to be posted; when the seminar met, discussion was already underway. According to Stout, "Because there was no longer 'down' time at the beginning of each class to hear and consider possible topics the reading had generated, class conversation became quite sophisticated."

Course Pages on the World Wide Web

Of all the tools available to faculty to communicate with their students, the World Wide Web is the easiest and most accessible, even for students unfamiliar with computers. Not surprisingly, there are more than 120 courses with Web pages at Stanford. The course page is usually linked to the syllabus, to information about the professor and TA, and to assignments with guidelines for completing them.

Head TAs use course pages to post lecture notes, hints about problem sets, and corrections and updates to assignments. Many of these pages are linked to the course newsgroup; some even have links to a Web bulletin board. Associate Professor of Anthropology John Rick puts complete instructions for assignments for Anthropology 3, "Human Prehistory" on the course home page, including tables and figures of data to be analyzed. The first paper due this fall, for example, asked students to "reconstruct the subsistence and organization of early human hunters on the basis of archeological data" from an African site.

Craig Stuart Sapp, a third-year graduate student in Computer-Based Music Theory and Acoustics, has set up Web pages for three courses in which he has been a TA.

From his experience in classes in engineering and computer science, he knew many students would be used to online communication, but some music students are not. Sapp finds that Web pages are the easiest for these students to use. Simply by opening up the link from the course home page to the syllabus for "Music in America," for example, the student can move not only to assignments and to the list of taped selections (on which listening tests are based), but to highlighted definitions of terms they will use in writing about the music. Clicking on the name of a composer of one of the selections moves the student to the online *Encyclopaedia Britannica* entry on that composer.

For the Directory of Stanford home pages, go to **http://www-leland/dir.html**

To see how colleagues have designed Web pages for courses and to get ideas for setting up your own, see the list of course home pages at **http://www-leland/var/dir.classes.html**

Note: These pages are linked, which means when you're on one you can move to the others by moving your mouse to a highlighted word or phrase and clicking on it. This ability to connect information through hypertext "links" is the World Wide Web's key feature.

In both "World Music" and "Music in America" students are required to attend several concerts and write up a report. Both guidelines for writing the review and myriad events (concerts and performance classes at nearby universities) to choose from are linked to the syllabus. When students find other appropriate concerts, they e-mail Sapp and he adds them to the list.

The home pages for Music 151, "Psychophysics and Cognitive Psychology for Musicians," contain "pointers to potentially useful and related Web sites"; to get to these sites students merely click on the hypertext links. These include an online museum exhibit on acoustics and pointers to related USENET newsgroups. Some of the Web sites are interactive. For example, on the WWW Music Database, if students don't find information on their favorite band, they can enter some.

Like TAs and CAs in other laboratory courses, Sapp organized the lab for Music 151 on the departmental computer system, in his case, the Center for Computer Research in Music and Acoustics (CCRMA). He put instructions for each lab session on the Web page, so that students would know what each week's assignment was—for example, what sounds they would create electronically.

Although these courses sound as though the students will be experienced computer users, many of them are not—at least when they begin the course. Some of the tasks simply introduce them to the possibilities. For example, an early assignment in Engineering 1, "The Nature of Engineering," taught by Associate Professor of Civil Engineering David L. Freyberg, requires students to set up their own home page on the World Wide Web. The rationale is for students to feel comfortable on the Web and to appreciate how easy it is to share information worldwide. After all, as Freyberg says, much of this sophisticated system of hardware and software was developed by engineers. What better introduction to the discipline than familiarity with one of its results?

Web pages are also useful in letting students know about courses before they sign up for them. When Explorations in World Music was a new course, Sapp set up the page for it and made fliers featuring the address of the web site where students could go for information (see **http://www-leland/class/music5a/**). Professor Mark Granovetter includes students' evaluations of Sociology 114, "Economic Sociology" from the last time it was taught (Winter 96) as a way of letting prospective students know as much as possible about the course.

Many course home pages contain elaborate graphics and photographs of artifacts and images. Two of the most beautiful are Professor Barbara Gelpi's English 305G: "'Stained-Glass Attitudes'—Victorian Mediaevalism," and "The Hebrew Bible," taught by Assistant Professor of Religious Studies Alice Bach. An example of the marriage of beauty and utility made possible by the Web are sites displaying research materials previously available only to scholars able to travel to an archive or museum. In Winter quarter, Frederic Stout plans to put the illustrations of the first edition of a classic utopian city planning text, Ebenezer Howard's *Garden Cities of Tomorrow,* on the Web. The reason? Because only the illustrations of the 1898 edition are in color, as he discovered on borrowing the Getty Museum copy on Interlibrary Loan. Because the edition is in the public domain, he has had color transparencies made of the art to share with students and urban planners everywhere. Most of them, used to the black-and-white reproductions, will be surprised.

Now that students are doing much of their research on the Internet, using Web search tools, they need to know how to cite sources they find there. A useful guide is "MLA–Style Citations of Electronic Sources," which is endorsed by the Alliance for Computers and Writing. Its author, Janice R. Walker, compiled a style sheet to standardize citation references to various forms of electronic information. The address for this Web site is ***http://www.cas.usf.edu/english/walker/mla.html***

Making Electronic Discussion Happen

According to Jean Wang, CTL's Technology Resources Specialist, there are three common ways to set up an electronic means of communicating with your students outside of the classroom: mailing lists, newsgroups, and course bulletin boards on the World Wide Web. All three can lead to improved contributions by students, for you can require them to send mail to everyone in the section or seminar, or to post comments on a newsgroup or bulletin board. Each form makes it easy for you to distribute information after class is over for the week. (Students who had to be absent will be particularly grateful.) Having an electronic means of communicating with students is especially important when your class meets only once a week. All three forms of electronic communication may also be set up to permit other computer users at Stanford or elsewhere to view portions of the class output.

The technologies outlined below are available to most students day or night. Most students go online regularly, but instructors in a large lecture class may need to remind students to check the class newsgroup or bulletin board at least once a week. Consider motivating them to check regularly by posting hints for problem sets or review materials there instead of handing them out in class.

Mailing Lists

A mailing list is just what its name suggests: a list of e-mail addresses stored on a list server under one address. When a group of e-mail addresses has been compiled—for example, by passing a sign-up sheet around the classroom—it is sent to a list server for storage. The list administrator assigns the list of e-mail addresses to a single address. Sending a single message to the list address sends it to all the subscribers (those whose e-mail addresses are on the mailing list). The sender simply types in the name of the list as the recipient of a message, instead of the individual addresses of all the subscribers, for example, **ctl-faculty@lists.stanford.edu**.

To set up a class mailing list at Stanford, collect the students' e-mail addresses. Then, send an e-mail message to **help@lists.stanford.edu**; no subject or message body is necessary. When the instructions come back (usually within minutes), answer the questions about yourself as "owner" of the list (faculty, student, or staff). You will be asked how restricted you want the list to be (instructors often limit the list to students registered for the course). When approval comes back, you will be given instructions about how to prepare the list of e-mail addresses. (Often, a student in the class can create the list for you.)

A Web page at
http://lists.stanford.edu
explains the commands available
for administering the mailing list.
Questions?
Contact Tim Torgenrud at 3-3940
or e-mail **majordomo-owner@lists**.

Usenet Newsgroups

"Think of Usenet as a computerized bulletin board system that can be read by thousands of Internet users all over the world," says Wang. Newsgroups are discussion areas on Usenet that cover topics ranging from the obscure to the commonplace. Besides reading articles posted to a newsgroup, the user can open up a dialogue by replying to an article or posting a new item. Articles in newsgroups are usually archived on a local news server for a certain amount of time before they expire and are deleted.

Participants use a newsreader application to read and post to newsgroups. Mac users can download NewsWatcher from the Web at **ftp://ftp.acns.nwu.edu/pub/newswatcher/**. Windows 95 and Windows 3.1x users can download Free Agent, a newsreader that's been getting rave reviews, from **http://www.forteinc.com/getfa/download.htm**. A distinct advantage that newsgroups have over mailing lists is that there are threaded newsreader applications, that is, a posted article and its associated replies collated and filed together as a "thread." The user can open up a thread and immediately see the article and all its related posts. Mailing lists, on the other hand, send out messages to the entire readership as soon as the list server receives the e-mail message; students sometimes receive several messages in a row, each one corresponding to a different ongoing discussion on the mailing list.

Stanford University class newsgroups typically follow the naming convention of *su.class.dept-and-course-number*, as in *su.class.ctl116*. They can easily be created by faculty and TAs. Send a short description of the newsgroup purpose (such as, "to allow all members of the class to communicate with one another"), giving your affiliation with the class (instructor or TA), in an e-mail message to **courses@leland.stanford.edu**. This will generate a response and very likely the creation of a class newsgroup within a week.

Class Bulletin Boards on the World Wide Web

The World Wide Web is fast becoming the most popular way to navigate through the information proliferating on the Internet, especially with efficient search engines like AltaVista and Yahoo that help users locate specific information. Accessing the Web on college campuses is a simple matter of starting up a browser and clicking on hypertext links to jump from one Web page to another. Graphical browsers such as Netscape Navigator or Internet Explorer are popular with users.

Faculty can implement a World Wide Web bulletin board that is accessible twenty-four hours a day, seven days a week. A bulletin board is the equivalent of reading a newsgroup on the Web, for the instructor, TA, or section leader can create discussion areas where students can read and post replies, or create new discussion threads.

With a little bit of sleuthing, ready-made-scripts that enable the creation of Web discussion boards can be found on the World Wide Web. One such script, appropriately called the WWWBoard, can be found at Matt's Script Archive: **http://www. worldwidemart. com/scripts/wwwboard.shtml**. It is specifically created for Unix systems that have Perl installed, but, according to the FAQ, it has been successfully "ported" to the Windows and Mac platforms. For anyone comfortable with Perl, who has the time to "hack around," Matt Wright's WWWBoard provides the basic tools of a discussion board for free, says Wang.

A page called "Getting on the Web at Stanford" tells you what you need to know to set up a page:
http://www-leland/howto.shtml

The Web offers some distinct advantages over e-mail lists and newsgroups. You can access the World Wide Web from anywhere, whereas you or your students cannot always check e-mail from another location. Newsgroups are accessible only via a connection to the Stanford network or from a Stanford e-mail account.

Some Stanford faculty are able to offer courses at more than one university with the aid of a Web page. One example is Sociology 160/260, "Formal Organizations," taught by Professor Lamont at Berkeley and Stanford in Fall 1995. Another is Music 252, "Human Computer Interface Design," taught this fall at Princeton University and San Jose State University as well as at Stanford. It is being run at Stanford by Professor Chris Chafe and graduate students Bill Putnam and Tim Stilson. Information about the course, sponsored by the National Science Foundation, is found at **http://www-engr.sjsu.edu/electeng/faculty/knapp/hci.html**. The Stanford extension of this page is **http://www-ccrma.stanford.edu/CCRMA/Courses/252/**.

According to Jean Wang, "All three methods serve the same basic function, though with different technologies, and so it would be unnecessary and even inefficient to implement more than one. The choice should be governed first by which method is comfortable for you and then by which method the students are likely to embrace." She says that faculty should take into account the fact that students will have different e-mail/newsreading/Web-surfing habits. They could be e-mail fanatics who check their mail religiously several times a day, or they might check infrequently. The same variation in habits is likely among students reading newsgroups and surfing on the Web. "Unless you have an accurate gauge of your students' Internet habits (much easier in the sciences, engineering, and math than in the humanities), any time-critical information should continue to be announced in class," she concludes. ■

• CTL Winter Quarter Events •

Jan 23 **Award-Winning Teachers on Teaching**
Prof. David Kennedy, History
"How to Give a Lecture"
Durand Bldg, Rm 450, 12 to 1 p.m.

Jan 30 **CTL Workshop Series**
Public Speaking for TAs
Sweet 403, 12 to 1 p.m.

Feb 13 **Award-Winning Teachers on Teaching**
Prof. Sylvia Yanagisako, Anthropology
"Adventures in Collaborative Teaching"
Durand Bldg, Rm 450, 12 to 1 p.m.

Feb 20 **CTL Workshop Series**
Designing Your Own Course
Hartley Conf. Rm, Mitchell Earth Sciences Bldg,12 to 1 p.m.

Feb 27 **Award-Winning Teachers on Teaching**
Prof. Russell Fernald, Psychology
"How to Design and Teach a New Course"
Durand Bldg, Rm 450, 12 to 1 p.m.