Web-Based Education Experiences

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The World Wide Web has the potential to revolutionize instruction and increase educational opportunities across corporate, government, and educational sectors. Not only will the Web enable distance learning and peer-to-peer connectivity, but it will also enhance student feedback and let instructors understand whether and how long students have studied a particular lesson. It also has the potential to reduce training costs. Some analysts argue that it will be a while yet before the Web can realize its potential, but there is evidence that the Web is already being used as a strong educational technology.

The concept of computer-based training (CBT) dates back to the late 1960s and early 1970s and the world of networked mainframe terminals. But the desktop PC revolution of the early 1980s quickly led to a proliferation of CBT, delivered first on floppy disk, then CD-ROM, and now the Web. It is now clear that education is becoming a primary use of the Internet. A recent Infoseek search returned almost 3.5 million Web pages containing the keywords "online courses." Other terms that turn up interesting CBT and WBT content include "virtual universities," "distance education," and "instructional technology."

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Today, CBT goes by many different names, including Web-based training (WBT) and distance education. There are at least three approaches to WBT: real-time WBT, non-real-time WBT, and a combination of the two. Real-time WBT projects attempt to create virtual classrooms in that they preserve the traditional roles of a teacher and a group of students meeting at the same time. Non-real-time WBT is simply an adapted version of CBT delivered over the Web. That is, non-real-time WBT is created in a traditional CBT authoring system, and then the student downloads the course from the Web to a hard drive and takes the instruction at his or her leisure. The combination approach might include course material delivered on CD-ROM with real-time data streaming from the Internet.

Many of today's WBT courses do not take advantage of the full power of the Internet. For example, many contain just skeletal materials—a syllabus, assignments, or instructor notes. Even in these cases, however, student-instructor communication can be handled by e-mail, and classroom discussions by newsgroup. But for the most part, these types of courses are still held in the traditional setting—a physical classroom—and the Web becomes a way for students and teachers to communicate out of the classroom.

But now instructors are gaining significant benefit from real-time WBT. Examples of these benefits include courses that we have developed at the University of North Carolina at Wilmington and Michigan State University. Both courses are completely online, with no classroom components. We describe our courses in the sidebars "Intro to the Internet…on the Internet" and "CSC 475: Made for the Internet."

CREATING AN ONLINE LEARNING ENVIRONMENT

The obvious advantages to online training have tempted many instructors to jump too soon to exploit WBT. To create an effective online learning environment, it is important to pause and consider a few practical and pedagogical issues, including the online roles of instructor and student, the best type of technology tools to use, and the process of collaboration. It is also important to consider how materials will be distributed, how students will be assessed, and how specialized software will be incorporated into the learning environment.

Roles

The instructor must accept the role of facilitator (as opposed to leader) in the learning process. This change requires moving from the "chalk-and-talk" role to a "guide-on-the-side" role. It is also important that instructors realize that self-directed learning requires high motivation on the part of the students.

Technology

Students must have access to a standard Web browser and Internet connec-

tion. Instructors must of course be familiar with HTML tools and the process of converting a traditional course for use on the Web.

Collaboration tools

Effective collaboration between the instructor and students is crucial. Instructors must be familiar with the many Internet technologies that support effective communication and collaboration, including e-mail, group discussion lists, text-based chat facilities, and even desktop videoconferencing.

Material distribution

The Web provides a platform for delivering not only the text materials that a class might need, but also the multimedia requirements as well, including audio and video streams of instructor lectures. Instructors must be familiar with the strengths and weaknesses of current technologies—even if other people will be converting classroom lectures into digital video for the Web—because understanding what the Web is capable of doing will help determine the Web site's content.

Student assessment

Computer-based testing, sometimes called computer-managed instruction (CMI), can provide instant feedback on student comprehension of course materials. But this type of managed testing can't work unless instructors accept assignments and provide feedback to students electronically.

Specialized software

In some cases, course content might dictate that specialized tools be used to improve course comprehension and

Intro to the Internet… on the Internet

Charles Severance

I taught CPS291—Introduction to Internet—in spring 1997 as a television class at Michigan State University, and in the summer I taught the same course over the Internet using Progressive Networks' RealAudio and RealVideo with synchronized slides. (For additional information, see http://www.vu.msu.edu/preview/cps291/.) Many students were able to take the summer course from their homes. In fact, students from all over the US enrolled in the course. And there were students from Hong Kong and Frankfurt. I delivered the homework and tests using software developed at MSU called CAPA (Computer-Assisted Personalized Approach).

I wanted to learn what it took to deliver this type of course material to home users over the existing Internet infrastructure. Delivering a quality course on the existing Internet brought with it a host of challenges.

Challenges

The first challenge was producing an hour of lecture each week and putting it up on the Web. I digitized the first lecture using Color QuickCam, a low-cost digital video solution. It then took me about 30 hours to prepare the video, PowerPoint graphics, and HTML files for the Web. To eliminate the need to transform my office into a television studio, for the second lecture I moved into one of our television studio classrooms and had the studio engineers digitize the video and audio. While this was the first time they had any experience digitizing a lecture, they were very interested in the process and spent a great deal of time learning how to do it well. They purchased a video capture card and used the RealVideo encoder software. Because this class was offered for credit, the services of the Instructional Television staff were provided at no charge. By the end of the semester, with help from MSU's Instructional Television staff, I had refined the process so that it only took about three hours to produce one hour of Internet lecture.

The second challenge was getting each of the home computers debugged so the students could properly view the videos. Because the students had myriad hardware configurations, operating systems, and Internet service providers, this technical support activity dominated the first two weeks of class and delayed the first two homework assignments.

A related challenge involved ongoing technical support: The class used real-time, text-based chat and conferencing facilities. The students with some technical skill found these facilities useful, but the beginning students generally did not use them. There were several students who had to drop the class because they didn't have access to the necessary equipment.

Lessons learned

So far the lessons I learned about starting an online course fall into two categories:

- do not ignore the need to debug the students' computing environment, and
- even with online chats and conferences, e-mail is the most useful communication tool.

In the fall version of CPS291, the first week will be called the "gauntlet." Instead of trying to teach anything, the week will be focused on testing and debugging software using an online "treasure hunt" which can only be completed with properly functioning software. To complete the gauntlet, the students must use their Web browsers to view a small lecture and then perform exercises designed to test their software configuration.

To date, students have felt the online lectures to be quite useful and informative. But to get a better understanding of how students use the resources in an Internet-based lecture class, I've developed a basic assessment survey that contains questions that pertain to both the technology used and the content of the course itself. I hope to study which areas and tools the students find most useful.

If the class succeeds, it will be expanded into a two-credit class called EGR124—Internet and Technology—which will be marketed to high school students and working professionals in addition to MSU students.

communication. For example, collaborative tools are now available that support shared workspaces along with application-sharing capabilities across the Internet.

We believe that colleges and universities will always have an important role to play in creating a social and academic community for the traditional 18- to 22-year-old student population. Perhaps one of the most promising uses of Web-based training and instruction is in the area of adult distance education or the so-called "lifelong learners." This is because lifelong learners have characteristics—geographical isolation, inflexible schedules, a high degree of self-motivation, and personalized training needs—that are often not present in a traditional student body. Web-based training and education is well-suited to the lifelong learner. ❖

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CSC 475: Made for the Internet

Ronald J. Vetter

During the spring 1997 term, a group of faculty at the University of North Carolina at Wilmington (UNCW) received a grant to develop online courses. As a member of this team, I proposed to develop a course that would be taught entirely on the Web. The course, CSC 475—Networked Multimedia—will be offered completely online for the first time during the spring 1998 term. (For additional information, see http://vetter.cmsfac.uncwil.edu/~vetter/CLASSES/csc475-spr98/.)

CSC 475 is a special topics course that consists of three major topic areas: the Internet, multimedia computing, and computer communication networks. Students in the course learn how to use Internet tools effectively, study the latest advances in multimedia technology (both software and hardware), and research emerging areas in networked multimedia.

Technology choices

To develop this course, I first did an extensive search on the Internet to see what kinds of courses were currently being offered online. As a result of this research, and in consultation with other faculty, I chose to use the following technologies for the course:

- E-mail for instructor-student interaction.
- Web pages, including text, graphics, and images, for distributing course materials.
- Progressive Networks' RealVideo software, which streams audio and video over the Internet at 28.8 Kbps, for video clips of instructor lectures.
- O'Reilly & Associates' WebBoard, for conducting ongoing, threaded discussion.
- White Pine Software's CU-SeeMe desktop videoconferencing and text-based chat software, for holding virtual office hours. (I'm also evaluating Microsoft's Netmeeting for this purpose, but Netmeeting currently supports only two point-to-point video connections. However, Netmeeting does allow multiple users to share and manipulate a single document, such as an Excel spreadsheet, over the Internet.)
- A custom Perl script called QuizMaker, for creating interactive tests and quizzes on the Web and for providing instant feedback to students on comprehension of course content.

Following traditional guidelines

I realized early on that although the course would be designed to be taken at a distance, in an asynchronous fashion, the instructor and students would still be bound to a few traditional university guidelines. For example, students register for the course in a traditional manner; the course follows the Spring 1998 calendar for adds, drops, and withdrawals; and students complete examinations and homework assignments throughout the semester and complete certain portions of the course by the deadlines given.

Although students submit and receive written homework assignments via e-mail, they must have their examinations proctored either on campus at a prearranged time or at their home or office by a person preapproved by the instructor. There is still no reliable way to authenticate users. Students must also purchase a textbook for the course, because I did not want to create or write all of the materials, at least not the first time through.

As I developed this course, it became clear to me that in order for universities to be successful in providing online education, they must modify their requirements and guidelines for enrolling students in Web-based education courses.

For example, the allocation of full-time teaching equivalents (FTEs)—which dictates state funding—is generated by seat counts of students that take on-campus courses. There is therefore little or no financial incentive for departments to offer online courses. Furthermore, workload responsibilities must be considered. How much time can faculty members spend on distance education? And how will remuneration be determined? Also, many students don't want to go through all the admission procedures at a university just to take a single online course. And if students don't have to spend time in classrooms, why impose artificial, inflexible time constraints like semesters or quarters?