Using World Wide Web Course Tools (WebCT) for Close Learning

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Abstract

Web-based learning is often thought of as a subset of distance learning, i.e., one technology out of many that can be used to provide educational experiences to students that rarely or never actually meet face-to-face with each other or with an instructor. But another model is possible: distance learning can be viewed as a subset of web-based learning because web-based course supplements also offer many benefits to "close" students taking courses that meet in traditional classroom settings. A third viewpoint is that "close" students are actually distance students most of the time, since even they should do most of their learning outside of the classroom; this model has the advantage of encouraging lifelong learning. This paper describes some of our experiences over the last three years while offering web-based course supplements, designed and delivered with World Wide Web Course Tools (WebCT) software, at the University of Arkansas at Little Rock. One benefit of web-based course supplements for engineering (as well as other) programs is that they can permit more class time to be devoted to interactive classroom activities such as laboratory experiments and demonstrations, group projects, problem solving sessions, and student-instructor discussions, by shifting many information transfer activities to the web. Another benefit is that the multiple channels of communication offered by the web can encourage engineering students to write and interact with each other and the instructor more often than is the norm in many traditional engineering courses. Thus, these two benefits together give engineering students the opportunity to improve their oral communication skills in the classroom, and their written communication skills outside the classroom (on the web), two areas of relative weakness in the skill sets of traditional engineering graduates, but which are, nonetheless, highly desired by employers.

I. Close vs. Distance Learning

The web may be used to support the teaching of, and learning by, both on- and off-campus students. Several colleges and universities now offer entire web-based degree programs to distance students, but local students will likely enroll in these programs as well. In fact, many

institutions have been surprised to discover that on-campus students often comprise the majority of registrants for web-based courses that were originally created for distance learning programs[1].

Web-based education offers advantages to students by creating a virtual classroom that is available anywhere: at school, at work, at home, or even on a trip. In fact, students who attend classes in a classroom are also distance learners when they do schoolwork at home or at the library. From this perspective, *all* students are distance learners most of the time, and so *all* students can benefit from web-based education systems. If we want students to learn the habits of lifelong learning, then it is logical to encourage them to do a great deal of their learning outside of the on-campus classroom.

The benefits of web-based education systems include[2]:

1. Computer mediation,
2. Geographic independence,
3. Temporal independence,
4. Platform independence,
5. A simple, familiar, useful interface,
6. Increased communication, and
7. Increased learner control.

II. Web-Based Education at UALR

The University of Arkansas at Little Rock (UALR) uses a relatively inexpensive, but well-integrated product for creating, delivering, and managing web-based courses and supplements: World Wide Web Course Tools (WebCT), developed by Murray Goldberg in the Department of Computer Science at the University of British Columbia in Canada. The following description of WebCT is taken from the WebCT web site[3]:

> WebCT is a tool that facilitates the creation of sophisticated World Wide Web-based educational environments by non-technical users. It can be used to create entire on-line courses, or to simply publish materials that supplement existing courses.
>
> WebCT not only produces courses for the WWW, but also uses WWW browsers as the interface for the course-building environment. Aside from facilitating the organization of course material on the web, WebCT also provides a wide variety of tools and features that can be added to a course. Examples of tools include a conferencing system, on-line chat, student progress tracking, group project organization, student self-evaluation, grade maintenance and distribution, access control, navigation tools, auto-marked quizzes, electronic mail, automatic index generation, course calendar, student homepages, course content searches and much more.

> WebCT is an easy-to-use environment for creating sophisticated WWW-based courses that are otherwise beyond the ability of the non-computer-programmer.

WebCT was first installed at UALR in 1997, and it was used with students for the first time in 1998. I downloaded WebCT over the web, installed it on a Silicon Graphics Onyx workstation in our Computer Graphics Laboratory, and integrated it into our campus web site[4]. As the WebCT Administrator (I hired myself), I create WebCT course templates for other faculty members, offer occasional on-campus Web Course Design and Delivery workshops (more than a dozen since June 1998), upgrade WebCT when new versions are released, provide on-campus telephone and electronic mail "help-desk" support as needed, and stay abreast of designer and administrator issues by reading the WebCT users electronic mail list. Faculty and staff from every college at UALR have been introduced to WebCT.

I have created WebCT course supplements for all of the courses I teach: Problem Solving Techniques in Information Science, Introduction to Engineering, Fluid Power, Applied Thermal Science, Thermal Systems Design, Computer-Aided Design, and Engineering Graphics. Approximately 75 other faculty members are also using WebCT at UALR.

III. Classroom Time is Valuable

Some universities offer entire courses, and even entire degree programs via the web; others use the web to supplement on-campus classes. Supplementing on-campus classes with web-based learning environments actually has the potential to affect the largest numbers students. Recent research at the Massachusetts Institute of Technology (MIT) has demonstrated that using the web to deliver appropriately designed teaching materials can effectively increase the amount of classroom time that is available for higher value-added activities, such as discussions, laboratory experiments and demonstrations, group projects, etc.

The more recent study[5] at MIT showed that the combination of in-class, hands-on, experiential activities with faculty, and out-of-class web-based education was more effective, as measured by student grades, than was the combination of in-class lectures and out-of-class web-based education covering the same material. An earlier study[6] at MIT discovered that students who used web-based materials (and no lectures) performed better, on average, than students who received classroom lectures (and no web-based instruction) covering the same material. Both studies revealed that students study harder when web-based materials are provided and when students are required to use them. These two studies, taken together, imply that students study harder and learn more when:

1. Web-based course materials are made available for use, and when students are expected to use them outside of class, and

2. Class time is used for experiential activities that do not simply provide a second coverage of the course materials that are made available on the web.

A study at the University of British Columbia[7] supports the hypothesis that students learn more when in-class activities are supported by out-of-class web-based course materials, when compared with having *only* in-class instruction, or *only* web-based instruction. Thus, distance learning can be as effective as traditional classroom education, but the intensive interaction of a student with course materials and classmates, both inside and outside the classroom, seems to be optimal. When the in-class activities are interactive, they offer students the chance to improve their oral communication skills, and their ability to work in teams.

IV. Enhancing Written Communication Skills

A web-based course supplement can enhance the communication skills of students for many reasons:

1. Students can communicate via web-based electronic mail, course bulletin boards, electronic whiteboards, and real-time chat room facilities, in addition to telephone, facsimile, and meetings, and mail. Thus, students simply have more ways to communicate with each other.

2. Students can communicate quickly, but asynchronously, via web-based electronic mail and course bulletin boards. Thus, students can communicate more conveniently.

3. Students can communicate synchronously via web-based chat rooms and electronic whiteboards. Thus real-time communication, with graphical images, is possible even when students are separated geographically.

4. A record of all web-based student communication is stored in the course web site. Thus, the student can retrieve, search, edit, and share the content easily.

5. Students will often say more in an electronic forum than they would in a face-to-face situation[2].

It is not hard to find evidence that excellent communication skills are in high demand in the job market for engineers and technologists[8,9,10]. The stereotype of an engineer or technologist being good with numbers, but poor with words, is an anachronism. Web-based courses and supplements can help to improve this aspect of engineering and technology education.

One method of getting students to communicate is to require each student to post one or two course-related messages per week on the web-based course bulletin board, and read all of the messages that are posted. If a class of 20 students posts two messages per week during a 16-week semester, at least 640 messages will be generated. The instructor can seed the bulletin board with thought-provoking questions to get discussions started, and monitor the bulletin board to make sure that the students are posting messages that are related to the course.

Last year, I started requiring all of my students, in all of my classes, to do projects that include written and oral presentations. The projects start out as written proposals that are placed on the

web. Students can read each other's proposals to get ideas for how to improve their own projects. I also give them feedback, by electronic mail, in the form of an acceptance, an acceptance conditioned upon making certain revisions, or a rejection. After receiving the peer and instructor feedback, the students refine their proposals until their proposal is accepted unconditionally. Students must then complete a draft of their written presentations and make it available on the web. Each student reviews a specified number of the presentations and makes comments and suggestions about how their classmates' drafts could be improved. Students use these peer reviews, as well as instructor feedback, to revise their presentations and then make the final draft available on the web. Students also make oral presentations to the entire class during the last two weeks of the semester. The oral presentations must augment the written presentations in some way because the students will likely have read each other's written presentations already. The web-based presentations are maintained in the web-based course supplement, as learning resources for future students taking the course.

Of course, this writing process is a familiar one to scholars, but it is quite foreign to most undergraduate engineering and technology students. The web makes it easy for the students to share their work with each other, just as it did for the physicists in Switzerland who invented the web for just that purpose. The students work harder on their writing with this approach, not only because they do not want their peers to see a poor effort, but also because they get excited about seeing their work on the web and about learning about how to create web sites.

Finally, this approach to writing is a lot like the engineering design process. In this case, the products being designed are, at the very least, a web-based written report and an oral presentation. Writing the proposals corresponds to the ideation phase of the engineering design process. Writing, modifying, and editing the drafts correspond to the refinement phase of the engineering design process, and the production of the final reports corresponds to the implementation phase of the engineering design process[11]. Since the drafts are due shortly after the proposals are submitted, students are encouraged to start working on their reports even before the proposals are accepted. This simulates the concurrent engineering design process[11], and it helps the students do better work. Starting to work on the report makes it easier to write a good proposal, and preparing a well-written proposal makes it easier to write a good report.

V. Summary

Although web-based education systems make distance learning easier to accomplish than ever before, they can benefit close and distance students alike. In fact, there is evidence that combining interactive classroom learning activities with out-of-class web-based learning activities is better than either classroom-only or web-only learning. One benefit of using web-based course supplements is that valuable classroom time can be used for high-value interactive learning activities that involve oral communications and teamwork instead of information distribution. Another benefit is that web-based learning can help students improve their written communication skills. Communication skills and teamwork are highly valued in today's workplace, and the web has much to improve this aspect of engineering and technology education.

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