# Course Management Systems and HTML: Comparison of Two Approaches to Web-Assisted Instruction for Distance Learning

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Abstract

This paper describes and compares experiences with two approaches to web-assisted instruction for graduate-level engineering distance learning. In an effort for the faculty to become less dependent on staff and graduate student technical support, two approaches were implemented during the Fall 1998 semester. Each instructor had previously used web-authoring software with considerable technical assistance to develop and maintain web sites in support of a distance learning courses. Under the new approach, one instructor attended an HTML short course and developed and maintained his class web page by creating pages in HTML. This approach required an up front investment to learn HTML, but gave the instructor greater control and flexibility in the development of the class web pages. The other instructor adopted a graphical user interface course management system (CMS) resident on a third-party server. This approach required little development and allowed the instructor to focus on maintaining his class web page; however, the instructor had to work within the framework of the CMS structure and pay a license fee to the provider. The advantages and disadvantages of each approach are described. The two approaches are compared and recommendations for others implementing web-assisted instruction are presented.

## I. Introduction

Distance learning is extremely popular with the full-time employed engineer[1]. It makes obtaining a graduate degree possible without sacrificing one's current career. The functionality of the world wide web (www) and increased access to it have made this tool a necessity, rather than an optional part of delivering distance education. This paper describes and compares the authors' experience as the www has become an increasing part of how they deliver courses. While the courses are primarily delivered via live and recorded video, the instructors rely heavily on the www to assist with delivery. One author used hypertext markup language (HTML) to construct web pages for his course. The other author purchased access to a course management system, which allowed him to post content to an existing framework with numerous features and options. We begin with some background information on the distance learning environment and how web-assisted instruction was done in the past. Then two current approaches to developing web-assisted instruction are described and evaluated. Finally, the two approaches are compared and recommendations for implementing web-assisted instruction are made.

The University of Tennessee offers an MS in Industrial Engineering via distance learning. Classes are taught from the Knoxville and Space Institute campuses, but most of the students reside elsewhere. Interactive classrooms, with two-way audio and video, are scattered throughout the state. Students unable to attend one of the interactive classroom sites take courses

via videotape.  Materials must be shipped (or faxed) before class to arrive at interactive classroom sites and shipped after class to accompany videotapes.  Timely and effective distribution, particularly for frequently revised documents, is a challenge in this environment.

II. Past Experience with Web-Assisted Instruction

The world wide web was seen as a way to simultaneously distribute information to students at interactive sites, on-campus, and videotape locations.  The www was also seen as a conduit for increasing interaction between students and instructors.  Course web pages were used to post announcements, distribute materials, share links to other web sites, and facilitate increased communication by email.  "The value Internet technology brings to distance education lies not in direct translation from other media but in transformation of support mechanisms to exploit its potential"[2].  Course web pages were a distance learning tool that provided us with new capabilities, what we refer to as "web-assisted instruction."

Our initial web pages were rather basic.  To maintain local control, a server was set up using a surplus Pentium-based PC.  Microsoft FrontPage was used to develop web pages.  FrontPage was selected because it was available at an educational discount and some of our colleagues

were taking an online course teaching its use. Staff and graduate assistants created most of the web pages and faculty provided content. Content consisted primarily of the course syllabus created using FrontPage and downloadable graphic images based on scanned copies of the instructor's handwritten notes. By the second semester, downloadable materials were being created in Adobe Acrobat (pdf) format. This provided students with a wider variety of easily downloadable and viewable files, including Microsoft PowerPoint, Excel, and Word files converted to pdf format. Students with the free Acrobat Reader software could download and print these files even if they didn't have the latest version of PowerPoint or Word. Distributing materials via the www allowed instructors to post their materials shortly before class, as opposed to days in advance when mail was used for distribution.

III. Two Approaches to Web-Assisted Instruction

The availability of instructor notes, presentations, handouts, etc. in a format that could be read by all students quickly increased the demand for web-assisted instruction. Distance learning students who originally opposed the requirement of www access, suddenly expected all their instructors to provide this service. Email use exploded and increased instructor/student interaction. While MS FrontPage provided a graphical user interface for creating web pages, it was not as intuitive as we expected and learning was slow. We also found that FrontPage generated some "side effects" that weren't always compatible with other web pages. We began looking for alternatives.

Our first alternative was a return to basics. By having each faculty member learn HTML, they could create and customize their own web pages. Not everyone was able or willing to learn HTML. We discovered that UT-Knoxville (UTK) was evaluating online course management systems (CMS). "Course Management Systems provide support for managing student access to courses, monitoring student activity, administering and scoring student progress and performance tests, storing student records, managing access to student and course records, and reporting on student and course activity"[3]. The online CMS being considered provided a web-based framework within which an instructor simply enabled options and added content. In essence, the CMS provided a ready made course web page and much more.

III.A. Creating Class Web Pages in HTML

One of the authors organized and attended a basic HTML course. Each course participant sat at a networked PC while the instructors used a projection monitor to project their PC's monitor image onto a screen for all to see. The course provided approximately eleven contact hours from two instructors and a great deal of hands-on exercises. Topics covered included: creating basic HTML files, editing HTML files, creating tables, creating a web-based syllabus, introduction to online course management systems, and tips on incorporating the web into your teaching. The participants in the course had very limited to no prior experience with HTML.

Completing the basic HTML class provided enough knowledge and skills to create a moderately sophisticated course web page. The EM 535 Management of Technology course web page was more than just an online syllabus. The core of the page was a site directory with supporting hyperlinks, illustrated in Table 1. Each cell in the table represents a link to a web page or

document. *Assignments* and *Course Materials* provided a directory of handouts and the instructor's PowerPoint presentations.  These pdf files were posted at least one hour prior to the start of class.  *Schedule* was a regularly updated pdf file of the class schedule laid out week by week.  *Bibliography* was an HTML file listing the articles used throughout the course.  *Libraries* provided a description of the various library resources available to distance learning students with links to librarians' email addresses and online search services such as Northern Light and Uncover.  The *Libraries* page also included a link to a page listing journals commonly used in the EM program and a cross listing of which Tennessee libraries carried those journals.  *Related Sites* provided brief descriptions and links to a number of sites relevant to the course and student literature searches.  *Discussion Forum* took the viewer to the EM 535 NetForum discussion group, created by the UTSI webmaster and administered by the instructor.  "NetForum is a Web based discussion forum system developed by the University of Wisconsin Biomedical Computing Group"[4], not unlike a usenet newsgroup.  *Rogue's Gallery* was to be an online digital portrait gallery of the students in the course, along with their names and links to their email address; unfortunately, this was not completed.  Editing student-provided digital photos into a consistent format was more resource intensive than expected. *Return to UTSI Courses* took the viewer to the higher level directory of course web pages.

Table 1.  Site Directory from EM 535 Online Syllabus

| *Assignments* | *Course Materials* | *Schedule* (updated 10/26) |
|---|---|---|
| *Bibliography* | *Libraries* | *Related Sites* |
| *Discussion Forum* | *Rogue's Gallery* | *Return to UTSI Courses* |

The online syllabus included an internal menu and frequent "return to top" links to help the viewer navigate within the syllabus.  An experimental area included links to live and recorded audio lectures using the RealPlayer technology[5].  This allowed students to download the instructor's presentation prior to class and then listen to the lecture, real time or recorded.  Future trials will include an online chat room so students listening to class via modem can submit questions to the instructor without having access to a second phone line.

Creating course web pages using HTML requires very little computer resources.  No special software is required.  HTML pages can be created using a basic text editor, such as Notepad or Wordpad, usually provided as accessories with Windows95.  File sizes are typically modest (e.g., the online syllabus HTML file was only six kilobytes).  Creating pdf files requires the Adobe Acrobat Exchange software, but this modest expense eliminates compatibility problems between instructor's and students' software.

There are a number of advantages to creating your course web pages using HTML.  HTML is very flexible, allowing the instructor to customize the web page.  File structure and hierarchy are rather straightforward and easily learned by those with a basic background in programming (even engineering faculty who learned Fortran programming with punch cards).  HTML files are

easily linked to other web based software (e.g., NetForum) and don't seem to create any unexpected side effects when interfacing with other software. A side benefit of learning HTML is knowing how to edit HTML files and work with basic HTML tags, which can be useful as one does more and more work on the web (e.g., filling out forms, submitting text via browser).

There are also a number of disadvantages to using HTML to create your course web page. The up front time and cost of HTML training may not be necessary with a course management system. Creating and maintaining a web page with HTML is time consuming, particularly building the overall structure and establishing links between components. These administrative tasks are relatively low value-adding, compared to developing content to fit within this structure. Adding advanced features, such as CGI forms for online quizzes or course evaluations, is likely to require additional training. Simply having a form that allows each student to "register" to your web page and compiles their names and email addresses would be a great time saving device once established. Building such a form may require more energy than most instructors are willing to expend. Creating effective web pages in HTML assumes the instructor has the skills and inclination to create a visually pleasing and logically organized web page. This may not be the case. Finally, adding security features is a relatively advanced task likely to be omitted from even a moderately sophisticated web page.

III.B. Using an Online Course Management System

The EM 534 Financial Management course used the web-based environment provided by Blackboard CourseInfo[6]. CourseInfo provides a graphical, point and click interface that allows the instructor to organize and maintain a web site for a course. CourseInfo is browser based and requires no special software. CourseInfo allows the instructor to easily incorporate information from word processing, multimedia and presentation software. CourseInfo provides options for customizing and managing content and presentation and, if desired, for online assessment and grading. Students, after receiving a password, can easily access material at any time from any location. The standard course site opens to the *Announcements* page and provides the instructor/student several options as shown in Table 2.

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Table 2. Options for Navigating Within CourseInfo

> *Announcements*
> *Course Information*
> *Staff Information*
> *Course Documents*
> *Assignments*
> *Communications*
> *External Links*
> *Student Tools*
> > *Create New User*
> > *Control Panel*

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The viewer may click on any of the above "buttons" to access that portion of the environment. At the beginning of the course, the students sign up and authorize a password by clicking on *Create New User*. After a specified period of time, the instructor can de-activate this button and block access to those not signed up for the course. Only the instructor has access to the *Control Panel* to add or delete material from the site. The instructor has complete freedom as to the presentation of course material within the above general categories. Although content of most of the links is self-evident, the instructor should provide the students a general description of the type material each category contains. To make a posting, one would click on *Control Panel*, provide the requested password and then click on the element to be revised (e.g., *Announcements*). CourseInfo then guides the user through the steps for adding, deleting or changing material posted to that element.

CourseInfo allows the instructor to set security at any level desired and to set different levels of security on different areas of the course. The course can be left open for any www user to access or can be secured as a virtual classroom with access limited to the enrolled students only.

The environment allows the instructor considerable flexibility in organizing and presenting material. Folders for each lecture can be created under *Course Information* and material added as generated. The CourseInfo software allows the instructor to transfer files to the web site easily and most of the time, quickly. Rather large PowerPoint files (e.g., 100+ slides) were transferred and posted to the site without problem. A large amount of material was scanned and posted as pdf files. Transfer of scanned material was a bit more tedious and time consuming than transferring PowerPoint files. Whereas lectures were organized and presented under *Course Information*, the homework assignments and answers were posted under *Assignments*.

The *Communications Center* is a good tool for facilitating communications between all course participants. Options presented under *Communications Center* are: *Student Roster; Send E-mail; Chat Room; Discussion Board; Group Pages;* and *Student Pages*.

Students are asked to provide an e-mail address when they register and the *E-mail* option allows the instructor to e-mail all students simultaneously and easily. If desired, you can choose to e-mail only the staff associated with the course or selected students. *Student Roster* includes a listing and links to the email addresses of students registered to the site, thus facilitating interaction among students. CourseInfo also provides the student significant help via a *Student Manual* and other *Student Tools* that allow for easy development and modification of individual or group homepages, or sending files to the instructor.

The *Chat Room* is a versatile tool but will work only with JAVA enabled browsers. It allows simultaneous interaction and typed interchange between the parties. The chat room also has available a virtual *Whiteboard* that allows the instructor to create and portray graphical images. The whiteboard and the chat session can be maintained simultaneously.

The *Discussion Board* allows anyone with access to the site to post a message to start a thread for discussion. The discussion board is built with threads in order to allow one to follow

discussions over a period of time. Only the instructor can "kill" or remove a message from the *Discussion Board*.

One author used CourseInfo for the first time in Fall semester of 1998. The course web site was used primarily to post announcements, class lecture notes and homework assignments and answers. Since this was a very quantitative course (Financial Management), no attempt was made to incorporate the *Discussion Board* or *Chat Room* into the course presentation; although, they have been used in subsequent courses. Another feature used in later courses is the Assessment Tools and Gradebook, which creates online tests. Tests are automatically graded (e.g., multiple choice) and the grades entered into the grade book spreadsheet. For short answer questions, the instructor inputs the grade for each question.

A number of advantages to using the CMS over our past practices were mentioned in the description of how CourseInfo was used. Another advantage is it was easy to learn. No formal training was available so utilization of CourseInfo was self-taught. This was not exceedingly difficult but was time consuming. The downloadable instructor's manual is helpful, but not particularly detailed. Also, there are probably many shortcuts or features that we have yet to discover and use. The CMS package was for the most part user-friendly. The major advantage was the ease of use and the ability to access the site and post a variety of materials directly at any time. Finally, being able to focus on posting and organizing content, rather than constructing the site, was a great time and energy saver.

A disadvantage to using any CMS like CourseInfo is the cost of license fees. Purchased for an entire university or college, the license fee per course is relatively modest and may easily pay for itself in reduced development time and support. A minor disadvantage of a CMS package is that it may limit flexibility. The structure of your course web page is established for you and may not be the way you would do it for yourself. Two problems encountered with the more interactive features were the need for students to use the latest browser versions (Java-enabled) and conflicts with corporate security firewalls reacting to the interactive exchange.

IV. Conclusion and Recommendations

HTML web pages are a low-cost, highly flexible approach to providing web-assisted instruction. But the learning curve for HTML may deter some instructors from developing more than just an online syllabus. Worse yet, HTML may deter some instructors from using the web at all. This is a great potential loss in a distance learning environment.

The online course management system is a great labor saving device. The online CMS provides a pre-built web page in an easy to use format. The instructor can create their course content as usual. Rather than sending documents to be copied, the instructor posts them to the appropriate page within the CMS. This doesn't absolve the instructor from learning some web-based tools. The instructor still needs to learn to how to create pdf files to increase the compatibility of distributed files. A basic knowledge of HTML may be useful for customizing the CMS, but isn't required. The forms, discussion group, and chat room features of the CMS offer great functionality that simply has to be turned on. The password protection and other security

features of the CMS give the instructor control over access to the web page and its interactive (e.g., email mailing list) features.

Initial feedback from student evaluations is very positive regarding web-assisted distance education. We're awaiting more data before comparing their comments regarding the HTML versus CourseInfo web pages. We expect their feedback will be influenced more by each instructor's use of the technology, rather than the technology itself. Feedback regarding the HTML web page suggests strong agreement that we are meeting our objective of timely distribution of course materials and information, but mixed agreement in facilitating increased interaction between students.

For us, the CMS will soon become a necessity like the mimeograph machine and chalkboard of the past. We will continue to recommend our fellow instructors attend a basic HTML course; however, we'll be doing so to support our online CMS. Providing instructors with these tools allows them to spend more time on course content while providing a web environment that supports both the students and instructor in the delivery, administration, feedback, and evaluation of the course.

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