

A Beginner's Approach to Teaching with the Internet

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ABSTRACT

The purpose of this paper is to report on some “educational experiments” using the Internet and interactive teaching techniques. The author is seeking to develop a teaching style that encourages active participation on the part of the student and takes advantage of the wealth of new technology and information resources currently available. The use of the internet in two junior-senior level, required electrical engineering courses is discussed. A variety of course projects utilizing the internet are described. This paper gives some observations from the instructor and reactions from students participating in the courses. The students learned to use the Internet resources quickly, and student response has been quite positive.

I. INTRODUCTION

The use of computer and information technology in the classroom and course assignments increases student enthusiasm and makes communications and data exchanges more efficient. The World Wide Web (WWW or web) and the Internet allow students to communicate with each other and with the instructor on their own time schedule. A student can post a question at midnight that the instructor answers the next morning (or vice versa!). Problem assignments, tutorial presentations, information searches, data file exchanges, and announcements can all be done easily and efficiently out of the classroom¹. Using this technology in the educational process provides engineering students with some essential computer and communication skills that today's engineers need. This paper presents some base uses of the web in electrical engineering “Linear Systems” and “Energy Conversion” courses. There are countless uses for the web in education, and MIT has prepared a study of the WWW for educational purposes².

II. WWW BASICS

The WWW consists of *sites* also called *pages* or *home pages* linked by an addressing system that utilizes addresses called *URL's* (Uniform Resource Locators). The sites or pages are simply files on the owner's computer that are formatted in a standard form and made accessible to the world. Programs called *browsers* read these files and display the results on the computer screen. Users move from one page to another by giving the URL of the desired location. In many cases, *links* are included on WWW sites to allow the movement to be done with a click of the mouse button. The formatting language is called *HTML*



(hyper-text markup language). This simple language is text based and allows for the inclusion of graphics and other special effects. The number of special effects available to a user depends on their browser and the system they are using. Netscape and Mosaic are two browsers that are commonly used at the present^{3,4}.

III. MAILING LISTS AND BULLETIN BOARDS

Email mailing lists and WWW bulletin boards were used to encourage student-to-student and student-to-teacher discussions outside of the classroom. A mailing list can be set-up in a number of ways, and they allow mail to be sent to a list of recipients by sending a message to a single address. A bulletin board was also set up on a web page. To post a message on the WWW bulletin board, the user simply goes to the page on the WWW and fills in the blanks. With a click of a button, their message is posted and is made a part of the web site. The web site can be browsed by class members to keep up on class news, or find answers to frequently asked questions (FAQ).

In these classes, the mailing lists proved to be much more frequently used than were the bulletin boards. Perhaps the permanency of the bulletin board discouraged students from using them. In theory, students would send questions to the list to be answered by other students or the instructor. As in the classroom, however, students were reluctant to pose questions in front of the others for fear of asking a “dumb” question. Students readily sent questions to the directly instructor via Email. These questions with answers (and the names deleted) were then sent to the list. This helped to serve the purpose of making office hours more efficient, and may have helped some students who didn’t make to the instructor’s office.

A large percentage of the messages sent to the list were sent by the instructor for “house-keeping” purposes. It was used for posting of test scores, to alert students of upcoming deadlines, to inform students of new WWW resources, and to pass on various course, departmental, college and university announcements. Through specific assignments, students could be encouraged to use the lists more interactively. However, even this largely one-way use of a list provides time savings and increased efficiency.

IV. WWW SYLLABUS

The course syllabus was provided completely on the WWW. The syllabus included homework and reading assignments, test dates, project requirements, and links to additional resources related to the class. A model of a web site for a class is given in Figure 1. The arrows in the figure represent links to additional web sites.

In addition to the openly available pages, grade summaries were posted using code names at a URL given to class members only.

Students expressed a need for hard copies of the syllabus and other materials. If there is ready access to a printer that is capable of printing WWW documents, the students can do this independently. Otherwise, paper copies may still need to be distributed to the class. In order to allow students to download materials for easier printing and editing, links to “text only” versions of the assignments can also be included on the web site. In addition, these versions can be sent to the whole class via the mailing list.

When homework or project due dates are determined or changed during the semester, it is important to update the web site as soon as possible to avoid confusion to students.



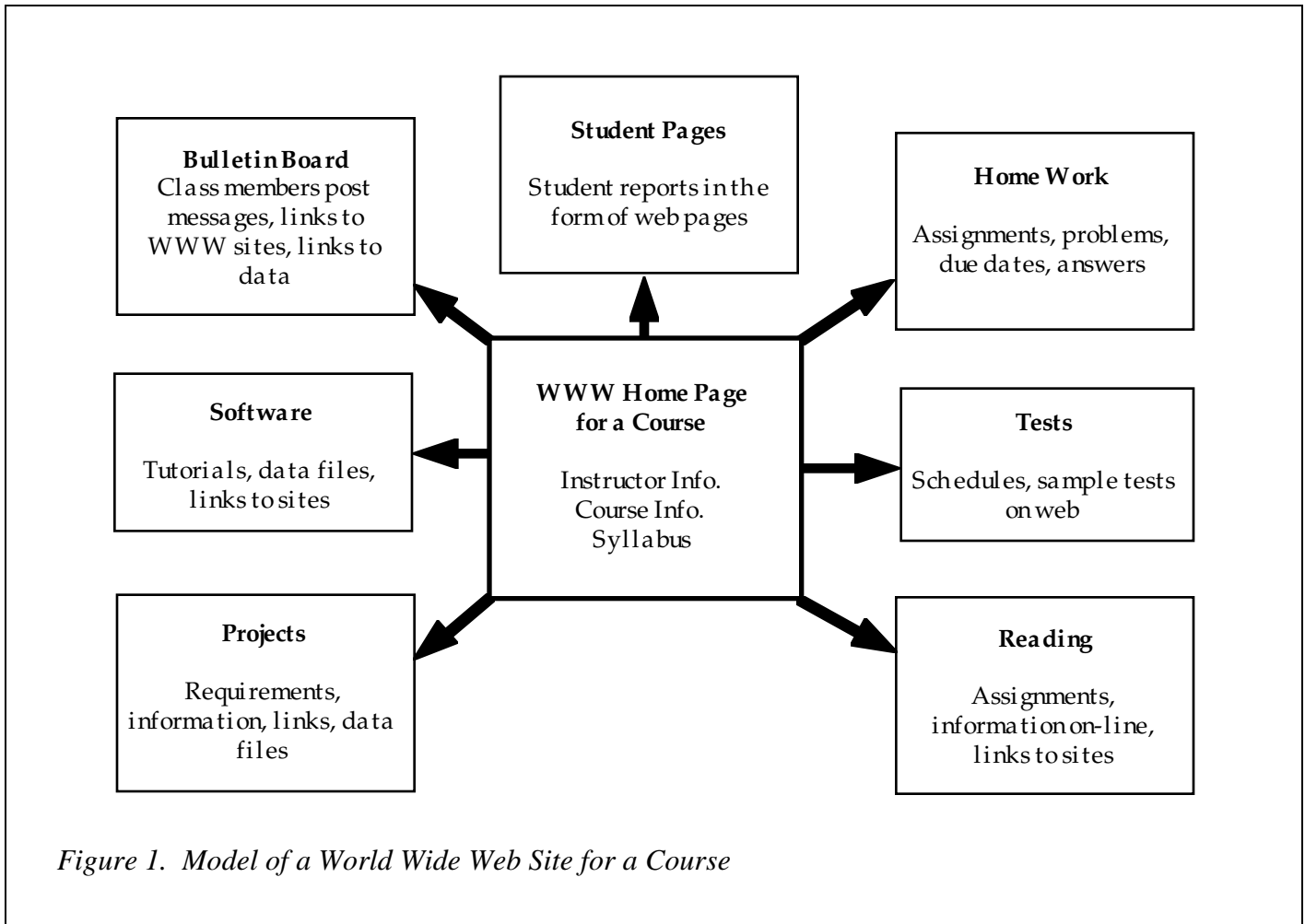
V. WWW TUTORIALS

The web contains an overwhelming amount of tutorial and instructional information. Numerous sites describing the use of HTML and graphics are readily available. Software and graphics are available and easily downloaded directly through the WWW. In addition, numerous programs called *filters* exist for converting word-processor formats to HTML. This allows for the easier conversion of existing course materials to the WWW format.

The WWW was used to present information to lead students through the process of learning about a software package to be used in the course. Specific instructions on how to get a program running on the KSU computer system were included, and links were provided to an interactive “Tour” at the publisher’s WWW site⁵. Students were required to visit the tour by a certain deadline. Problems occurred near the due date when the site seemed to become overloaded with students completing their assignments at the last minute. If a similar use of a remote site is planned, students should be warned about the dangers of waiting until the last minute.

At first, students were slow to explore and use the information on the web. Assignments were made that required them to access the information and use it to complete assignments. By the time the first assignment was complete, the students seemed quite comfortable using the web.





VI. STUDENT WWW REPORTS

As an alternative to submitting reports on paper, students were required to write a report in the form of a WWW page. A number of WWW resources were used to guide the students through the process. Very little time in class was spent on HTML details. Students were directed to several good web resources and expected to learn the basics on their own^{6,7}. Although students were unsure when first presented with the problem, several of them commented later that they had wanted to learn more about the web, and they were glad that this project had finally prompted them to do it. The resulting reports were quite good. Several students produced effects that were beyond the instructor's capabilities.

In order to ensure that the students employed a range of WWW features, the students were required to employ at least three links to additional resources and at least two graphics in their pages. Because it is so easy to "borrow" graphics on the web, the use of graphics from other sites should be discussed. This provides a chance to discuss some ethical issues with a class. As part of this type of project, students should be required to either create their own graphics or get permission to use the graphics they borrow.

VII. DATA EXCHANGES

The Internet, WWW, and Email were used to distribute and collect data and instructional files for use in defining and completing course assignments. With a few simple steps, files can be linked to a web site for downloading to student accounts. This provides an efficient means of distributing data files for projects.

In several cases, students were allowed to submit homework assignments and project reports via Email. It is felt that this was a successful means of collecting work, however, there were a few obstacles. Because students use different mail programs with different file encoding methods, several files had to be re-sent and the instructor needed to learn to save and convert the various formats to an acceptable format. This was an educational process for both the students and the instructor! A good degree of organization is useful in collecting assignments in this way. It was found that a descriptive naming system that includes the student name and assignment identification can be quite useful.

VIII. STUDENT REACTIONS

Students in these courses possessed a wide range in Internet experience levels (i.e., from UNIX system administrator to World Wide What?). Students also had a varying range of computer access. University facilities were available for all assignments, but several students had computers and modems at home that allowed for easier access to web materials. In general, students were quite receptive to the use of the internet in these courses. Forty-six students answered a survey that is summarized in Table 1.

Question	Number of Student Responses				
	Disagree		Agree		
The use of the WWW in this class was worthwhile and should be continued	1	2	12	14	17
The use of the Email mailing list in this class was worthwhile and should be continued	1	3	6	14	22
The use of the WWW bulletin board in this class was worthwhile and should be continued	4	3	19	9	4
The WWW assignment was worthwhile and should be continued	3	6	5	14	18

Table 1. Summary of Student Surveys



IX. OBSERVATIONS

The Internet and World Wide Web provide a flexible resource that can be very valuable to the engineering educator. The simple coding language and “point and click” user interface make both building and using the WWW easy. This paper describes a few basic ideas that were implemented by the author after a few weeks of learning about the WWW on the WWW. The web’s structure of links and URL’s lends itself naturally to additions and modifications. You can design a basic structure and add onto it as you accumulate resources and additional information.

Students enjoy using and learning to develop web pages. The author would encourage anyone to visit her web page¹ and use anything they might find interesting. It’s fun!

- 1 <http://www.eece.ksu.edu/~starret>
- 2 <http://www-evat.mit.edu/report/>
- 3 <http://www.netscape.com>
- 4 <http://www.ncsa.uiuc.edu/SDG/Software/Mosaic/NCSAMosaicHome.html>
- 5 <http://www.wri.com/demo>
- 6 http://www.zdnet.com/~eamonn/crash_course.html
- 7 <http://www.ncsa.uiuc.edu/General/Internet/WWW/HTMLPrimer.html>

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