

8-15-1997

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## Recommended Citation

Earhart, Terry L. and Valentine, David W., "Information Systems Students and the World Wide Web: What should the undergraduate know?" (1997). *AMCIS 1997 Proceedings*. 159.  
<http://aisel.aisnet.org/amcis1997/159>

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# **Information Systems Students and the World Wide Web: What should the undergraduate know?**

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## **Abstract**

This paper explores the development and content of an undergraduate course aimed at teaching Information Systems students about the World Wide Web. The core issues to be covered revolve around the three concepts of the Model, the Mode and the Message of the Web.

## **I. Introduction**

The World Wide Web (WWW) has exploded onto the American cultural scene like something out of popular fiction. "Are you on the Web?" has become a question used to establish a sense of success or embarrassment. We are seeing a herd mentality rush to establish a WWW presence, and of course, the implementation details fall upon the already overloaded IS professionals in an organization.

In the academy, the problem is no less stressful: our undergraduate curriculum is already full. It has been noted that the IS96 Curriculum Model "has more areas of instruction and more skills to teach than any previous Information Systems curriculum model." [Elder, 1996] Yet, there is no mention of the Internet or the World Wide Web in that curriculum model. Where does one insert this new material, this new paradigm? What existing material can we jettison to make room for the new? How are the faculty going to get themselves tooled up for the endeavor?

This paper will discuss one possible answer to these questions. It describes and evaluates a new course offered to undergraduate IS majors. In particular, we want to focus on issues of course design and methodology, answering the question, "What should the undergraduate know about the WWW?"

## **II. Required Topics: The Model, the Mode and the Message of the Web**

The WWW presents a unique problem in course design. Berners-Lee and Andreessen did the seminal work for the WWW in 1991 and 1993 respectively. To put it bluntly, the Web just has not been around long enough for us to have an established, accepted paradigm for teaching about it. The WWW is one of the forces pushing IS curricular design [Pick and Schenk, 1996]. One text is a collection of essays from "the Industry Leaders"; 'leader' is defined as one who was using the WWW in 1994 [McCoy, 1996].

As we examined the IS 95 Model Curriculum and Guidelines, it seemed obvious that a study of the World Wide Web naturally fell across three of the fundamental areas: IS'95.2 Personal Productivity with IS Technology, IS'95.3 Information Systems Theory and Practice, and IS'95.6 Telecommunications.

As we reviewed the current literature, it seemed natural to organize the required topics around three central themes: the Model, the Mode, and the Message of the WWW.

### **A. The Model of the WWW.**

The first question asked by non-IS professionals about the WWW is: "What exactly is it?" People are familiar with the PC and a particular local area network, and it is only natural to visualize the WWW in terms of their LAN. "Where is THE server located?" becomes a natural question: that is the model they

know and use. The concept of Client/Server is lost amidst IP addresses, DSN, TCP/IP and the like. Yet understanding the Client (browser)/Server model is fundamental to understanding WWW.

We found that the best way to clear up this misunderstanding was to let students install their own server software. We provided a dedicated Windows 95 PC with an Internet connection, and had the students locate, download and install server software from the WWW. Once students were able to call up their own server from another site, most of the 'mystery' of the Client/Server model disappeared. Their server became another site among the tens of thousands of servers around the world.

Many authors recommend that during development, we should examine our pages with a variety of browser software. This also provides a form of learning for our students. The WWW ceases to be just a 'Netscape' thing or an 'Explorer' thing, when you use a variety of browsers with essentially identical results.

Once students have seen, touched and used both sides of the Client/Server model, issues like IP addressing, Domain Name Servers, TCP/IP and SLIP have a place to fit in their thinking. Their understanding grows from the kernel of the Client/Server model.

## **B. The Mode of the WWW.**

Of course, the essential medium of the WWW is HTML, the hypertext markup language; it is the mode of communication. Our undergraduates need a solid introduction to its syntax, its semantics and elements of style. Students generally expressed a surprised delight when they see HTML for the first time: it's easy, it makes sense, and with just a little practice, they can construct 'real Web-pages'!

It is our belief that the best way to teach HTML is by example. Students readily grasp the syntax of a simple page. Then by examining other pages, they extend their knowledge. We espouse a model of simplicity: students are encouraged to stay well within the limits of commonly implemented HTML constructs. Since our goal is communication, it is counter-productive to use language elements not recognized by all browsers.

While we instruct the students to actively copy HTML elements from sites they enjoy, we do vigorously address the issue of intellectual property rights and copyright. Generally this is not a problem because of the 'gift mentality' still on the Web. Most authors take it as a compliment when asked if we can borrow an image or two from their site.

While the syntax of HTML is very straightforward, the semantics of the language are more difficult to codify. That is, we can quickly construct syntactically correct HTML documents, but judging how the reader will receive the document's meaning is less clear. The newness of the WWW phenomenon, coupled with the headlong rush to new HTML standards and extensions means we are aiming at a moving target. Once more, our goal is simplicity. Whenever possible, we want to use conventional design elements that will be quickly (and correctly) interpreted in the Web culture.

The discussion of semantics quickly leads to elements of style. A page written in a good HTML style will be a page whose semantics are correctly interpreted; that is our goal. Yet the 'experts' disagree on what is good style. So, students searched the Web for various HTML style guides or recommendations. As a class, we consolidated those recommendations with the comments of our textbook, producing a class-approved style evaluation checklist. That checklist became a valuable tool as we evaluated existing Web sites, as well as our own work.

Finally, we needed to address the issues of CGI scripting, Java applets, push-technology and other emerging Web features. While we espouse simplicity, we fully recognize that what is cutting edge today will be 'simple' in six months!

## **C. The Message on the WWW.**

Tom Vassos, Internet Strategies Manager for IBM, has said: "The Internet is not about marketing and mass markets. It's about people- individuals with unique aspirations, needs, desires, and cultural backgrounds." [Vassos, 1996] Our goal is to communicate our message clearly to those people.

We organized this course around a team-based semester project. Student teams selected various organizations for which they wanted to construct Web sites. These organizations ranged from campus clubs to not-for-profit agencies in our community. In each case, students are working with an external organization that has a message they want communicated on the Web.

The first task was to find several existing WWW sites dealing with the same kind of topic and to evaluate them. Here is where our class-developed evaluation check list proved so useful. Once the teams had located a set of quality sites related to their topic, then they were ready to begin planning their own site.

Working on a site for a real organization, with a view to really publishing the results, introduces a wide range of practical issues: hiring an ISP versus doing it in house; the need for continual maintenance and updates; security versus access, appropriate use (and size) of graphics, and others. In each case, students have in their projects a concrete paradigm that helps them organize their thinking. Our goal is to communicate the client's message to the best of our ability. The diversity of our clients and projects provides a richness to the class discussion as teams share their progress and problems.

We are there to project our client's message into the Web culture, understanding the WWW model, and using the WWW mode of communication.

## **III. Results of the Course.**

The best testimony about the success of our approach is the quality of our final semester projects. Unlike so many of our current, bloated software packages, the WWW and HTML present the novice with a very short learning curve. Students were immediately encouraged as they built their first page. The immediate feedback and gratification were very stimulating.

The ease of the learning curve also meant that within a single semester, students could invest a much larger proportion of their time in the actual design and implementation of the project. Less time is spent 'doing mortal combat with the software.' The computer seemed to disappear in the design process; rather than being an enemy, it became an essentially invisible design tool.

Of course, once they mastered the fundamentals, the student teams naturally rushed forward into what has been called the "cool stage" of development. We had team projects with JavaScript applets, audio files, CGI scripts, and clickable maps. The media itself seemed to draw the students forward into the design process. And of course, they complained that our lab was hopelessly behind the times because we were running Navigator 2.0!

For the instructor, the course was both a joy and a frustration. It was a joy, because for the first time in a number of years, the medium itself seemed exciting to the students. There was no need to artificially generate student enthusiasm. It was reminiscent of the situation years ago when just using the computer itself was exciting for undergraduates, before it became a mundane part of campus life. It was a frustration because the environment is changing so quickly that we spent the whole term shooting at a moving target. But that too became part of the learning in the course. For example, students on their own discovered browser side clickable images and how to do them. That technology is not even mentioned in any of our course texts (and the texts were published within the last year).

For others looking to put up such a course, our recommendation is simple: just jump in and do it. Find the best book you can (the trade publishers like Que seem closer to the developing edge than traditional textbook publishers), and leap in. The Web itself can be an excellent learning tool. For example, the following sites are helpful:

1) <http://applenet.apple.com/hi/web/web.html> ,

2) <http://ds.dial.pipex.com/pixelp/wpdesign/wpdintro.htm> and 3)  
<http://www.webcrawler.com/WebCrawler/Facts/Servers.html>.

Almost all of the mystic will quickly disappear, and you will be pleasantly surprised as the shortness of the learning curve. Keep reminding yourself that almost everyone else is just as much a novice as you are!

While each team member has become (hopefully) an expert in the domain of their client's world, they have seen and learned from the other teams in the course. They have seen how the Model, the Mode and the Message on the WWW can be adapted to a variety of client needs. Even in the course of a semester, they saw and were able to adapt new design features of the Web into their projects. This was perhaps one of the more rewarding learning experiences for our students. Even if they themselves do not go on to positions of WWW responsibility for their firms, they will be able to understand and communicate effectively with those who do bear those responsibilities.