

Enhancing Business Classes With the World Wide Web

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Though the Internet existed for many years before Vice President Gore raised awareness among the general public with the term “information superhighway,” it was largely unknown outside academic and scientific circles. That is changing rapidly as the advent of easy access through the World Wide Web has caused an explosion of interest and availability of new information. The World Wide Web is officially described as a “wide-area hypermedia information retrieval initiative aiming to give universal access to a large universe of documents.” Special software called a “browser” provides a user-friendly interface to this vast web of information.¹ Educators, like most other professionals, are being challenged to change the way they do their jobs.

The World Wide Web (WWW) is being used as a tool to improve three classes in the College of Business at Oregon State University (OSU). Each student has an individual network account and is taught to build WWW pages. WWW pages are used in a wide variety of ways to eliminate the need for hand-outs, publish reading assignments, make class announcements, build common support resources, conduct peer reviews of student papers, and give “hands-on” exams in a computer lab. We conclude this article with a description of tips, tricks, and traps we discov-

ABSTRACT. This article describes how the World Wide Web (WWW) is being used as a tool to improve three classes in the College of Business at Oregon State University. The examples illustrate how other business professors could use the WWW to communicate information about classes, publish teaching materials, teach students to build WWW pages, and test students’ skills. The course-specific objectives achieved in these classes included students learning (a) about Internet, World Wide Web, and hypertext; (b) more about one specific subject area; and (c) the rules of copyright law. The WWW projects also support general learning objectives to develop students’ organizational skills, writing and presentation skills, ability to coordinate with others, meeting deadlines, and learning to think ahead.

ered while experimenting with the WWW in these three classes.

Since the first business applications of computers over 40 years ago, applications to the business of education have also been explored. Alexander (1995) reviewed the evolution of instructional technology. The benefits expected from computer-based instruction were many—freedom to follow individual learning paths, the convenience of self-paced work, richer materials, and automatic measurement of progress (Kulik, Bangert, & Williams, 1983).

The WWW can have substantial advantages over traditional ways of exchanging instructional information.

Specifically, the WWW platform does the following:

- Allows faculty and students to cooperate in developing stronger teaching materials. These commonly developed WWW areas provide future classes with access to in-depth and up-to-date information.
- Makes it possible to have every student’s work go through a peer-review process that encourages students to revise and improve their initial work. This also gives students multiple perspectives on their work and provides students with more extensive and timely feedback than the instructor could provide.
- Makes possible collaborative development of course materials in academic areas that would be too small or fragmented to support development of a commercially viable textbook.
- Sidesteps many problems of distance learning, because WWW pages can be accessed from anywhere in the world.
- Allows class materials to be revised and “re-published” instantly. This ability is particularly important in rapidly changing areas in which paper-based textbooks can be obsolete by the time they are published. But it also provides a convenient mechanism to correct errors in any discipline. For example, we were able to correct errors in midterm

and final exams during the exam itself by editing the exam's WWW pages.

- Holds the potential to lower the cost of education by eliminating the need for students to purchase some or all textbooks.

- Can provide important linkages directly to the professional world. For example, by linking class notes to outside resources, the instructor can provide a relatively easy way for students to read primary source materials—all without having to physically go to a library.

Communicating Information About Classes

The World Wide Web offers outstanding opportunities to improve communication among students and instructors. Presently, 22 classes in the

College of Business have WWW pages. Some pages have minimal information about the instructor and office hours, whereas others have extensive information including course objectives and description, textbook excerpts, links to class schedules, lecture notes, assignments, exams, and other class materials.

These course-specific materials generally are organized for students and presented through a home page similar to that illustrated in Figure 1. The Web-based information is available as an ongoing reference for students taking the class and can be updated whenever a change occurs. The materials are also available to academic advisors and prospective students who want to explore courses before graduation. In the future, this will also be an important link to

other institutions in the Oregon State System of Higher Education as cooperative courses develop on multiple campuses. The materials could also form the basis of online classes offered at remote locations.

Published Teaching Materials

The teaching materials published on the WWW fall into two categories:

- Standards and shared resources
- Materials to enhance specific courses that would be difficult (or expensive) to deliver in another medium

Standards and Shared Resources

The World Wide Web is being used to provide students with the following:

- Standards and examples of proper-

FIGURE 1. Class Home Page Using Graphic Buttons to Organize Class Materials Into Major Categories

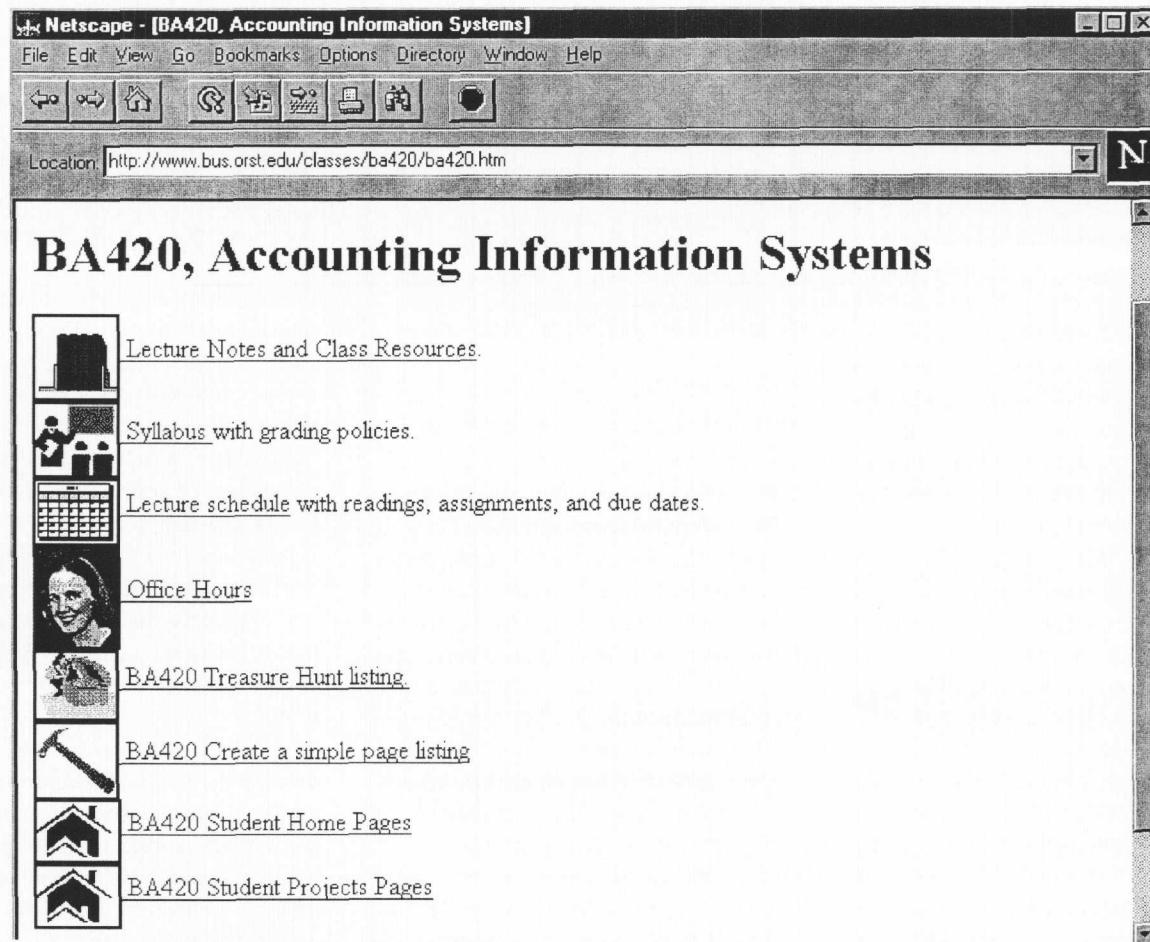
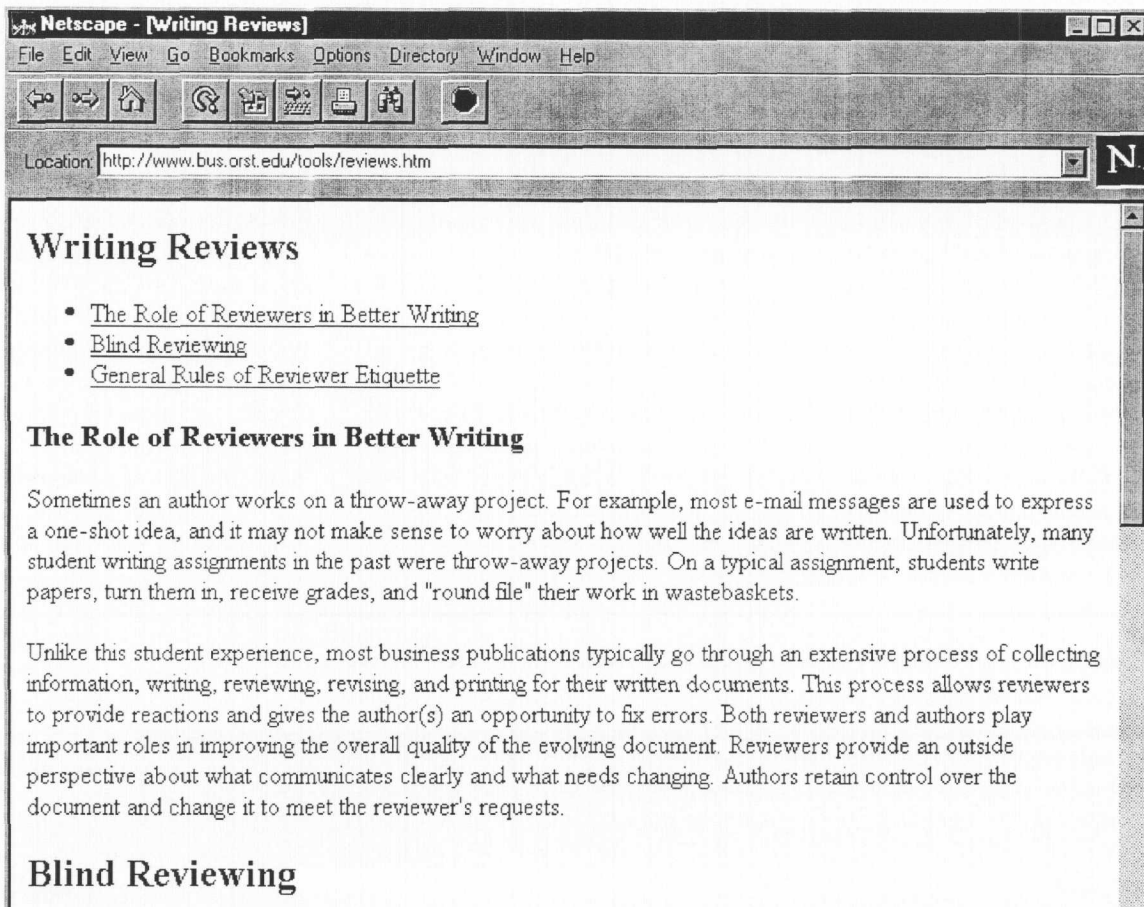


FIGURE 2. Page Communicating Shared Information About Reviewing Other Individuals' Work



ly prepared business memos, reviews, and so forth. In Figure 2, we show a sample of a resource that we developed collaboratively and that is now readily available through the World Wide Web to all faculty colleagues for use and/or improvement.

- Instructions for computer operations specific to our lab configuration, such as capturing graphic images.
- Links to outside remedial resources like Purdue's On-line Writing Lab (OWL) at <http://owl.trc.purdue.edu/>.
- Links to domain-specific information sources for marketing or accounting and finance that may not be included in our campus library.

Objectives of these resources include limiting the amount of time that instructors spend "reinventing the

wheel" and reducing the disparate messages that students sometimes receive from professors within the same college about the "right" way to do something. The latter is particularly troublesome when there are several "right" ways to do the same task. For example, a professor of organizational behavior with a background in psychology might prefer the APA Style of footnotes and bibliographic entries, whereas a professor who publishes in economics and finance might prefer a Turabian style. Without standards and guidelines, students can be caught in the middle.

Course-Specific Materials

A sense of inadequacy about teaching materials played a role in our development of WWW resources in the follow-

ing three classes, even though the reasons underlying these inadequacies varied considerably. This section will help the reader understand the challenges we faced in delivering adequate materials to students.

Materials for accounting information systems. In the case of accounting information systems classes, inadequacies result from the rate of change in technology and the fragmentation of the market for textbooks. The WWW is used to deliver lecture notes and tutorials. Its principal benefit is in the shared availability and responsibility for developing teaching materials among colleagues at different campuses. Examples of this use are found in the fields of electronic sabotage, artificial intelligence, and expert systems.

Materials for risk management. The number of universities teaching classes in risk management is relatively small, and the choice of textbooks is much smaller than in many fields of business. For example, the course at OSU used *Essentials of Risk Management* for several years. Though this book offers an excellent introduction to the field, it is written primarily for professionals who may have been in the workplace for several years and generally lack some of the financial and statistical background of seniors currently majoring in finance. Because the book's level is too low for an upper division college course, we obtained permission from the holders of the copyright to convert it into a hypertext markup language (HTML) format and posted portions of an edited version on the World Wide Web. In this format,

remedial course material is placed behind a line and thus can be passed over by students familiar with it or readily accessed by students whose skills need refreshing.

In addition to basic textbook material, the World Wide Web is also being used to deliver (a) cases used in classroom discussion, and (b) more sophisticated material than the textbook includes. For example, the book *Underwriting Profit for Insurers under CAPM* was posted in HTML format, with permission from authors Blaine Nye and Jane Nettesheim at Stanford Consulting Group, Inc. For the risk management class, a principal benefit of the World Wide Web is improved teaching materials for future classes by building on the work of previous students. Using the students' research time to ex-

pand and update the materials will strengthen the materials available to all future classes. In Figure 3 we show a listing of some projects and topics that students produced during the 1994–1995 academic year and that will enhance the resources available to students during 1995–1996.

Materials for information technology. In the information technology class, students learn how to use recently released application software by reading assignments and tutorials directly from World Wide Web pages. This allows assignment-description pages to be linked directly to tutorial pages. Because screen-capture images can be included in the tutorials, students can see exactly how to complete each step. Everything—instructions, tutorials, and the appli-

FIGURE 3. Page Linking Student Projects “Under Construction” in the Risk Management Class

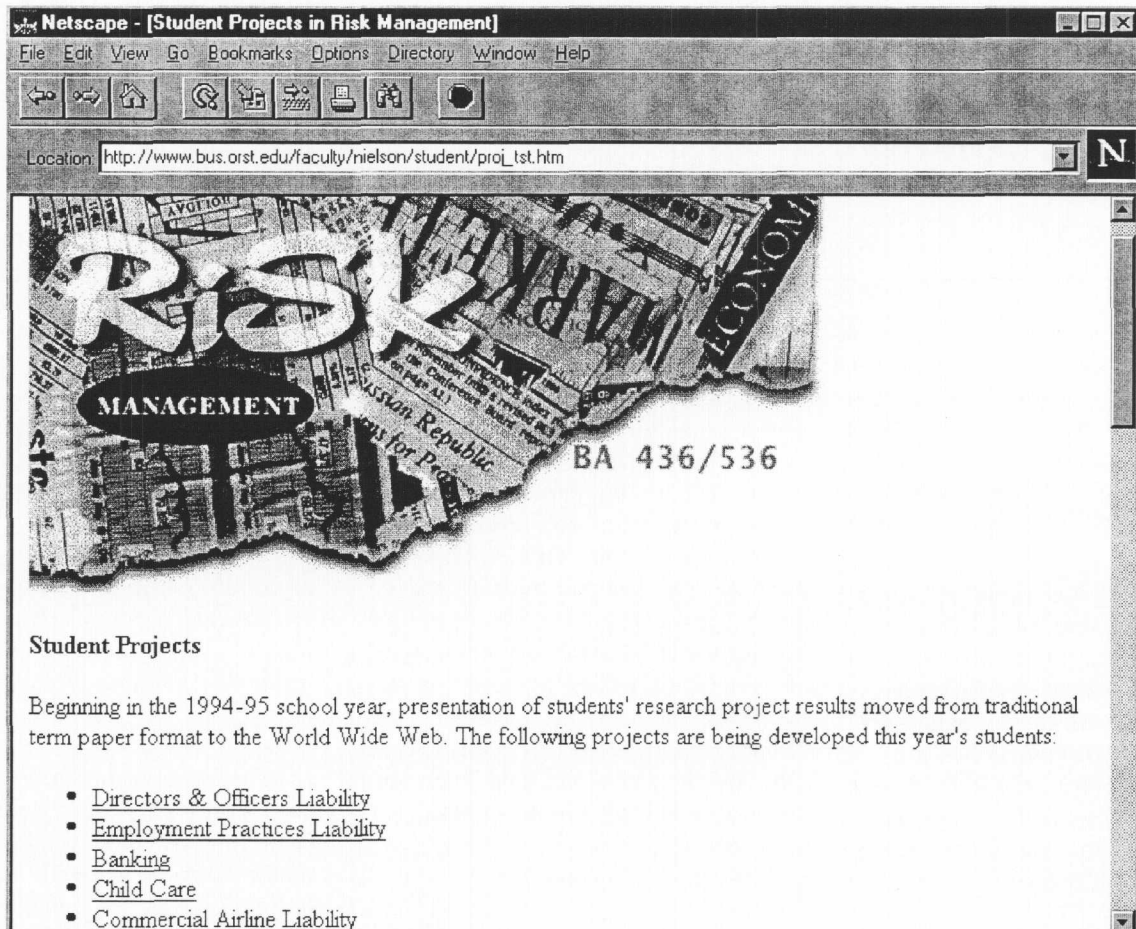
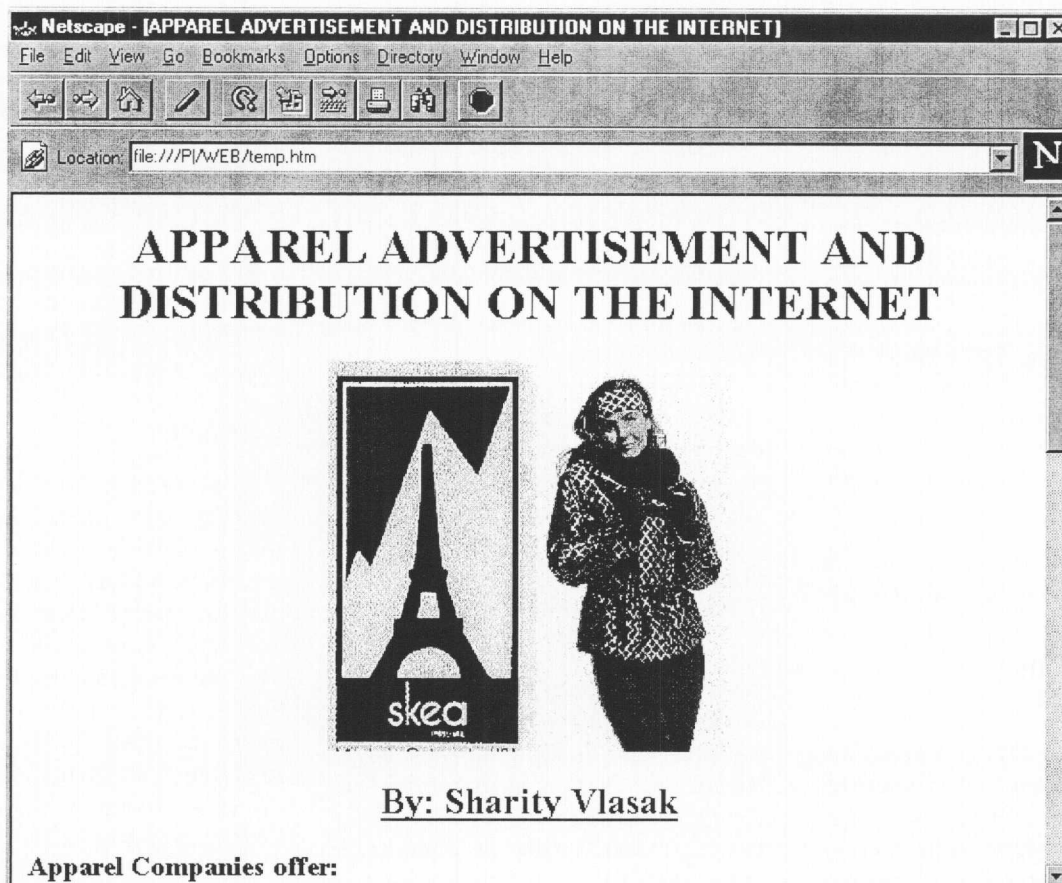


FIGURE 4. Example of Lively Mix of Graphics, Text, and Hypertext Links Among Pages of a Student-Built WWW



cation programs—appears in different windows without the need for any printed material. For instance, an assignment requiring students to use a scanner is at <http://www.bus.orst.edu/faculty/sullivan/ba271/assign/photo.htm>, and tutorial instructions for the assignment are at <http://www.bus.orst.edu/tools/capture.htm>.

Teaching Students to Build WWW Pages

By asking students to prepare a simple Web page with graphics and various kinds of links to other pages, we have been able to achieve two learning objectives necessary to today's business graduates: to (a) learn about Internet, World Wide Web, and online communication in general, and (b) learn the basic con-

cepts of hypertext. Some of the professors use WWW assignments to teach the technical skills associated with developing Web pages; others emphasize the material presented on the students' Web pages while incorporating the technical skills on an almost "incidental" basis. Students are assigned to research a topic and develop and publish a Web page on it. The learning objectives for this phase include an appropriate selection from the following list:

- Learning more about one specific subject area
- Learning to follow basic rules for adhering to copyright law both in print and online work
- Developing skill at organizing material in a linked hierarchy of pages

- Developing writing and other visual presentation skills
- Developing the ability to coordinate with others
- Learning to meet deadlines and plan ahead

An important part of each assignment is for students to review each other's work in a formal peer-review process. Without a common computer network to store and distribute drafts of written work, the management of a peer-review process would be so time consuming and error-prone that all three instructors would have to skip the process entirely. The learning objectives for the peer-review process included

- Improving the quality of written communication,

- Learning to reconcile conflicting comments,
- Learning to give and receive constructive criticism, and
- Learning about additional specific subjects as developed by fellow students.

In Figure 4, we show a sample student page. Details of the variation used in the three classes are available at the following Web sites:

- The information technology class (business software applications): (<http://www.bus.orst.edu/faculty/sullivan/instruct.htm>)
- The accounting information systems class: (<http://www.bus.orst.edu/faculty/brownc/methods/assn-420.htm>)
- The risk management class: (<http://www.bus.orst.edu/faculty/nielson/methods/teach436.htm>)

These URLs can be used to view the actual pages provided for students to use.

Testing Use of the World Wide Web

Articles such as that by Byrnes, Debreceny, and Gilmour (1995) described the development of generic tools to provide multiple-choice testing facilities on the World Wide Web.² The Information Technology class has been using World Wide Web for “hands on” testing of students’ ability to build Web pages and to deliver instructions for taking a test on creating database tables, queries, forms, reports, and so on. The testing is not limited in any fashion to multiple-choice formats for the exam.

The instructor begins the “hands-on midterm” with an instruction page that lays out the ground rules for the exam. Though students are encouraged to practice for the exam, they are not permitted to use work prepared in advance. After receiving a set of general exam instructions, students are assigned one of four color-coded examinations, for which specific instructions are accessed by clicking on the correspondingly coded icon at the bottom of the general instructions WWW page. One midterm exam required students to

1. Open PowerPoint and use the Pick-a-Look wizard to create an On-Screen Presentation.

The specific color-coded exam instructions told students

- which background template-design to use,
- what to type into the slides’ titles,
- what to type into the three bullets in the body of the first slide,
- what images to place in the slides,
- how the bullets should “build” one item at a time when the slide is viewed in the slide-show mode, and
- how the slides should wipe (or transition) from one slide to the next.

2. Save the slide presentation with a specified filename.

3. Capture a specified graphic image using Paint Shop Pro and save to a specified filename. This was used as an icon for the WWW page created in the next step.

4. Launch an HTML editor and use it to open a previously prepared HTML file that includes instructions to

- Modify the file to include a link to the course readings that proved most useful during the course. For example, students who “thought the first day’s lecture was the best (perhaps you feel the class has been all downhill since then . . .)” were instructed to prepare a link to the URL for that day’s lecture.

- Write a sentence describing what made that lecture so good (or what made the other lectures worse!).

- Write an essay on the topic specified on color-coded exam instructions. Students were instructed to write clearly and describe their topic in an understandable way. They were permitted to copy material found elsewhere (perhaps from an e-mail note or a Web page), but were to identify the source of any material that was not their original work.

5. Send the instructor an e-mail message with a short note critiquing the exam. Students were instructed to include their ID number in the subject line of the message and to attach the files from the PowerPoint exercise, the Paint Shop Pro exercise, and the WWW page exercise.

More Information

More specific information about how WWW has been integrated into the

classes described in this article can be found at the following Web locations:

- Information Technology in Business, a required sophomore class for all business students, has its home page at <http://www.bus.orst.edu/classes/ba271/ba271.htm>.

- Accounting Information Systems, a required senior class for accounting students, has its home page at <http://www.bus.orst.edu/classes/ba420/ba420.htm>.

- Risk Management, an optional senior class for finance students, has its home page at <http://www.bus.orst.edu/classes/ba436/436syll.htm>.

Conclusion

A pioneering article by Vannevar Bush in a 1945 *Atlantic Monthly* called for “mechanically linked information-retrieval machines to help scholars and decision makers” deal with the explosion of information already underway. The Internet offers the linking to which his vision referred; the World Wide Web offers the public ready access to the information contained on the Internet. Widespread adoption of the World Wide Web truly signals a move to a world where the ability to find information is at least as important as knowing the information. Educators in business and every other discipline need to move quickly in that same direction.

NOTES

1. The most popular browsers today are Mosaic and Netscape, but it is likely that within a year or two many people will use a browser that comes built into their word processor.

2. Examples of such tools include Carleton College “tutorial gateway” (<http://www.civeng.carleton.ca:80/~nholtz/tut/doc.html>), *Qform* (<http://www.satlab.hawaii.edu/space/hawaii/qform.html>), and *WWW Tutorial Delivery* (<http://www.ets.bris.ac.uk/ets/resource/tutorial.htm>).

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