

Techniques to Enhance Online Lecture Materials

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More educators are beginning to utilize course home pages in order to make their classes more interactive and accessible. Such features as an online syllabus, course schedule, links to data files and supplementary materials, and discussion boards are becoming more common. Some even include online lectures, lecture outlines, or examples. However, online lecture materials are often not as effective as they could be. Often they are simply a linear, online version of the presentation materials. This paper will show a few simple techniques that can be used to enhance online lecture materials.

The author assumes that most readers are able to create a web page. Although some people design their web documents through line-by-line coding in the hypertext markup language (html), a great many people are turning to web authoring tools because they are easier to use (Hoyer, 2001). Tools like FrontPage make web creation relatively easy, and even Word allows documents to be saved in html format.

This paper does not discuss techniques that require sophisticated programming skills, like Java animations, or enhancements that require special software, like Flash. Rather, this paper will describe some approaches that intermediate and even novice users can utilize to make online lecture material more effective.

The paper begins with an examination of different considerations that must be taken into account when planning online lecture material. It then presents techniques to make those materials more useful. After a discussion of online authoring, the paper concludes by addressing the issue of Fair Use and ways to avoid copyright violations.

ONLINE LECTURE MATERIALS

Many professors prepare lecture notes and examples prior to each class. As technology and tools become more familiar, transparencies and overhead projectors are giving way to computer-supported presentations delivered by digital projection systems on large screen displays. This gives rise to at least three considerations when preparing notes:

- Should the notes be made available to the students via the Internet?
- How much detail should the notes include?
- What format should be used?

Availability

The decision as to whether to make course notes available over the Internet has both supporters and detractors. The author long ago made the decision that the benefits of posting online notes outweighed the drawbacks. One of the major benefits is accessibility. Notes can be created from home or from the office, posted online, and then accessed from the classroom without taking the risk of forgetting to carry a diskette to or from class. Further, students can read the notes from any machine that has Internet access, whether they live on campus or not. More importantly, if students have a copy of the lecture, they can concentrate on what is being said in class rather than frantically taking notes.

A common argument against online notes seems to be that it encourages students to skip class. The assumption is that if students do not have to attend class in order to take notes, they may

opt not to. However, this unintended consequence should be kept in perspective since increased absences can also result when professors provide students with photocopies of lecture notes (León and Parr, 2000). Further, regardless of the depth of the notes, the actual lectures invariably emphasize the more important topics and put a unique spin on the course content. Personal experience has detected no decrease in attendance, even with the availability of detailed notes. However, attendance policies can always be implemented if need be.

Detail

The designers of course notes must also decide how much detail to include in their notes. The answer to this question should be driven by pedagogical goals, not by technology. Lecture notes ranging from a brief outline of the topics covered to something approaching a full transcript of the lecture can be provided. If your intent is to develop a class discussion and generate questions, then a brief outline is sufficient. Students can print the brief notes before class and write in much of the detail during the discussion. On the other hand, if the goal of that particular class session is to show the students how to accomplish a specific task, more detailed notes that include examples can be used. To encourage attendance, some of the contents of the notes can be left out of the student-accessible notes and be made available by the instructor only during class. Whether providing outlines or detailed notes online, the advantages for the students is that they can concentrate on what is being said in class instead of writing constantly, and that the notes will be available in a well-organized fashion for further review after the class session ends.

Format

If class notes are made available online, the format becomes an important factor. Both PowerPoint files and html files can be posted online, but in the author's view html offers several advantages.

- Online notes are generally viewed with a browser. Notes created in PowerPoint, a Microsoft application, generally retain their appearance when viewed with Microsoft Internet Explorer. However, when viewed with Netscape Navigator, PowerPoint notes often suffer in appearance. Although PowerPoint offers an option to support all browsers, the resulting html files are often unacceptable when viewed in Netscape. In contrast, a presentation in html format will generally appear similar in all browsers.
- Further, html offers more navigational flexibility than PowerPoint, especially if a table of contents is incorporated, as discussed below.
- Finally, html allows better referencing of online resources than does PowerPoint.

Implications

Online lecture materials are used differently than materials in traditional course management. Students can download copies of the material, and print them only if they want hard copies. This is a "distribute-then-print" alternative to the current "print-then-distribute" paradigm using paper (León and Parr, 2000). In addition, depending on the level of detail, the online notes can serve as a quick reference when students are working on an assignment.

León and Parr (2000) provide a table that compares the use of online materials with traditional course management. A portion of that table is presented below.

Table 1: A comparison of the use of online materials to traditional course management.

Dimension of Difference	Class with No Course Home Page	Class Supplemented with Course Home Page
Distribution of handouts and other information	Push - Professor prints, hard to update, one time, hassles	Pull - Students print, easy to update
Student misses classes	Student visits professor who searches the pile of materials from the course for handouts, coverage, etc.	Student checks course home page
Next year's class preparation	Revise old notes	Revise old notes and course home page
Data sets	Distribute by floppy or type	Download

ENHANCEMENT OF ONLINE MATERIALS

The web tools discussed in this section are applicable to lecture notes that are developed in html format. They make use of the multimedia aspects of the Web so that online materials are more interesting and useful than traditional printed materials.

Many of the web tools make use of JavaScript, a technology for enhancing the capabilities of a web page, and where appropriate additional information about implementing these features is provided. However, a detailed understanding of these technologies is not necessary to make use of the techniques discussed, and links to working models are provided in Exhibit 1.

Web Tool: Pop-ups

Often, lecture notes may include terms or concepts that students should be familiar with, but some may need a reminder. In addition, it may be helpful to provide definitions of new terms without disrupting the continuity of the lecture notes.

A pop-up window is a web browser window that is smaller than a standard window and lacks some of the standard features, such as tool bars or status bars. Pop-up windows are popular for small sidebar-style pages that are digressions from the main page. With pop-up windows, a user can display a secondary web page in a smaller window by clicking on a link.

When lecture notes contain terms for which a definition must be supplied, or a topic that needs expanding upon, the term or topic can be associated with a link. The definition or discussion can be stored in a separate html file. When the user clicks on the link in the lecture notes, it opens a smaller window that displays the html file that contains the definition. When the user is finished reading the secondary file, the pop-up window can be closed. The original window containing the lecture notes remains unaffected. This allows students who already know a concept to read through the main page without being bothered with extraneous information, but those in need of further explanation can use the pop-up window.

Pop-up windows can be conveniently created using relatively simple JavaScript scripts embedded in the html file that contains your lecture notes. See the Exhibit 1 for information on JavaScript pop-up windows.

Web Tool: Image Swapping

Lecture notes often contain example exercises that the professor works through with the students to demonstrate the problem-solving process. While it is helpful to include the solution in the notes so that it can be shown to students, at the same time it may be better to omit the solution so that students are forced to reason it out without too much guidance. The ideal approach is to include the solution, but to make it visible only when the professor wishes to reveal it. The “mouseover” can be used to implement this solution. A mouseover is generally used to change the image on a web page as the user's mouse rolls over it. In effect, the web page swaps one embedded image for another when the mouse cursor is rolled over the image area.

To accomplish this, two images must be created: a blank image that is embedded in the notes where the solution should be located, and another image of exactly the same size containing the solution. What the students see when they browse or print the html notes is a blank area where they can fill in the solution, but during the lecture, when the professor moves the mouse over the designated spot, the actual solution appears on the screen. When the mouse moves away from the spot the solution image is again replaced by the blank image. As an alternative, the notes can also be set up so that the solution is displayed when the professor clicks on the blank image, and remains visible unless he/she clicks again. Links to working examples and JavaScript code to make this work can be found in Exhibit 1.

Web Tool: Table of Contents

Lecture notes can be very involved and often cover a range of related topics. To help make the notes more usable, a table of contents can be included in online lecture notes. The table of contents serves as an outline of the material (Knox, 1997). The table of contents can take the form of an html menu, listing all topics included in that set of lecture notes, each providing a link to the specific page or section that discusses the topic. A table of contents makes it possible for students (and the professor) to easily locate and go directly to specific sections of online notes. This ability to navigate to almost any point with only two or three mouse clicks makes a site more comprehensible for students (Knox, 1997). A table of contents is useful when a student is attempting to locate specific topics in lecture notes as they work on a homework assignment, or when the professor wants to refer to a specific topic during class. Further, the table of contents is very helpful for reviewing the material, allowing students to move quickly to a particular section of the lecture (Knox, 1997).

A simple table of contents can be easily implemented using bookmarks. A bookmark is an item or location in a document that is identified and named for future reference. Bookmarks can be used to quickly jump to a specific location in an html document. Each topic in the notes can be associated with a bookmark. A table of contents can be included at the top of an html page by creating a list of topics, and linking each topic in the list to its associated bookmark. Then, when one of the topics is clicked, the browser will jump to the bookmarked location in the notes.

More sophisticated tables of contents can be created using JavaScript. The table is created as specified above, but stored in a separate html file. When the user clicks a button in the lecture notes, a pop-up window containing the table of contents appears. Such scripts are generally referred to as remote controls. The remote control contains links to the various sections of the site. When students click a topic link, the remote control closes and they are taken to that section in the main window. Links to JavaScript code to implement remote controls are available in Exhibit 1.

Exhibit 1: JavaScript

There are several JavaScript tutorials available on the Internet. For example, for non-programmers there is <http://www.webteacher.com/javascript/>. For experienced programmers there is <http://www.wdvl.com/Authoring/JavaScript/Tutorial/>.

One of the most useful sites for functional scripts is The JavaScript Source at <http://javascript.internet.com/>. Many of the scripts described above were either obtained directly from the site or slightly modified.

The scripts described in the text can be found at <http://cob.isu.edu/parkerkr/exhibits/javascript.htm>.

ONLINE AUTHORIZING

As online lecture materials evolve, you will find that in comparison to writing printed material there are both similarities and differences in preparing your online materials. As in any form of writing, structure is important, but the capabilities of online delivery add new dimensions that must be considered.

The structure of lecture material is vital, regardless of the form of delivery. Although there are various approaches, whenever possible I prefer to define the topic, provide a justification, and then discuss the details. Another alternative is the problem-requirements-solution approach. The student approaches online lecture materials with roughly the same expectations that they bring to a textbook. They expect to be able to understand quickly what the lecture is about, to be able to move through it readily, to have a clear idea of the boundaries of the work, and to be informed by the content (Knox, 1997). By remaining aware of that and by maintaining consistency in the structure that is used throughout your online materials, you will often notice an improvement in student comprehension.

The availability of hypertext and the ability to provide links to unlimited resources must factor into our design of online materials. A hyperlink is a connection from one page to another destination such as another page or a different location on the same page. Online documents are inherently different from printed material, whose very nature prevents references to other material from being followed up instantly; there has to be an effort on the part of the reader to seek and retrieve the other resources. Online documents are able to provide seamless links to additional material online, allowing the reader to maintain attention on the subject content itself rather than on the task of retrieving it, leading to vastly improved learning (Shaw and Polovina, 1999). Carlson and Everett (2000) underscore this point:

The use of hypertext and linkable material is what enhances your online course and makes an online course a rich experience. It allows your content to be connected to relevant Web resources. As a result, it gives your student a new depth of understanding and adds a new dimension to course lectures. Print content is still superior to web content because of speed, type, and image quality. The Web is superior in terms of interaction and user engagement.

Online authoring should take advantage of the online environment by providing students with relevant hyperlinks to web-based material within your course content. Therefore, writing online content becomes different from writing content for other media. As a result, we have to change our writing style to reach our online audience (Carlson and Everett, 2000). Content can take many forms on the web. Knox (1997) points out "we are [not] simply putting content on the Web, we are putting it there in a particular form." He further notes that

So many variables enter into the equation—the personality and tastes of the teacher, the constraints of the discipline and subject matter, the technology itself, the type of students, and so on—that one cannot reach general conclusions. The important lesson is that a form works best with a conscious pedagogy underpinning it. (Knox, 1997)

The nature of hypertext invites non-linear presentations, but the old-fashioned lecture format is still viable (Knox, 1997). The use of target frames can help to maintain linearity while at the same time taking advantage of the richness of hyperlinks. If the target frame html tag for off-site links includes the target="_blank" specification, it will cause each link to open in a new browser window. If this is not done, the linked document will replace your document in the current window and the browser's "back" button must be used to take the student back to the original page. Student surfers can easily become lost or distracted, and it is often safer to simply open a link to a different site in a new window. The "_blank" parameter is widely used in web pages that are devoted to links to other online resources. By opening a new window for each resource, the user has a sense of a "main" page (the list of resources) and "secondary" pages (each individual resource). Be sparing in your use of the "_blank" parameter, because opening an excessive number of windows may irritate some readers. See Exhibit 2 for more information on target parameters.

Exhibit 2: Target Parameters

Target parameters control where the new document will be displayed when the user follows a link. Most of the time, clicking on a link simply loads a new document in the current window. However, with target parameters, you can have the new document open in a new window, or if you are using frames, in another frame.

- target = "_blank" opens the new document in a new window.

More details can be found at http://cob.isu.edu/parkerkr/exhibits/target_parameters.htm or the Idocs Guide to HTML <http://www.idocs.com/tags/>

LIMITING ACCESS TO NOTES

At times, it is necessary to include copyrighted material from textbooks, such as images and figures, in course notes. While this is allowed under Fair Use guidelines, we have the responsibility to ensure that this material is not available to those not enrolled in the course. The sections that

follow explain Fair Use, and then discuss some precautions that you can take to assure that you are in compliance with Fair Use if you must use copyrighted material.

Fair Use

According to the Copyright Act of 1976, copyright owners have the exclusive right to reproduce, prepare derivative works, distribute, transfer ownership, rent, lend, perform or display their creations. Fair Use is a legal principle that defines the limitations on the exclusive rights of copyright holders in order to promote free speech, learning, scholarly research and open discussion in accordance with the First Amendment. Educators, scholars and students can develop course notes using portions of copyrighted works under Fair Use rather than by seeking authorization for non-commercial educational uses.

Without infringing copyright, educators can:

- make or have made for them a first generation copy for personal use of an article or other small part of a publicly marketed copyrighted work or a work in a library's collection for such purpose as study, scholarship, or research; and
- make transitory copies if ephemeral or incidental to a lawful use and if retained only temporarily.
- expect rights of use for nonprofit education to apply in face-to-face teaching and in transmittal or broadcast to remote locations where educational institutions of the future must increasingly reach their students.

The Fair Use Guidelines for Educational Multimedia state that

- Educators may use their multimedia productions, which contain portions of copyrighted material, for teaching purposes, up to two years after the first instructional use with a class. Use beyond two years requires obtaining permission for each copyrighted portion incorporated in the production.
- If at any time the educator wants to commercially reproduce or distribute the work, he or she must obtain copyright permission for all copyrighted material.
- For practical purposes, the guidelines strongly advise the producer to take steps to obtain permissions during the development process rather than wait until after the product is completed when it could be more difficult.
- Educators can use the unfinished unreleased production for teaching purposes over a closed network or distance learning system provided there are technological limitations restricting access to the network and program, such as a password or PIN, and the technology prevents making copies of copyrighted material.

The courts favor educational use over commercial use when determining Fair Use. It is more likely acceptable when the copyrighted work is altered into something new or creative, including quotations or graphic images into an online presentation (Thoms and Motin, 2001). See Exhibit 3 for links to more information on Fair Use.

Exhibit 3: Fair Use

There are web sites that explain Fair Use. A good analysis is presented at <http://www.libraries.psu.edu/mtss/fairuse/dalziel.html>. See also

Fair Use Guidelines for Educational Multimedia	http://www.indiana.edu/~ccumc/mmfairuse.html
Educational Fair Use for Digital Images	http://www.aam-us.org/text/fairuse.htm

Web Tool: Password-Protected Links

To ensure that copyrights are not violated and you are making “fair use” of copyrighted materials that are included in your online materials, password protection can be used. Password protecting notes makes sure that only authorized individuals have access to the online materials. There are many ways to password protect a web page. One of the easiest to implement utilizes only a single password, and anyone who knows that password can access the site. Passwords are not assigned on an individual basis. For simple password protection of a page or a series of pages, Active Server Pages (ASPs) can be used. The concept is simple: when a password-protected page is loaded, an ASP script is executed to see if the user entered the correct password. A login form must be created for the password-protected pages. The script executes when the page loads. If the password has not been entered, or if it is incorrect, the protected page does not load.

As noted, password protection helps to meet the Fair Use requirement of limiting access to the material. In addition, it allows the professor to post a homework solution for a teaching assistant while preventing students from accessing it. See Exhibit 4 for links to resources to help setup password-protected pages.

Web Tool: Date-Triggered Links

Date-triggered links allow an entire set of course notes to be posted in advance, while still preventing student access until shortly before the notes are discussed. When date-triggered links are used, links refer to a "Page Unavailable" page until a specified date, at which point they are automatically reset so that they refer to a valid web page. It is possible to specify an activation date as well as a deactivation date for each individual link. If the current date falls between the activation date and the deactivation date, then the link points to the valid page. Otherwise, the link points to a generic "Page Unavailable" page.

Date-triggered links help to satisfy the Fair Use requirement that material that contains copyrighted items be retained only temporarily. Like password protection, date triggers are most easily implemented using Active Server Pages. For more details on implementing date-triggered links, see the links provided in Exhibit 4.

Exhibit 4: Active Server Pages

Information on ASPs can be found at <http://www.sitecrafters.com/support/asp/index.asp>.

Details about the ASPs described in the text can be found at <http://cob.isu.edu/parkerkr/exhibits/asp.htm>.

Web Tool: Robots Meta Tag

There are numerous search engines on the web that employ software “robots” that continuously scour the web for new pages to index for searching purposes. If you are using copyrighted materials, you may want to prevent your online course notes from being indexed by the search engine robots. The Robots Meta tag allows html documents to indicate to visiting robots if a document may or may not be indexed, or used to harvest more links. (Currently only a few robots pay heed to the Meta tag.) It is a fairly simple process, requiring the insertion of only one line of html into your file. Information on how to accomplish this can be found in Exhibit 5.

Exhibit 5: Robots Meta Tag

Information on the robots meta tag can be found at <http://www.robotstxt.org/wc/meta-user.html> and <http://www.robotstxt.org/wc/exclusion.html>.

Implementation details about the robots meta tag can be found at <http://cob.isu.edu/parkerkr/exhibits/robots.htm>.

CONCLUSION

Online lecture materials can be a boon to both students and educators, and when we begin to take advantage of their potential, they can greatly augment the learning environment. Pop-ups used for clarification, image swapping used for the demonstration of solutions, tables of contents used for navigation, and hyperlinks used for reference and reinforcement, all contribute to making online materials invaluable. Judicious use of technology helps to grab students' interest in the classroom, and extends the learning process beyond the classroom.

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