Using the Web in the Classroom

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Abstract

Providing additional channels for intra-class communication, offering a much easier and convenient way to access information and materials traditionally available in academic libraries, and allowing students to engage in primary not necessarily quantitative research or active learning are the three major, interrelated, yet distinct ways to use the Web in the undergraduate classroom. The first two ways are relevant for any course on any topic; employing the Web as a tool for gathering mostly textual information is particular promising for a many courses in the social sciences. For all three uses of the Web, specific advice for instructors as to available sources and modes of utilization is given. Didactic and technical challenges are discussed in the context of the college at large, of support and resources provided by computer services and the library. Special consideration is given to the situation at large public urban institutions of higher learning.

Introduction

The Internet and, in particular, the Web is changing a wide range of activities in the workplace and at home like the way we do our banking, make travel arrangements, purchase goods, access news, plan our leisure time, and -- last but not least – the way in which we communicate with others. Consequently, teaching and learning are affected as well and to some extent irrespective of an instructor's preference to use or not use the Web. The Web has drastically changed and continues to change information gathering and the acquisition of knowledge, and simply ignoring its existence in the college classroom would be a serious disservice to our students. The question, then, is not *whether* we should use the Web, but *how* we should use it in order to exploit its full potential for the intellectual development of our students and to guard against negative consequences of its unwise use.

Several distinctions need to be made to break down this rather complex issue into more manageable pieces. First of all, we need to distinguish between using the Internet/Web
•   as additional channels of communication both between instructor and student(s) and among the students in a class and
•   as a source of substantive contents supplementing and maybe replacing sources such as conventional textbooks and the materials (books, journals) found in a traditional library.
Secondly, as a source of contents, we need to distinguish between
•   traditional library material which now can be accessed via the Web,
•   traditional archive material that for all practical purposes has not been available to the average undergraduate student but which is now accessible on the Web, and
•   the wide range of information and data offered by the millions of web sites world wide.

Uses of the Internet/Web as additional channels of intra-class communication and as a much more efficient and convenient way of accessing traditional information sources (that required a physical visit to the library in the past) are not restricted to any particular field or any particular topic. In this sense, the Web can be brought into any classroom, no matter what course is taught. Notwithstanding technical requirements in terms of adequate access to suitable computers and additional burdens on the instructor, there are undisputed benefits and relatively few drawbacks to this kind of Web use.

Uses of the Internet/Web as a source for non-traditional contents, however, promises even more significant benefits but poses a number of serious problems as well. Greater benefits – in social science courses – because by their very nature many courses in sociology, political science, and other social sciences deal with the "world out there" and the Web allows to bring this world directly into the classroom, to access primary sources rather than dated secondary accounts and summaries in textbooks. The Web makes it possible to realize the concept of the (undergraduate) student as a researcher, to shift the balance between reproductive learning and active discovery. These uses of the Web require careful planning on part of the instructor in order to guide this discovery, to contain frustration, and in order to avoid that the technical aspects take center stage. While it is useful when students learn how to type in a course on English composition, writing not typing must remain the focus. Similarly, in any social science course the focus must remain on the substance matter, be it the "Sociology of the Family" or "American Government", and not on surfing the Web or developing web pages. However, while even less successful (inner city) high schools usually succeed in teaching students how to type, there are no uniformly accepted standards for computer or information literacy and related skills tend to vary greatly among college students. Uses of the

Web as a tool of information gathering, then, can easily produce more confusion and distraction rather than a deeper understanding of the substance matter.

Finally, bringing the Web into the classroom can be seen as a first step towards Making a course suitable for (asynchronous) distance learning. However, between a conventional classroom based course and distant learning delivery lies a wide range of different degrees of incorporating the Web and other Internet services into a course. While distance learning is enthusiastically embraced by some, it provokes strong negative reactions on part of others. In general, administrators tend to support the idea of distance learning, often sensing economic advantages (reaching more students with fewer faculty), while many faculty are deeply worried about a loss of academic control, intellectual property, and last but not least faculty lines through an advent of distance learning. While the implications of Web use for distance learning are obvious, we will not discuss these ramifications, positive and negative, in more detail. No matter how reluctant one may feel about the current trend towards distance learning, it is not sufficient reason to forego putting the Web to its most productive use in the conventional classroom.

The Web as additional channel of communication

Chances for direct contact between instructor and student vary in the average undergraduate class. They range from close to zero in large lecture hall classes with over a hundred or even several hundred students to theoretically fairly good in smaller classes with 30 to 40 students. At my home institution, Hunter College -- a large public urban institution located in the heart of Manhattan -- most undergraduate classes in the social sciences are indeed taught in smaller sections. But even in these smaller settings many students are reluctant to participate actively in classroom discussions. More importantly, most students at Hunter College as well as those at other colleges in the CUNY (City University of New York) system – all in all close to 200,000 students – commute to school and many face significant obligations at work (being forced to maintain employment) as well as at home caring for children of their own and/or other relatives. Typically, most students – even those formally considered as full-time – come to school two or three days a week only or fit classes around a busy off-campus work schedule. Typically, conventional office hours are used rarely and, if at all, most likely for inquiries about a grade, negotiations about deadlines and/or missed assignments, requests for letters of recommendations, and other business with immediate consequences for the student. In addition, many faculty prefer to work at home, also restricting their presence on campus to scheduled class periods and a weekly office hour.

Using e-mail. The situation at a college in small town with everyone living on or near campus is certainly very different from a large urban institution. Still, contacting the instructor with some 'dumb questions' is often seen as an imposition – sometimes by both student and faculty. *E-mail*, then becomes an important channel of communication between instructor and student – even if physical co-presence is not a major issue. The asynchronous character of this form of communication allows both parties to use this channel at their preferred time. Students can send an e-mail message when they feel the need for clarification, when a question occurs to them. They don't have to wait for the scheduled office hours possibly several days away, they do have an alternative to trying to talk to the instructor after class -- under time pressure and often in quasi-public. Faculty can respond to e-mail messages during some "down" time when they are not preoccupied with other business, maybe with writing a research paper. While a phone call is often disruptive (and many faculty carefully guard their home phone numbers even if they spent most of

their work time off campus), e-mail communication is not. Today, offering e-mail accounts to all members of an organization (like to all students in a college) does not demand a great deal of technical investment though efficient, safe, and reliable maintenance of a large e-mail system does require considerable expertise. Colleges underdeveloped in the information technology (IT) area may have the necessary hardware, but are likely to lack such support staff. However, these days everyone can easily get a free (usually web-based) e-mail account. While hotmail.com was a pioneer in the area starting free e-mail service in July 1996 (in late 1997 it was acquired by Microsoft), there are now offers galore, and the only price to pay is a deluge of advertisement banners on the corresponding web pages.[1] Beyond one-on-one communication, e-mail can be used to broadcast to all students in a course. This can be conveniently done by either setting up an address book entry ('nickname') in the instructor's mailer program (and basically all mailer programs offer this option) or by having the college e-mail administrator create an 'alias' for the list of addresses for all students in a course on the system side. The latter obviously requires that students have college rather than private accounts and that such service is offered by the local computer service unit. At Hunter, any instructor can obtain such a system alias (e.g., "soc241") for any class upon request. This way, not only the instructor but any individual student can easily broadcast to the whole class – which may not be the optimal choice in all circumstances.

Broadcast e-mail has some advantages over postings to a course web page (see below) in that there is a better chance of actually reaching the student in time – if the student checks his or her e-mail account at all. A second advantage is that e-mail can be easily accessed by using low grade hardware, such as 286 stations running under DOS. Supplying e-mail *accounts*, however, is just a beginning. At Hunter, e-mail accounts are created automatically for every enrolled student. However, many of these accounts are dormant and many students don't even know about their existence. To make e-mail a widely used and effective tool in a course setting, the instructor must introduce the tool. At some colleges and especially in lower division classes this may have to include actual instruction in the use of e-mail – an unwelcome distraction from the actual course content. However, as long as a college does not define an IT literacy standard and implement related instruction as part of freshmen orientation and/or in form of workshops (for transfer students), instructors will face the necessity to either provide this training themselves or organize supplemental workshops possibly with the help of specialists in computer services or the library.

The course web page. The center piece of a Web-enriched course, however, is a course-specific web page. This web page can be thought of as an electronic form of the traditional reserve shelf in the library – except that it can easily be made much more comprehensive, into a repository of all course related documents being continuously updated over the course of the semester. Depending on the specific nature of a course, the web page can contain some or all of the following: syllabus, assignments, selected articles/texts, clippings about recent events/data, study guides, class summaries, feedback on assignments/exams, (selected) students' work/papers, technical advice about using Internet-related tools for intra-class communication, general announcements (deadline reminders, schedule changes, etc.), "web guides", "links" to online data bases, and "links" to other sources around the world.

Some of these items are obvious, others need some additional explanation. In particular, the last three items go beyond the use of the Web for intra-class communication and will be discussed in more detail in a subsequent section. To start with the obvious, a course page should include the syllabus, of course. However, the syllabus should be made available ahead of the registration period which may lie -- depending on the college schedule -- considerably ahead of the start of classes. Ideally, students would check the syllabus to see if the course meets their expectations and

interests, if they are sufficiently prepared for this specific class. Currently, few students go to the trouble of checking physical postings of syllabi ahead of registration; time slot rather than course contents seems to be the most relevant factor in explaining students' course choices.[2]

The course web page can also contain postings of assigned readings. Here, however, the thorny issue of copyright needs to be considered.[3] As far as hard copy is concerned, it has been well established under which circumstances copyrighted material can be used without obtaining prior permission, what constitutes 'fair use'. If an instructor puts one copy of a journal article on conventional reserve, individual students can get this copy and legally make another copy for themselves. The widespread practice of course packs, however, where the instructor selects a number of copyrighted articles, has them xeroxed as a set, and distributes these sets to students (either personally or via a commercial copy service) does require prior permission – though copyright violations in this area are frequent. The process of obtaining permissions can be lengthy and the fees vary considerably between publishers making a strictly legal approach rather cumbersome and often costly. But, there are commercial services offering to take care of everything and an instructor may not want to know whether or not the commercial service cuts any legal corners in the process – as long as the packs are available on time and at a reasonable price. In contrast, 'fair use' of electronically stored material is not clearly defined and legal opinions differ widely. Again, the safe way is to obtain prior permission, but for the most part this is rather impractical. At the other extreme, posting a copyrighted journal article on a web site accessible to everyone without permission is certainly a violation of the law. Colleges run great liability risks if they let instructors do this. An approach with good chances of standing up to legal scrutiny is to restrict access to a course web page to the students enrolled in this class and to remove any copyrighted material at the end of the semester. There are good reasons to keep the course web page itself and legally non-sensitive items beyond this; above all, it provides an opportunity for future students to find out more about a course, in particular, about the didactic approach taken by a specific instructor.

Assignments, study guides, class summaries, and feedback on assignments or exams do not need additional explanation. The crucial issue here is that posting to a course web page makes these materials available to students 24 hours a day, 7 days a week – even in cases where a student had to miss class due to time conflicts arising at work or at home. Class summaries – certainly an added burden on the instructor – are particular useful in providing an opportunity for students to catch up; the notes taken by a good friend are often not particular helpful and a rather poor representation of what really went on in class. This does not necessarily imply poor note taking, but notes taken in class are -- by their very nature -- mostly a means to stimulate one's memory. Unless transformed into a complete account after class (certainly not a common occurrence among the students at Hunter), they rarely constitute a self-contained and accurate rendering. Critics may claim that a course web page of this sort encourages students to cut class. While this is possible, such critics underestimate the genuine problems students at an institution like Hunter College face and the maturity and dedication of "non-traditional" students. In addition, any class session that does not offer more than what a summary can provide to those physically present must be considered a didactic failure. Not providing summaries just to keep class attendance high is a rather poor strategy.

Finally, the course web page can be used to make students' work available to each other to stimulate mutual discussion and critique. Theoretically, it is possible to do this in a traditional classroom by distributing xerox copies of student papers to everyone. In practice, this is hardly an option given limited copy budgets and the scarcity of help. Putting student papers on a course web page, in contrast, requires very little work and no additional funds -- as long as students are

required to submit their work on diskette (or via e-mail attachment). Knowing that papers will be available to everyone in the class may serve as an additional incentive to try hard and to do one's best. On the other hand, having a less successful paper openly displayed may be an embarrassment and thus counterproductive to a students' development. So, there is no hard and fast rule how this option should be used. It is conceivable to post only a subset of all papers, maybe the better ones in the view of the instructor. Another possibility is to post papers without names and specific personal references – like in the peer review process of academic journals. Beyond intra-class discussion, successful students often like to show off the results of their hard work. With student permission, such papers can be posted to a part of the course web site that is available to everyone, e.g., to the web surfing grandmother (to cite an actual request by one my students).

Bulletin boards and chat rooms. The course web page is certainly the center piece and e-mail offers a convenient way to communicate about what is displayed on the course page and what goes on in the physical classroom. However, there are two more tools to involve students more actively in a course. One is a course-specific bulletin board offering an opportunity to students to post messages of their own, read other students postings, and reply to them. In other words, to engage in an asynchronous exchange of views and ideas. It usually takes some instructor involvement to start a meaningful discussion. E.g., in a course on the sociology of the family, the instructor could post a provocative thesis (like "Marriage has nothing to do with love, it is a business proposal.") and invite students to respond to it. The "invitation" can in form of a (graded) assignment requiring each student to respond to the original thesis as well as to at least one comment by another student. Sometimes, students take advantage of this option without any prodding. E.g., faced with less than ideal conditions in the computer lab, many students vented their anger on the course bulletin board in a recent course by one of my colleagues. A bulletin board is an important instrument for 'community building', for bringing students in touch with another – especially when they rarely see each other outside scheduled classes at an institution like Hunter. Bulletin boards have great advantages over using e-mail in this respect. All contributions are readily available at one location and they can be visited at the convenience of the individual student. They also avoid that students get swamped with a great number of e-mail messages.[4]

The second option is to use a course-specific chat room to offer an opportunity for synchronous discussion outside the physical classroom. For example, if team assignments are given, teams could meet in the chat room at a pre-arranged time to discuss their work. Rather than spending two hours for the round trip to commute to and from college to meet in person (over the weekend), a chat room meeting may provide a more efficient use of time. Of course, communication in basic chat rooms via typing is slow and hardly adequate for discussions of complex issues. But it works quite well for exchanging factual information, e.g., about work progress, literature found, or next steps to be taken. The next step would be to move from chat rooms to video-conferencing, but then more advanced hardware is needed. At least for now, this is not a realistic option at colleges like Hunter.

How to set it up. While all this may sound exciting, the practical issue is how the average instructor can do this. Does it take a computer whiz to bring the Web into one's classroom? Does it take a well staffed and cooperative IT/IC unit in the college to provide ongoing support? Apart from access to suitable hardware (which we will discuss below), the answer is basically no. It is fairly easy for any instructor to create and maintain a course web page (as described above) if the college provides a convenient shell or platform for these activities.

At Hunter, we currently use software called ERes (Electronic Reserve Shelf) developed by Phil *Kesten*, a physics professor at the University of Santa Clara, and now marketed by the Docutek

corporation. ERes provides an administrative shell that makes it extremely easy to create and maintain course pages using a web based interface. Instructors obtain accounts for the ERES system (but they do not need shell accounts on the server), then they can create and modify web pages for their courses without having to rely on IT/IC support.[5] Students and others can access the ERES course page system freely via the Web from anywhere in the world -- notwithstanding instructor imposed access restrictions to parts or all of specific courses pages. As an instructor option, the ERES system automatically creates a bulletin board and a chat room for each course. Course pages in the ERES system are best viewed with the Netscape browser (version 3.0 and higher) and a number of features require javascript support. ERES does not include student accounts for each course. Apart from the supplemental bulletin boards, chat rooms, and e-mail ('mailto') links, it is a one-directional system with the instructor as sender and the students as recipients. There are several other systems on the market including TopClass, MHLA (McGraw Hill Learning Architecture), WebCT, and Lotus Learning Space.[6] These more elaborate systems allow to monitor individual students' use of posted material, to administer (individualized) exams, and to provide (automated) feedback to students like machine scored results of a multiple choice test. We will focus on the low cost one-directional alternative in this paper. To obtain a first hand impression on how such a system works visit an active ERES installation like the one at Hunter College or the company's web site.[7] Computer-savvy faculty only need about an hour or two of basic introduction to start using the system; faculty with less computer familiarity (quite common in the social sciences, arts and humanities) profit from having a (student) assistant assigned to them for a limited period of time to get them going. At Hunter, we offer "jump start" workshops for all interested faculty and a number of grants that provide 20 hours of support by a student assistant.[8]

ERES and similar systems do not assist in producing web material, they simply help in making such material (in a wide variety of formats including handwritten notes) available and to easily maintain a table of contents (the starting web page for the course) working either from home, the office, or any place in the world with a computer connected to the Internet. ERES does allow to use documents in standard word processing format, but due to file size and the necessity of having special viewing software installed on the recipient side this approach is suboptimal. The actual production of material in a format well suited to web distribution requires other tools. In this area, enormous progress has been made in that current versions of the most common word processing programs (like MS Word and WordPerfect) include options to easily save any new document in html (web) format and to convert existing documents (like syllabi from previous semesters) to it.[9] In addition, the Netscape composer is just one free, but convenient and powerful tool to create and modify web pages.

The Web as a source of substantive contents

As stated above, as an additional channel of communication the Web can be brought into any classroom irrespective of discipline or specific topic. A course on "Postmodern Thought" can benefit from its use as much as course on "Calculus", on "Social Welfare", or on "Medieval Art History". In this respect, there are no differences between the arts and humanities, the natural sciences and mathematics, and the social sciences. When it comes to substantive contents, differences do emerge and we contend that in (some of) the social sciences the potential benefits are the most significant. However, for almost any course in any field with a research paper assignment, locating and retrieving published findings and results is a key task. Typically, this task has been accomplished by a physical visit to the campus library and the use of catalogs (on cards or machine readable), browsing the stacks, perusing recent issues of academic journals, checking specialized

journals (with abstracts), and – more recently – accessing data bases on CD-ROM using dedicated work stations in the library. However, much of this substantive contents has now become available via the Web with much more to come in the future.[10]

Traditional library material now accessible via the Web. Except for special collections, the transfer from card catalogs to machine-readable and computer-searchable data bases is probably concluded at most college and university libraries. Even remote access to the basic catalog via special dial-in or telnet is not a particular novel feature anymore. However, this type of access often requires knowledge of special phone numbers, the installation of special software, and familiarity with usage features specific to a particular catalog. A more recent trend is to provide a user-friendly Web interface to the catalog; a good example is the research branch of the New York Public Library which – unlike quite a few academic libraries – is available to everyone on the Web.

A good supplement to the book catalog of the college library – often short on funds and behind on purchases of recent publications are provided by the catalogs of online bookstores like the pioneer Amazon.com or recent e-commerce affiliates of established booksellers like Barnes & Noble. The searchable listings at these web sites come close to the electronic version of "Books in Print (BIP)," to some extent they provide even richer information. In many fields, they easily outmatch even the best-funded academic libraries when it comes to recent publications and they provide a great substitute at colleges that do not offer any remote access to BIP.[11]

Practical all important reference services like the Social Science Citation Index, Sociological Abstracts and similar compilations in other fields are now available in machine-readable form. At many libraries, however, these services are either not available or available to library staff only making access for faculty cumbersome and often barring access for (undergraduate) students altogether. In addition, differences in query language and user interface constitute a serious barrier to routine usage of such sources. However, commercial as well as nonprofit information services now provide attractive alternatives in making a large number of such data bases available via a common user friendly web interface. A prime example is *OCLC* (now: Online Computer Library Center, Inc.) – a worldwide nonprofit library consortium founded in 1967 as the Ohio College Library Center to develop a computerized system to share resources and to reduce costs now linking more "than 30,000 libraries in 65 countries and territories." Their "First Search" service now offers end users more than 70 databases to search. However, libraries my have partial subscriptions to First Search only, so your local connection may give you just a fraction of what is really there. In part, these data bases provide access to the full text of articles, in part they give access to abstracts or title information only. Web access is usually restricted to connections from a station with an IP address belonging to the school's domain.[12] Other such providers include *Project Muse* at John Hopkins University with full text versions of over 40 journals (as of fall 1998) and the *Uncover Company* based in Colorado.[13]
Finally, a number of online journals have emerged, some of them bypassing the traditional of production of hard copy and the dependance on commercial publishers altogether. Some of these online journal have illustrious editorial boards and follow as strict a peer review process as traditional hard copy journals. A good example is *Sociological Research Online* based in the United Kingdom. The number of these journals is growing and this field is very much in flux. The WWW Virtual Library Electronic Journals List provides a fairly comprehensive, yet not complete compilation of electronic journals.

A good deal of the information traditionally retrieved via a physical visit to the college library can be

accessed via the Web now, but most of it requires a license or a per case fee. This part of the Web is practically unavailable for classroom use – unless the college library has obtained a site license that includes (undergraduate) students. So, the extent of possible usage in this area is strongly determined by the college context and there are narrow limits to the creativity and initiative of the individual instructor. On the other hand, many faculty don't even know what web based information services are available on their campus – in part because they have not changed their own information gathering behavior and in part because libraries are not doing enough to educate faculty about these new options. Instructors contemplating using the Web in their classroom should consult with the specialists in their campus library to determine what it has to offer in terms of access to (licensed) electronic resources. With a shortage of funds at many places, it may not be much in terms of faculty research needs, but it may be a decent amount with respect to serving the needs in an undergraduate course.

Bringing the world into the classroom via the Web. In the vast majority of conventional undergraduate social science classes students are not expected to go beyond reading the textbook(s), the pre-selected additional articles, and using the resources a traditional library has to offer. Students are not supposed to do primary research, to dig up material in out-of-town archives, to collect information from organizations and institutions across the nation and possibly beyond, to keep a close eye on current events and developments in foreign countries, to find recent statistics or public opinion data on a controversial social issue. The reason is quite practical, students do not have the time nor the resources to do so. And even if they had the time and money, an instructor could not possibly guide and supervise a whole class of students possible going in very different directions. The Web has changed all this. Via the Web the "world" has come within easy reach, data and information are abundant – some good and useful, some dubious and misleading. Instead of solely relying on often not quite current and one-sided information in textbooks, students can now check out the facts for themselves, find recent and comprehensive evidence before drawing a conclusion and/or taking a position on a social issue.[14]

Most of this information is textual rather than quantitative – quite in contrast to the early use of computers in the social sciences and the analysis of numerically coded data sets in social statistics courses. These textual sources can be roughly classified as follows:[15]
- *Government and legislative documents* (like The White House Electronic Publications, Federal Legislative Information, FedWorld Information Network, National Conference of State Legislatures, NY State Government Locator Service)
- *Legal documents* (like court decisions by the US Supreme Court and the US Federal Courts)
- *Historical documents* (like the Historical Collections (National Digital Library) at the Library of Congress, the Directory of Historical Resources from the History Computerization Project at USC)
- *Documents produced by (non-governmental) organizations and institutions* (like APC (Association for Progressive Communications) and APC Members (from over 25 countries), the US APC affiliate called Institute for Global Communications (IGC) with its subdivision Econet, Peacenet, Womensnet, Labornet; Townhall, a listing of conservative organizations, the list of extreme Right organizations from "The Militia Watchdog")
- *Newspapers and Radio/TV online editions* (comprehensive listings at News Resource with a worldwide directory with over 7000 entries as of fall 98 and the AJR (American Journalism Review) News Links)

In addition, there are many web sites that provide (mostly) quantitative information in tabular form,

as charts, or embedded in a narrative. Again, a rough categorization:

- Official statistics (the Bureau of the Census and information pooled from over 70 agencies at FedStats, Demographic Data Viewer at Columbia University)
- Public opinion data (like Pew Research Center, Gallup, Public Agenda)
- Basic Facts (like CIA World Factbook 1997)

The sheer volume of available information can easily be overwhelming, certainly for an undergraduate student, but for instructors planning a guided journey for their students as well. Luckily, the *Scout Project* at the University of Wisconsin continuously screens the Web for contents suitable for undergraduate teaching and publishes its findings in weekly reports providing the URL along with a short description (of typically 10-12 lines) for each selected site. These reports are discipline-specific; in addition to a scout report for the social sciences, there are scout reports for science & engineering and for business & economics. Reports are sent via e-mail (free subscriptions) or can be viewed at the project's web site. Previous reports – as of fall 98 over 5,000 scout summaries have been produced -- can be searched via a special search engine (Signpost). For both novice and experienced instructors (with respect to web enriched courses) the Scout Reports are an invaluable resource. For quantitative data, there is a corresponding web site at the University of California at San Diego, the Social Sciences Data Collection (SSDC). In particular, their listing of "Data on the Internet" is unparalleled; without doubt the absolutely best starting point in any search for quantitative data.

To make students' venture into the world via the Web productive, to make it an experience of genuine primary research rather than a frustrating and confusing odyssey with very uncertain outcome, I feel strongly that students should be provided with a "web guide" rather than just instructed in the use of general search engines like Altavista or Yahoo. While these general search engines are extreme useful to locate specific pieces of information, their efficient use requires a good deal of training and experience. A web guide, on the other hand, is an annotated task-specific collection of a limited number of starting points (links). Optimal extent and detail of such a web guide depends on the students' level of both IT literacy and subject familiarity. It may also be advantageous to break an assignment down into several steps (see, e.g., Shackelford at al. in this volume). Student discoveries in the first step can be incorporated into a more detailed web guide for the second step. At any rate, the instructor must be prepared to watch over the students' explorations and to check on the accuracy and validity of the reported findings. Without doubt, this approach creates a lot of work for the instructor and more ambitious (paper or research) assignments should be attempted in smaller classes only to ensure adequate feedback to each and every student.

Didactic Challenges

We have already mentioned one didactic challenge that arises with any use of the Web in the classroom: to make sure that the students have sufficient command of basic computer and IT skills like working in a Windows environment, using a mouse, and sending and receiving e-mail. While these skills can be taken for granted at many colleges with reasonably well prepared students, my experience at Hunter shows otherwise. Hopefully, given the current trend of increasing use of computers and the Internet in the society at large, the situation will improve over time. For now, however, it is worthwhile to make sure that the students in a web enriched course do have these skills. Otherwise, more ambitious uses of the Web may fail simply because a significant portion of the students is unable to master very basic tasks. On the other hand, class time is always precious and – with few exceptions – instructors typically feel that they do not have sufficient time to cover

the substantive material in sufficient depth. Setting aside another week or two at the start of a class to teach basic IT skills, is a decision most instructors are very reluctant to make. But with no college wide policies and provisions in place and facing under prepared students it may be the only sound choice. Still, it may pay to check with both the library and the IC/IT unit on campus to arrange for a workshop and/or tutoring sessions outside the regular class hours to bring all students in the course to a sufficient level of technical skills as quickly as possible. In this section, we will focus, on didactic challenges that arise specifically with using the Web as a means to engage students in primary research. I see three major issues: teaching how to evaluate Web sources and documents, teaching how to document and summarize explorations on the Web, and encouraging original work, fending off electronic plagiarism.

As mentioned earlier, the amount of information found on the Web can easily be overwhelming and the quality of the information varies widely. Producing (basic) web pages does not require great technical skills and most ISPs (Internet service providers) offer space on a web server as part of their basic package. ISPs exercise little control over the contents of these pages except for protecting themselves against liability and prosecution. Thus, they typically prohibit the display of pornographic material and other contents considered as violating existing criminal laws. Usually, however, they do not check on what may be called "intellectual or information fraud". And, unfortunately, it is very easy to set up a bogus web site and/or to offer doctored information.

For example, anyone can set up a page in the name of a non-existing organization say a "Center for the Study of Social Justice"[16] complete with a fictitious board or grossly misrepresent the status, composition, and/or goals of an (formally) existing organization. And this web site may publish false and/or misleading information, maybe doctored documents originally released by government agencies or bona fide non-governmental organizations. In the past, web pages created by individuals – fraudulent or not – could often be recognized by the specific format of the URL, a path starting with a " ~ ". Now, many ISPs provide official sounding addresses for a modest additional fee. In our example, a web address (URL) like "http://www.cssj.com/social-justice.htm" could easily be obtained without the need of setting up and running a web server.[17]

Information found on the Web, then, requires a much higher level of scrutiny than information found in a traditional library. There are exceptions, of course. Apart from an occasional hacker attack where the genuine contents of a site is altered by outside intruders – but typically in a way that makes the interference quite obvious, web sites run by well-established institutions and organizations are safe sources. Government documents found at an official government site can be assumed as genuine as if retrieved from a library depository; newspaper stories found on this newspaper's site as authentic as those found in the printed version; and policy statements and action programs by a special interest group or social movement organization (SMO) found on this organization's web site as valid as printed material received via snail mail. So, as far as authenticity is concerned, many sites can be considered safe. This is not to say that newspaper stories never contain false information; or that all figures published by the government are valid, but this is not a Web-specific problem. Assessing the validity of any piece of information whether found on a web page or in traditional print format is a separate problem.

Given the ease with which information fraud can be committed, there are two Web specific problems. The first is to check the background of a web site's owner or operator beyond a possibly impressing looking front and to determine a possible systematic, maybe hidden bias or agenda in the information found on this web site. The second is to check for alterations or misrepresentations of genuine documents. So, the real challenge lies in teaching how to evaluate what is found on the

Web, not so much in teaching how to find information in the first place. Of course, the two tasks are interrelated: good search strategies should include considerations of bias and trustworthiness and, consequently, will lead to documents that are less problematic. Luckily, not every instructor has to start from scratch to develop material suitable to help his/her students to meet these tasks. Quite a few libraries have developed general advice on searching for and evaluating material found on the Web. One very good set of materials has been developed at Widener University. These materials also contain links to similar resources at other sites.[18]

The second didactic challenge is to teach how to document and summarize material found on the Web. Documentation is not a major problem – in theory. All major reference and citation styles have been amended to cover the citation of web sources. The practical problem, however, is that URLs are much more transient than the bibliographic details for books and journal articles. Once published, these details do not change and the contents associated with the details does not change. There may be more than one edition of a book and even the publisher may change (mostly due to mergers and acquisitions in the publishing business), but still one particular edition of a book stays fixed in contents and is retrievable by one fixed set of bibliographical details. Not so, on the Web. The contents associated with a specific URL may change quite drastically. So, the contents at a specific web address in the summer of 1999 may be quite different from what could be seen at the same address in the fall of 1998. As the author of this piece, I have no guarantee that my discussion of the contents of a certain web page (for which I provide the URL) will make any sense to a reader in the summer of 1999 – simply because the owner of this web page has changed the contents significantly. A related problem is the frequent restructuring of web sites in which the location of documents gets changed and the URL no longer works. In a way, this is less of a problem. For one, the change is obvious. Secondly, in many cases it is possible to find the new location using a table of contents on the starting page or using a site-specific search engine.[19]

In a class setting, both problems are less acute because we are dealing with much shorter time spans, so the chances that both URL and associated contents will remain unchanged are better. However, increasingly, web sites make use of techniques like "active server pages." Here, the URL does not refer to a fixed page at any point in time. Rather, the URL points to a set of instructions of how to put together a web page based on an ever changing data base. Web contents, thus, becomes fleeting, escaping any attempt to expand the formal rules of conventional citing and referencing. The only way to deal with web sites that use active server pages and/or change their pages frequently[20], is to download the complete page and stored it privately. While this solves the problem of internal documentation (during the research process), it does not help with external documentation (in the final product, the paper or research report). As far as newspapers and other sources routinely archived by commercial information data bases like Lexis-Nexis are concerned, a conventional citation of the source (referring to the hard copy version) provides some remedy. In a course setting, however, this is practical only if the college has (licensed) access to an information service covering this source. Otherwise the instructor will not be able to actually check on the source cited in a student's paper.[21]

The third didactic challenge is to prevent plagiarism. Despite the Web presence of a number of 'paper mills' where whole papers can be downloaded (usually for a fee), this is a minor problem. For one, if the student can find the paper on the Web, so can the instructor. Downloading complete papers is much more of a problem for instructors who do not bring the Web into their classroom and who may have very little knowledge and skill how to use the Web effectively themselves than for instructors who do. Secondly, by making paper assignments specific, requiring the inclusion of most recent information, by calling for multiple submissions or requiring a stepwise completion of a

paper project, students have little to gain from a paper mill – unless they are willing to spend a considerable amount of money of having a customized paper researched and written for them. The real problem is plagiarism in the form of lifting major portions from documents found on the web and pasting them unmarked into one's paper. In essence, not a novel idea. But in the old days, this required at least retyping. Now whole pages can be copied and pasted with just a few mouse clicks. The temptation, then, has become much greater.

What can the instructor do about this? For one, some preventive education may pay off. Sad as it may sound, but in my experience many students do not clearly understand what plagiarism means – beyond that they should not have somebody else write their paper. The line between (illegitimate) plagiarism and (legitimate) paraphrasing is not clear cut. How many words must be changed and/or omitted before using the text unmarked (as verbatim citation) becomes legitimate? A discussion of illustrative examples may be genuinely appreciated by students uncertain about when to use quotations marks and when not. In addition, simply using quotation marks does not solve the larger problem. A paper consisting mostly of verbatim quotes is not acceptable either though no plagiarism has been committed. Undergraduate papers tend to be rather short in length, maybe 10, maybe 15 pages and it is very easy to fill these pages with extensive quotes from a few randomly selected documents found on the Web. The massive amount of information available on the Web requires a much higher capacity for screening and condensing information, for separating the grain from the chaff. Again, thoughtfully constructed web guides will go a long way to help students to focus on and to pick out the most important information. With the number of web documents reduced to a relatively small number (but based on particular topic-related criteria not randomly), the task of condensing this information -- which includes appropriate paraphrasing -- gets much easier.

If the preventive measures fail, copy-and-paste plagiarism can often be detected by abrupt changes in writing style. Few undergraduate students have writing skills matching those of a professional writer, a considerable portion has writing skills in dire need of improvement. When a paper starts out with poorly constructed sentences and suddenly the prose becomes quite elaborate or highly technical, chances are that plagiarism rules have been violated. Again, the Web is the instructor's great ally. By picking a phrase with rather unusual wording or containing highly specialized terms and using this string in a search with an engine like Altavista, there is a good chance that the source can be identified with a reasonable investment of time and energy. The chances of discovery are much better than if the material in question is taken from a conventional print source not available on the Web.

Technical challenges

For a computer-savvy instructor already using the Web, little, if any, additional investment is needed to start a course web page. A general shell for course web pages – like the ERES system discussed above -- is of great benefit for less computer-involved instructors and thus for the dissemination among the faculty at large as well as for providing students with a common entry point when looking for course related material on the Web. But, an instructor could go ahead with bringing the Web into the classroom – even at a college with no IT infrastructure whatsoever. The instructor could put the pages on server space provided by his/her private ISP, and students could use private connections to the Internet and private e-mail accounts. But, to participate in a Web enriched course convenient access to a suitable hardware configuration is needed. At a minimum a work station with the following characteristic should be available: 486 (better: Pentium 100) processor, 8 (16) MB memory, 14" (17") color monitor, Windows 3.x (Win95), 28.8 (V.90) modem for connection to

the Internet. A useful, though not absolutely necessary addition is a sound card to be able to access an increasing amount of video material on news media web sites. The efficiency of Web browsing (fast load times) is greatly enhanced by additional basic memory and the quality (memory) of the video card. In contrast, the processor speed and even the connection type (modem vs. Ethernet card) are of secondary importance.[22] Systems with the specifications above are now available for under $1000 -- and sometimes significantly less -- and prices are still falling.

While this 'private' or 'zero college support' approach may work for select courses with a very special student population – say in a graduate course taken mostly by fully employed students in fulfillment of license mandated continuing education requirements, this model will not work well in an average undergraduate course at a public urban institution serving predominantly students from a less affluent homes. As of summer 1998, the share of households with Internet access in the United States is (optimistically) estimated at about 25-30 percent.[23] A large special survey conducted by the US Census in the fall of 1997, showed that less than 10 percent of both Black and Hispanic households had online service, with even lower figures for the "Central City" regions.[24]

At colleges like Hunter, then, institutional support is crucial and even the most enthusiastic instructor cannot overcome the obstacles posed by inadequate access to suitable work stations for students and unreliable Internet services (like extended shutdowns or repeated malfunctioning of e-mail and web servers). Given that using the Web in the classroom requires a considerable investment of time and effort on part of the instructor, faculty must have confidence that their efforts are not thwarted by administrative neglect and incompetence. Before making a decision about embarking on an endeavor to use the Web in the classroom, college support in the IC/IT area should be evaluated by checking into questions like the following: Are there "wired" classrooms and lecture halls including an instructor station with an appropriate projection device; is there sufficient space in computer labs available for class and individual use; are the computer labs adequately configured for Web access; is essential software (like Netscape including widely used plugins) installed efficiently and updated as new versions are released; do the labs have decent printing facilities at reasonable or no cost to students; are labs open in the evening and on weekends for individual student use; are trained lab assistants available to make student sessions more productive; is there a functioning help desk to handle student problems with off-campus connections; is technical support staff on alert during evenings and weekends to respond quickly to any server problems; are backup systems for critical components (gateway, routers) in place; and is there support for faculty, at least for non-routine problems?

I am sure that faculty at many colleges will find the infrastructure at their institution wanting. Obviously, I do not intend to discourage faculty, but it useful to be aware of difficulties and obstacles beforehand, so that a first involvement with using the Web in the classroom does not result in immediate frustration and, consequently, abandonment of such a project.

Conclusion

Bringing the Web into the classroom is an exciting endeavor with great potential benefits for students, faculty, and the college as a whole. However, beside all the enthusiasm, we need to consider some problems as well. With respect to students, we must be sensitive to differences in degree of preparedness for this kind of learning among our students. There is a possibility that an active learning approach, an emphasis on students doing primary research will mostly benefit the

better students and will put less prepared or less talented students at an even greater disadvantage. And catering to the special needs of less prepared students while covering the substantive contents in sufficient detail may be too much of a load for an individual instructor to carry.

With respect to faculty, the question of reward for the instructor arises. To be realistic, not for everyone the joy of teaching is reward enough. Especially younger faculty need to worry about tenure and promotion. At most colleges, there is at best lip service to the value of teaching when it comes to tenure. The 'smart' strategy for an assistant professor is focus on research and writing, and invest in teaching only to the degree that no serious complaints emerge. In terms of cost and benefits, engaging in time consuming innovative teaching projects like bringing the Web into the classroom is a 'dumb' decision – unless both established faculty and administrators are willing to reconsider the current reward structure.

While colleges administrators (President, Provost, Deans) should expect the faculty to be innovative and open to new ideas and opportunities in teaching, they must do their part in making successful innovations possible. The initiative and creativity of the individual instructor can go a long way, but without a proper IC/IT infrastructure, even the best efforts will ultimately fail. Bringing technology into the classroom is not a great way to save money; and it should never be viewed this way. Bringing technology into the classroom is a great way to improve the learning environment for our students and prepare them for the challenges of the information age. To this end, faculty, specialists in libraries and computing centers, and administrators must work together – ready to rethink and redefine traditional role definitions, reward structures, and divisions of labor.

Additional Information on Sources

List of URLs for web sites mentioned in this article (in alphabetical order)

AJR (American Journalism Review) News Links http://ajr.newslink.org/news.html
Altavista (search engine) http://www.altavista.com/
APC (Association for Progressive Communications) http://www.apc.org/indexeng.html#contents
Bureau of the Census http://www.census.gov/
CIA World Factbook 1997 http://www.odci.gov/cia/publications/factbook/index.html
Copyright & Fair Use Site (Stanford U) http://fairuse.stanford.edu/
Demographic Data Viewer http://sedac.ciesin.org/plue/ddviewer/htmls/whtst.html
Directory of Historical Resources from the History Computerization Project at USC
http://www.history.la.ca.us/history/hddirect.htm
ERES (Docutek) http://www.docutek.com/
ERES at Hunter http://maxweber.hunter.cuny.edu/eres/
Falling Through the Net II (Digital Divide) http://www.ntia.doc.gov/ntiahome/net2/falling.html
Federal Legislative Information http://thomas.loc.gov/
FedStats http://www.fedstats.gov/
FedWorld Information Network http://www.fedworld.gov/
Gallup Polls http://198.175.140.8/The_Poll/thepoll.asp
Institute for Global Communications (IGC) http://www.igc.org/igc/about/
LEXIS-NEXIS Academic Universe http://www.cispubs.com/acaduniv/
Library of Congress: Historical Collections (National Digital Library) http://memory.loc.gov/
Lotus Learning Space http://www.lotus.com/products/learningspace.nsf
MHLA (McGraw Hill Learning Architecture) http://www.mhla.net/
National Conference of State Legislatures http://www.ncsl.org/
New York Public Library – Research Branch http://catnyp.nypl.org/
New York Times http://www.nytimes.com/
News Resource http://newo.com/news/
NY State Government Locator Service http://www.nysl.nysed.gov/ils/
OCLC (First Search) http://www.oclc.org
OCLC (First Search): Data base list http://www.oclc.org/oclc/fs/database.htm
Pew Research Center http://www.people-press.org/
Project Muse http://muse.jhu.edu/muse.html
Public Agenda http://www.publicagenda.org:80/
Scout Report for the Social Sciences http://wwwscout.cs.wisc.edu/scout/report/socsci/index.html
Scout Report Signpost (search) http://www.signpost.org/signpost/index.html
Social Sciences Data Collection (SSDC) at UCSD http://ssdc.ucsd.edu/
The Militia Watchdog Links to Extreme Right Organizations
http://www.militia-watchdog.org/m1.htm
TopClass http://www.wbtsystems.com/
Townhall: Conservative Organizations http://www.townhall.com/
US Federal Courts decision at Emory http://www.law.emory.edu/FEDCTS/
US Supreme Court decisions at Cornell http://supct.law.cornell.edu/supct/
WebCT http://homebrew.cs.ubc.ca/webct/webct.html
White House Electronic Publications
http://www.whitehouse.gov/WH/Publications/html/Publications.html
Widener University: Evaluating Web Resources
http://www.science.widener.edu/~withers/webeval.htm

Widener University: Teaching the World Wide Web
http://www.science.widener.edu/~withers/pyramid.htm
WWW Virtual Library Electronic Journals List http://www.edoc.com/ejournal/

All URLs were operational as of fall 98. However, there is no guarantee that they will work at a later point in time and that the contents will not been altered significantly.

Notes

1. While e-mail accounts are free, actual use of e-mail requires easy access to a suitable computer, a crucial issue we will discuss in more detail later.

2. In fairness, I have to admit that electronic postings of my syllabi have not received much more attention. However, if a college adopts a rule that all syllabi need to be posted on the Web (as some colleges have) and a user-friendly interface is offered, checking syllabi ahead of time would become attractive to students – with great benefits to both students and faculty.

3. While of extreme importance, the issues involved are too complex to be discussed in sufficient detail here. The "Copyright & Fair Use Site" at Stanford University is an excellent starting point to explore these issues further. Specific URLs for this and other web sites mentioned in the text are listed in alphabetical order in the appendix.

4. An alternative would be to create an e-mail list with a web based archive. Using the 'nomail' option could even cope with the deluge problem. However, this requires adequate list software (like a recent version of LISTSERV) that may not be available at a particular college and considerable more effort and/or technical support to set up such a list.

5. It should be noted, however, that at a number of colleges ERES is run by the library and used in a more restricted way to make material traditional put on a physical reserve shelf available via the Web. At Hunter, ERES came into being as an independent faculty initiative with only marginal support by academic computing services (ACS) for installation and maintenance of the system. ACS, however, provided support for the web server (hardware and http daemon). More recently, the current IT/IC unit at Hunter (called OICIT) has resumed responsibility for the maintenance of the ERES system which is not a very taxing or time-consuming job.

6. MHLA uses the TopClass software but bundles it with McGraw Hill products (textbooks). Learning Space requires the installation of Lotus Notes for administrative and course development (instructor side) purposes, while students can access course materials simply using a web browser like Netscape. Using Learning Space, then, requires a major investment on part of the college unless it uses Notes anyway. The Lotus 'Learning Server' is an accompanying product for synchronous delivery in distance learning.

7. Some courses pages at Hunter are password protected, but many are not. Check the sociology courses for a good mix of illustrations. Extensive local help pages (click on "Help at Hunter") provide answers to frequently asked questions about the system and its use. Official information is available at the company site. As of fall 1998, the ERES system is available for both Unix/Linux and Windows NT servers and is used at over 50 colleges and universities.

8. Given the unfortunately low rate college assistants are paid, these grants are very modest (about $200 each). Recipients are expected to share their newly acquired knowledge with other faculty in their department or unit, so that these grants are only needed until a critical mass of instructors actively using the ERES system has been reached.

9. Things may change, but for MS Office 97 support for this feature (HTML support) is not part of the default installation. As many computers come pre-installed with the software, the feature is easily overlooked. However, the web support component can be installed from the distribution disks or CD using the 'custom' method without much effort. I suppose, Microsoft excluded HTML

support from the default installation of MS Word to steer unsuspecting users towards buying additional specialized products like MS FrontPage.

10. Most of these services, however, are fee based. The extent to which individual colleges subscribe to such services and the limitations colleges place on access to those resources (e.g., for faculty only, via a library specialist only, on-campus access only, etc.) vary tremendously. Actual access may still be very limited even in libraries that have embraced the electronic future (and not all have) given the common shortage of funds. Even among large public institutions, like SUNY and CUNY, access to these services can differ sharply.

11. Libraries may have a subscription to the CD-ROM version of BIP and they may make this data base available for remote access via telnet/tn3270 (as Hunter does). Even more conveniently, libraries can make BIP accessible via OCLC FirstSearch and its user friendly web interface. For those with access to OCLC First Search, the BIP data base is in the "General & Reference" section (click on the list entries on the left side of the starting page). At my home institution, only a rudimentary version of OCLC is available as of fall 1998, but the full service is available at all SUNY campuses.

12. If a college offers its own dial-up service for connections to the Internet, i.e., serves as an ISP (Internet service provider) for its faculty, staff, and students, this includes off-campus use. If not, a college may choose to set up a proxy server so that faculty and students can access such services from anywhere by simply changing their web browsers options (in Netscape: 'preferences') from 'direct' to 'proxy server' access to the Internet.

13. Project Muse is funded by grants from the NEH and the Andrew W. Mellon foundation as well as membership fees from the participating libraries. The Uncover Company offers free searches of their data base, but charges for fax delivery of the full text. Fees are substantial and easily amount to $25 per article and more (depending on the amount of the copyright fee on top of a fixed handling fee).

14. While we focus on the social sciences here, and in particular on topics with implications for social or public policy, the Web connection can be of great value in other fields as well. For example, student in art (history) classes can pay virtual visits to museums and art galleries world wide and students in language classes can visit web sites and chat rooms using this language, can read newspapers from a foreign country on a daily basis, and much more. There are no limits other than the imagination and creativity of the instructor to utilize this new access to the 'world outside'.

15. In parentheses, web sites are given that provide a good starting point for locating more specific sites providing this kind of information. Corresponding URLs are listed in the appendix.

16. This is a purely fictitious example. A check using Altavista on October 30, 1998, did not find any web page either belonging to an organization of this name or mentioning such an organization.

17. This is possible because one physical web server can be known by a whole list of different names as long as these are entered in the ISP's domain name server (DNS).

18. I have found their module on evaluating Web materials as particularly helpful. Links to similar material elsewhere is an added bonus. See appendix for URLs.

19. Most web servers provide a date of last modification for the pages served (which can be disclosed by, e.g., Netscape's "view/page info" feature). This can provide some proof that a page

has not been changed (if the modification date lies before the creation date of referencing document), but gives little indication as to the extent of changes if the modification date is recent. The change may have been trivial or may have been significant.

20. This is a common problem with media (newspaper) sites. Increasingly, only the current issue is available for free while back issues are transferred to an archive with usage fees. For newspapers, free access to most material is often limited to a single day. A case in point is the New York Times.

21. The Lexis-Nexis company now provides a web based service called "Lexis-Nexis Academic Universe" designed for the end user rather than the information specialist in the library. While direct access is certainly an advantage and makes this service much more accessible to students, this expansion comes at the price of reduced depth, meaning that not all sources available via previous Lexis-Nexis products (to the library specialists) are available in "Academic Universe". However, this service does provide free (relative to the college license) access to sources which otherwise would require a fee (like the New York Times). More than 600 colleges and universities representing more than half of the student population in the United States provide access to this service – according to a news release (of June 29,1998) by the company.

22. My home station using a V.90 modem and 48MB of memory with a 4 MB video card offers much faster access than minimum specification stations on campus connected to the Internet via the college backbone and a T1 line – even for watching streaming video. The slow modem speed is clearly a factor in downloading large files consisting of several MB, but this rather atypical in everyday Web use. There are, however, a number of ways to optimize browsing speed given any specific hardware configuration including the configuration of both Windows (including DUN – dial-up networking -- and virtual memory settings) and the browser software as well as simply avoiding to run other applications at the same time.

23. Figures taken from a posting of October 30, 1998, to the AAPORNET list by Barry M. Feinberg, Senior Vice President at Audits & Surveys Worldwide based on their TechTrack Study.

24. This study -- titled "Falling Through the Net II" -- is available on the Web; the figures cited are displayed in chart 21.