

Going On-line in Math and English: Computers in the Classroom

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Abstract

A partnership with computers? Empowerment through computer networking? In the postsecondary classroom? Yes!

Incorporating computers into the traditional classroom reduces many of the counterproductive restraints inherent in pedagogy. Virtual classrooms have advantages and as well as disadvantages when compared to the traditional (non-virtual) classroom. The use of computers in English and Math courses allow teachers and students alike to create natural, satisfying learning experiences. Students are connected not only to the classroom community but also to the research and world communities. Such opportunities provide students with a natural and vital process in which they will engage for the rest of their lives.



“May you live in interesting times” is an old Chinese blessing that describes quite well the times in which we teachers live, especially those of us who have elected to embrace new technologies in our classrooms. Computers, and the environments they introduce, compel us to share the learning space of traditional classrooms and their tools – the board, overhead projector and other visual aids, lectern – with the Internet as well as synchronous and asynchronous learning environments. What we are facing is a Brave New World where technology affects in a significant way our mission as professors, whether in the English or the Mathematics classroom. Our students come to us today far more sophisticated and knowledgeable than when we began using computers to facilitate the teaching of English at California State University, Northridge, back in the late ‘80s, a time when maybe one or two students would be computer literate. Contrast that with two of the author’s recent English classes, when only one student out of a total twenty-six had no computer experience and more than half the class had created their own web pages.

What is the role of computers in the math and composition college classrooms in our information-oriented age where our students have access to tools we never dreamed of ten years ago? Not only do they now have computers operating in nanoseconds, they have opportunities to study in a student-centered, rather than the traditional professor-centered, classroom. In his plenary presentation at the first PEPNet Conference, John Gardner emphasized the importance of student-centered environments in the effort to achieve greater retention of students. Unfortunately, as Gardner explained, traditional pedagogy fosters paternalism and dependence of students on professors through a system of established values, culture, policies, and procedures. The professor is viewed as the Enemy who stands in front of the class and says, “I talk, you listen. I lecture, you pass my tests.” As Gardner explained, the locus of control in these settings is in the professor. Students, dependent on the lecturing professor, learn to blame others for their failures. Success is determined by how well they can synthesize the lecture content with book information and perform on examinations that test one’s ability to memorize facts in this system of passive learning. Rather than empowerment and

partnerships, we have a system of individualism and competition.

Gardner was specific in what a new pedagogy must do. The approach he advocated involves faculty and student interaction where collaboration is the norm. His triangular formula for success calls for time, energy, and commitment. Whether in class or outside class, students invest time in this Culture of Success, where they interact with peers and faculty. Students and faculty both invest energy: they develop relationships, make friends, become involved through a variety of activities – debate, art, song, dance, drama, and other creative arts. Commitment emerges from being around and interacting with others and learning from fellow students and faculty. The traditional 9-to-5 day is modified to maximize the interaction of the university administration, faculty, and staff with students.

This pattern of partnerships and collaboration is evident in the on-line courses that we teach. These are courses that connect the study of mathematics, writing, and technology through the use of computers and the Internet. Our unique collaborative system empowers students with the ability to form partnerships, with the classroom community, the research community, and the world at large. Working both independently and in groups, they learn to collect information from a variety of sources. They create their own evaluation instruments so that they know what to do with the information and how to use it to solve problems.

Interest in the Internet as a teaching tool has exploded, as is evidenced by the proliferation of World Wide Web delivered courses spanning all areas of study in higher education. For example, in Fall 1996, California State University, Northridge offered seven on-line courses. In Fall 1997, that number had increased to fifteen. The more our courses move into virtual space, the more we find ourselves asking: *Exactly where are we? Where are we going? How do we connect to where we were? And what does all this mean?*

Given the rapid exchange of ideas and the breakneck speed at which information is created, the mastery of multi-media technology becomes fundamental in the effort to meet the needs of today's students. We expect our students to know the tools that allow for the types of connections and partnerships that Gardner discussed. We want them to connect with ideas and with one another, to be critical thinkers and discriminating consumers of information. But this is a process that does involve connecting with faculty who have no idea what a *syllaweb* is or have never heard of a *MOO* and yet demand that their students have the ability to write sentences with parallel construction and think both logically and linearly.

And so, we ask, how do we incorporate technology into our student-centered pedagogy? What are the questions we must ask before we actually begin?

Perhaps one of the most critical issues has to do with the challenge of teaching writing as opposed to teaching computer skills. Do we actually teach writing, or are we teaching something entirely different? Truth be told, the lure of the computer is seductive and powerful. The task of writing, on the other hand, is often frustrating and time-consuming, requiring a certain amount of probing, reflection, theorizing, analysis, and assimilation. We are compelled to discover that middle ground where we meet departmental curriculum requirements and still implement the tools and resources available through technology.

Is writing actually *taught*? Is on-line discussion writing? Is the first draft e-mailed to the professor and returned with e-mailed comments as valuable as the first draft submitted in the traditional printed text and returned with handwritten notations? Is the design of hypertexts and the creation of web pages as significant as the multi-drafted and carefully crafted three-to-four page essay? Exactly what do we expect of students in the short 15-week semester, or even shorter 10-week quarter?

Does technology actually improve pedagogy, whether in Math or English courses? Do computers in the classroom, or in the home or dormitory for on-line classes, help students in their efforts to become information literate?

Before we can teach our students in courses that are conference based and computer supported, we must

become informationally literate ourselves. All too often professors are tempted to present the same activities of a "regular classroom" in the computer classroom, with the computers functioning as word processors or typewriters. In math classes, on-line practice sheets and tests take the place of handouts and teachers use the keyboard and an overhead projector to replace chalkboard. Rather than exploring and creating a different pedagogical approach, a new way of looking at writing or the teaching of mathematics, are we simply doing the same old thing in a different venue?

How do we merge traditional learning tasks with modern tools? Do we adjust teaching to the technology, or do we use technology to enhance our teaching? We believe that the true power of technology in the classroom lies in our ability to bring students together through communication and collaboration. Even a simple listserv, where students are able to send e-mail messages to all members of the class, gives us a communicating group. Students who normally see each other only during scheduled classes are able to actually "hear" the ideas and thoughts of their classmates both in and out of class. Students who are deaf, hard of hearing, or hearing perform on a level ground, with everyone receiving the exact same information, regardless of the ability to understand sign language or the interpreter who may be in the classroom.

Incorporating technology into our classrooms takes various forms and is as diverse as the faculty who use it. Some professors simply put course information with appropriate links on a web page and tell students to go on-line to access the syllabus. Other teachers make their web pages repositories of course notes. Still other web sites are much more complex, to the extent that students do not need to appear in a classroom but do all their work at their own computers.

In the English and Mathematics courses which we teach at California State University, Northridge, we have moved from the traditional authority-centered model of instruction to a more collaborative, process-oriented approach. Toward this end, we have created web pages, which facilitate instruction and enable us to enhance instruction. By no means have computers replaced group discussions, lectures, or paper-based assignments. Instead we use computers to complement and integrate the processes of linking, clustering, webbing, and associating with traditional techniques.

Ah, the Webs These Teachers Weave!

*Home, home on the Page,
Where the URLs and the applets all play,
Where seldom is heard a printable word,
And the hair on my head turns all gray!*

Larry Blasko, Associated Press

Denise has a web page with links to all four of the classes she teaches. The links lead to the class syllabus, homework and testing schedules, and math resources. The resources are perhaps the most important component of her web site, taking students to the California State University, Northridge Math Department's home page. From there, they move on to areas which include descriptions of the courses (common for all sections), practice worksheets and tests, and access to videos which have been developed specifically for the lessons taught in the Developmental Math courses on campus.

Barbara's web site, on the other hand, is much more complicated. She includes many of the components of the full on-line web course. On-line resources were incorporated into two of her Fall 1997 courses. The on-line presentation was actually quite simple, offering only the course syllabus, the course contract (for grading purposes), e-mail and listserv facilities, and a chat facility.

The most significant, and perhaps most difficult, aspect of on-line course development is the thorough design of web pages. The designer (professor) must be able to identify the logical components of the web page and the order in which students will use them. Toward this end, a well-defined *Table of Contents* (or, as it is sometimes called, a *Site Map*) is critical. *Figure 1* shows Barbara's basic homepage with its seven vital links to the courses she teaches. *Figure 2* presents the more complex "web" of components in her English 255 (Introduction to Literature) course. Internal links stay within the web site; external links take students outside the course web site to a variety of sources. For example, when students read Shakespeare's plays, they are provided with links to resources available in Great Britain, complete with photographs and background histories of the plays. In this sense, students are exposed to information not available in their textbook and sometimes difficult to find in libraries.

The creation of web pages is in itself sometimes a formidable task. The designer must have a complete idea of how the web site as a whole will look prior to designing any one page. Putting together a web site is a blend of publishing, user interface design, and technology. The web site must be pleasing to the eye, provide appropriate and necessary information, attract students with sometimes short attention spans, be easy to navigate, and link all site elements in a logical fashion. Web site design does not involve showing off one's technical or graphic arts skills. Nor is it imitating a magazine or newspaper page, or a television show, or any other existing form of communication.

The amount and kind of information on a page depend on the purpose of that page. The first page, usually called the *Index Page*, is by far the most important. Not only must it be appealing to the eye, it must be so designed so that the first impression is seeing something significant within eight seconds. Text needs to be visible while graphics are being loaded. Generally, the first page is less than 20K, and the site name and purpose appear instantly.

This exciting, interesting, attention-grabbing index page provides the key facts, including the name of the school, e-mail contact, and the specific courses included in the web site. If we revisit *Figure 1*, it is obvious that Barbara's homepage has seven internal links, including her four classes, a welcome page, a links page for both internal and external links, and an e-mail link.

Each course has its own 'homepage.' *Figure 2* shows the numerous links in Barbara's English 255 (Introduction to Literature) course. Student access to the page is granted through the use of a password. The advantage of the password path allows students to feel a sense of privacy, knowing that they can post materials for class use only. Within the restricted area of the 255 section is the *Tools Page* with links to a searchable and linkable glossary, e-mail facility, chat facility, and bulletin board. The *Notes Page* links students to study materials, lecture notes, and goals pages where learning objectives are presented.

Much debate has centered around the need to include references on a page. References are generally URLs, which can be given a link. A mouse click takes the student directly to the reference. Both Barbara and Denise include references to various OWLs (On-line Writing Labs, both at California State University, Northridge and also at other universities), the departments for which we teach, and dictionaries or glossaries pertinent to the course for which the page is made. Barbara's Literature class, for example, has links to authors and critical commentaries on the plays, poetry, and short fiction that she teaches.

In summary, the page layout needs to be simple, easily navigated, and perfectly clear.

Once a page is designed, the professor determines what elements of on-line courses to include. These vary, according to the professor's needs as well as the specific course needs.

Student/Professor and Student/Student Communication

The features of these integrated communication mechanisms allow for equal access of all students, regardless of hearing status or other disabilities and for a virtual community of students exchanging information.

We found the most popular of the communication tools to be the **real-time chat** feature. Group members enter a chat room and a window appears, displaying the text typed by individuals in that room. A second window allows visiting members to type out messages/responses. A third window identifies the occupants of the room. The room can be 'locked,' allowing for privacy.

The **hypertext** feature is an off-line asynchronous electronic conferencing system, which allows participants to make comments or ask questions of each other. Responses can also be posted at any time, whether the students are on-line or not. The overriding advantage of hypertext is that it allows for a complete history of exchanges. We have found, however, that the primary disadvantage of hypertext, for our students in particular, is that they are quite frequently reluctant to post essays, comments, or text for the entire community to read. No doubt this has to do with feelings of insecurity about writing in general, the writing of deaf or hard of hearing students in particular.

The most widely used facility is the **e-mail and listserv** systems allowing for one-to-one or one-to-group message transfer. In the fall semester, Barbara received and sent a total of 831 e-mail messages to the 26 students in her two classes, not including messages sent on the listserv.

Student Task/Presentation Tools

One quite popular feature is that which allows students the option of creating a **homepage** of their own in HTML format. One of the more excellent homepages recently had to do with censorship; the student created a page documenting a history of censorship in the United States and listing more than 50 links leading to various types and examples of censorship. Of course the professor must have the capacity to edit these pages for security reasons. Barbara allows students the option of completing lab assignments or creating a web page.

A **course glossary** may be searchable (created by the designer and course specific) or it may be linkable (linked to glossaries made and posted on the Internet by others).

Goals pages are links that present specific learning goals that help students summarize a particular page, identify objectives, and pose questions. In Barbara's literature course, these are in the form of study guides that are also linked to the notes for each literary selection assigned for the course.

While these are the basic components of our web pages, they are by no means the only elements. Professors need to consult with one another, learn how web pages are created and how they evolve, then determine for themselves their own best practices.

Conclusion

We have learned that there are distinct advantages as well as disadvantages of using computers in the English and Math classrooms. Barbara especially had found that using computers helps break down the "school" writing that so many students are conditioned to write. Hierarchies are broken down as well. The professor is someone who communicates directly with each student, and students are able to see the exact writing of the professor.

Students see their *real* audiences – their classmates and professor, or perhaps others with whom they may connect, for example, a group of deaf and hard of hearing students in Brighton, England. In this environment, they are writing not only for the professor but also for a much broader audience.

Using computers tends to push some of the more resistant writers into new territory so they are more willing to try new things. Immediate access to the Internet and on-campus library resources lead students to think more deeply and critically, be more aware of the status quo, and challenge the assumptions they may have made. Four of Barbara's students, for example, undertook a group project where they investigated various positions on the death penalty, with the intention of preparing for a debate as well as a paper in which they present the different opinions. What is most

interesting was the extent to which students were compelled to confront their own biases and prejudices before they could satisfactorily evaluate the thousands of articles they found on the Internet and integrate the information into a coherent and unified piece of writing.

Adjunct facilities such as an overhead projector connected to the computer at the professor's station, allow for a demonstration so that students see exactly what the professor is doing. A similar feature may be the *PC Duo* that allows networked computers to interact synchronously. Using programs such as Power Point helps the professor focus information and present it in a creative and interesting manner.

Distance courses deliver classes to new populations. Although this can be an isolating phenomenon, it need not be with careful engineering.

Using computers in the classroom can and does reduce marginalization. Deaf and hard of hearing and hearing students are on equal status when they start exchanging information on their networked computers.

The availability of the Internet and its vast resources as well as the ability to connect with campus and public libraries facilitates the conduct of research and provides students with up to date information conveniently and quickly.

Students receive timely responses to their work, interact regularly with their peers, and receive peer responses as well. This advantage was mentioned again and again in student evaluations of the course. They felt that the ability to receive feedback via e-mail, on-line chats, and the listserv enabled them to complete their work in a more timely fashion and thorough manner.

For the professor, seeing student responses as they engage in networked conversations is especially delightful. One can actually observe learning as it happens.

Finally, the use of computers in the classroom facilitates the development of Information Literacy. The Freshman Writing Class is one of the first courses students take and the ideal place for merging computer technology with writing and critical reading assignments.

On-line courses also have disadvantages.

- Successful teaching of on-line courses generally requires at least two or three semesters of actual practice to “get the hang of it.”
- Designing web sites to use in on-line teaching is much more than simply using word processing tools.
- Maintenance of the web site takes time. Minor changes may require hours of concentrated work.
- We do not yet have adequate tools by which to evaluate web sites and the actual success of on-line instruction.
- The volume of information can be overwhelming and problematic. The Internet is constantly evolving; the fluidity of information is both exciting and scary.
- The Internet allows for freedom and flexibility but also poses ethical issues with which we continue to struggle such as confidentiality and the professor/student relationship.
- Funds are not always available for the most up-to-date and appropriate hardware and software.
- Maintenance of a computer lab is a significant issue. This is especially true as long as we have students who play around with the settings and mess up the format of installed programs.
- As with all technology, computers do fail us sometimes. Students have lost, in the click of a key, weeks worth of information. Viruses can be especially problematic.
- We also have the issue of creating courses, which meet the demands of the department for which we work but also allow for the use of interactive tools. Students sometimes do not know how to use these tools and valuable class time is devoted to filling the information, knowledge, and experience gaps.

- Finally, persuading department chairs to recognize the financial and time requirements to initiate on-line courses is a potential obstacle.

In Dark Tower, Stephen King wrote: *The world has “moved on”— before we know it.* The question we ask ourselves as professors is this: To what extent have we helped our students in their process of exploring and preparing for this Brave New World?