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ABSTRACT

Three years of developing an online course, responding to student needs, technological advances, communication issues, campus policies and politics, and an assortment of other issues taught the authors of this paper many lessons about Web-based instruction at the university. Experience indicated that prior to committing a course to online delivery, four areas should be addressed: philosophy (reasons for pursuing online instruction), student needs, instructional paradigms (matching the appropriate pedagogical model/strategies to the distance learning environment), and preparation/teacher needs. The paper concludes that the delivery of Web-based distance learning is both workable and productive, and that online learning can be superior to that of traditional classroom instruction. (Contains 14 references.) (AEF)

Realizing the Potential of Web-Based Instruction: Lessons Learned

By:

Scott B. Wegner, Kenneth C. Holloway and Sandra K. Wegner

REALIZING THE POTENTIAL OF WEB-BASED INSTRUCTION: LESSONS LEARNED

By
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Introduction

One can not pick up a paper, magazine or news release without noticing the effect that the World Wide Web (WWW) has had on government, business, information services or our personal lives. The "web" has revolutionized the way we conduct commerce, gather information and communicate and, at least in the United States, has impacted every facet of our population. It is no surprise then that educational institutions are rapidly turning to the WWW as a means of delivering their services.

The growth of the WWW for the delivery of on-line instruction at universities has been phenomenal. While relatively unheard of just a few years ago, a key word search of the Internet today using "Web-based distance learning" yields hundreds of sites devoted to the subject. Additionally, a quick perusal of conference sessions and workshops at national conventions held for university personnel shows that online instruction, and especially Web-based distance learning, has become part of the normal university infrastructure. Not only do opportunities to receive coursework via the WWW exist now at most universities, but opportunities to pursue entire degree programs are becoming commonplace. The prognostications made just a few short years ago, that the Internet and the WWW would soon be as common as the telephone or television as a means of communication have rapidly become a reality. Indeed, use of the WWW for delivery of distance education is currently active at all levels of the educational hierarchy and only appears to have begun its momentum (Plotnik, 1995).

A prime example of the impact of the Internet was evidenced at these authors' home university. In the early part of this decade distance learning was the domain of but a few instructors, using cable television as the platform. By the mid-nineties point to point television courses provided additional opportunities for distance learning but only to two selected locales. By the end of the decade, with the rise in popularity of the Internet and the WWW, the delivery of web-based coursework grew to the extent a special section of the course schedule was created to house "on-line" courses. To support and expand such Internet-based efforts, the establishment of "Virtual Campus" was authorized by the Board of Governors with the appointment of a Chancellor and a budget to carry it out. This commitment by the Board of Governors resulted in a large number of professors creating on-line materials for all or part of their courses.

The Metamorphosis of a Web-Based Course

Our Web-based course did not happen overnight, nor without its fair share of challenges. Initially the course was conducted through the departmental web site. Course work was accessed through a link on the instructor's home page and support materials were made available through the mail. Class communications were conducted using the student's personal e-mail accounts, video-conferencing utilizing CUSeeMe software, facsimile transmissions and the telephone. While student results were promising, there was general concern about the amount and quality of communications between class members and the instructor. Students reported problems using personal e-mail accounts for the class caused by different encoding/decoding software packages, computer platforms and Internet Service Providers (ISPs). Additionally, attempts to use video-conferencing throughout the semester were generally disastrous with only six

successful link ups of marginal quality in approximately 15 attempts. The major communication tool proved to be one of the oldest technologies: the telephone. Student use of the telephone for contacting the professor, as well as the other students, was almost double that of the other technologies. (Wegner, Wegner, Holloway 1999) Not unexpectedly then, lack of communication with the instructor and need for access to more support materials constituted the bulk of drawbacks listed by students in post-class surveys. (Wegner, Holloway, Garton 1999) These communication problems led to the first major change in the delivery of the course: use of a commercially developed instructional management system (IMS) to coordinate communication and provide class support.

The IMS contained an integrated e-mail system, asynchronous discussion capabilities, coursework and testing functions along with several administrative tools. The IMS had a significant effect on student communication patterns. E-mail usage jumped over 700% and use of the WWW for purposes of research rose 150 %. Use of conventional technologies, such as the telephone and facsimile transmissions, was virtually cut almost in half. (Wegner, Wegner, Holloway 1999)

The convenience and familiarity of a single software package, one containing all applicable communication technologies needed by students, had the desired effect: lack of contact with the instructor was almost eliminated as a student concern in post-class surveys. However, opportunity for communication does not always insure quality in communication. Students continued to report a need for better class support materials. Textbooks, journal articles and even lecture outlines were considered poor substitutes for

the type of instructional support typically available through traditional classroom delivery models.

Since the nature of most support materials on the WWW is text-oriented, the team felt that some effort should be made to provide support that was more multi-media. This multi-media approach raised some interesting problems. Most graphics, audio and video files were so large that download time is prohibitive for most students; modem speeds and bandwidth were simply inadequate to make them a viable solution. After investigating this problem, the team decided on the development of CD-ROM for the medium of support. The basic theory was to furnish a variety of file types (graphics, audio, video, text, PowerPoint etc.) on CD-ROMS developed by the team. Access to the files would be through links located in the coursework section of the IMS. As students requested information, or the instructor felt there was a need for the information to be disclosed, the links would be added to the IMS coursework section. These strategies would allow the instructor to not only meet the needs of the students as they worked their way through the course problems, but it would also allow the instructor to manage the flow of information for better continuity and focus of the problem solving process. A basic formula of audio and PowerPoint files to provide information, text and graphics to provide examples and video to show professionals modeling desired behaviors was adopted.

Current efforts have produced the first of five projected videos using the avi. file format (the mpeg. file format is being explored for better compression ratios), a number of text and graphics files and three PowerPoint presentations with embedded audio files Additionally the university has now added a server capable of transmitting "streaming"

technologies which will hopefully replace audio files on the CD-ROMs in the future. Fully functioning CD-ROM support is anticipated by the spring 2000 semester.

Lessons Learned

Three years of developing an on-line course, responding to student needs, technological advances, communication issues, campus policies and politics and an assortment of other issues has taught our team many lessons. Foremost was that, contrary to popular opinion; using technology did not insure quality learning. In fact, without special attention, technology can diminish the educational experience. It was our experience that prior to committing a course to online delivery, the following four areas should be addressed: Philosophy, Student Needs, Instructional Paradigms and Preparation /Teacher Needs.

Philosophy. The first question is "Why". Is taking the course on line for student convenience? Financial efficiency? Outreach to remote areas? Why are you pursuing distance learning?

As the team studied the literature the driving forces behind the movement to distance education could be usually categorized under three basic titles: 1) Finance; 2) Portability; and 3) Convenience. From a financial point of view, while the initial capital outlay for technology may be perceived by some to be high, the prospect of increasing enrollments with electronic delivery of classes, unencumbered by classroom sizes or parking spots, is enticing (Marshall, Samson, Dugard, and Lund 1995). Even in its infancy, Romiszowski and Iskander (1992) reported that electronic-based instruction could be more cost efficient than print-based instruction and should be considered a viable educational delivery alternative. The potential reward of financial efficiency has

been and continues to be seen by many as a major advantage for moving to distance learning. The view that distance learning is financially efficient, however, is not shared by all. Delivering content over the WWW is considered to be much more intense and time consuming for instructors. Web-based delivery of instruction has been found to require more effort and expertise than traditional delivery methods, thus creating a situation which makes it difficult to accurately assess "true costs" of delivery (Brown, 1998). To some, the human resource cost requires closer scrutiny.

The category of portability refers the ability to reach areas with educational services that previously were considered inaccessible. Personal ownership of computers has seen a profound growth. In 1995, it was estimated that one-half of all households owned computers and that 17% of those not having computers expected to buy one within one year (Plotnik, 1995). The capacity to access information has never been higher and this potential for access to students, previously thought as too remotely located for traditional delivery systems, has not been overlooked by national policy groups. To be sure, almost every major educational reform proposal or plan includes technology, and especially the WWW, as a means of reforming educational delivery and increasing educational opportunity (Plotnik, 1995). While portability of education through web-based delivery is seen a panacea for equal access, it has also has its share of problems. Economic status, gender, physical disabilities and training are all seen as obstacles of true equity. As Neuman (1991) stated, "...despite the promise of emerging technology, it is important to remember that technology and equity are not inevitable partners".

A third category of reasons for the explosion of distance learning opportunities is convenience. The typical profile of students participating in distance learning is a working adult seeking specialized degrees or training and unable to attend traditional settings. (Hyatt, 1992) These students appreciate distance learning opportunities (especially asynchronous distance learning opportunities) because they allow them to maintain jobs, families and "normal" lives while studying and participating in coursework on their own terms. It is a simple equation. No more commutes, less personal expense, less interference with daily living, and more student autonomy add up to a more enjoyable and less stressful educational experience.

In our experience, on-line coursework should be pursued when it enhances the learning experience or at the very least offers a learning opportunity comparable to that of the traditional classroom. To do otherwise is to compromise the quality of education that students receive for the sake of financial gain, institutional or personal convenience or marketplace competitiveness. This should not be the legacy of technology enhanced instruction

Student Needs. Feedback from students in our asynchronous, web-based, distance learning environment caused us to understand that as the instructional delivery system changed so did the needs of the students. The very nature of web-based instruction has raised concerns regarding isolation of the learner from the instructor and other students. (Kubala, 1998) While this concern is a valid one, it need not be an insurmountable barrier. Some researchers, in fact, believe that web-based learning can even enhance socialization and learner interaction. (Bang, 1990) Furthermore, Stacey (1999) reported that online learning, if structured appropriately, could address equity

issues in communication and provide more democratic communication opportunities than the traditional classroom. The bottom line is that communication plays an important role in the education process. Students require the same opportunities for communication in a distance learning environment as traditional classroom. While web-based instruction presents some interesting challenges, it does not need to diminish communication. Our experience was that sufficient tools exist to satisfy these class communication issues. E-mail, discussion sites, listservs, IRCs, video-conferencing, multimedia on CD-ROMs, audio streaming as well as conventional text and graphics on the web-site are but a few of the one and two-way communication alternatives available at this time.

Instructional Paradigms. Perhaps the largest obstacle we found to effective instruction over the WWW was matching the appropriate pedagogical model/strategies to the distance learning environment" an environment which we came to refer to as the "teacherless" environment. As the team analyzed existing on-line courses, we found far too many instances of instructors "dumping" their lectures on web-sites expecting students to read them, do exercises from a book and then take an exam. This was not a pedagogical model that the team wished to emulate.

Selection of instructional models appropriate for web-based instruction has been the focus of great many discussions, writings in the literature and technology conference sessions. Stacey (1999) in her work on educational environments pointed to the work of Paulsen, Berge, Hardy Rohfeld, Hiemstra and Collis as examples of literature covering conceptual frameworks, teaching strategies, discussion techniques and other pedagogical considerations. Driscoll in her work Web-based Training (1998) has established criteria for the selection of pedagogy based on a variety of needs including course goals, type of

skills developed, whether the class needs to be synchronous or asynchronous and type of learner. Additionally, Tapscott (1998) outlined eight shifts in learning paradigms to provide better on-line learning. These shifts included linear learning to hypermedia, instruction to discovery and teacher-centered to student centered.

The pedagogy is slowly but surely catching up to the possibilities of web-based distance learning, but much work lies ahead. The team learned the lesson the hard way, failure to consider the strengths and weaknesses of the instructional medium when selecting teaching strategies can lead to diminished learning.

Preparation/Teacher Needs. Class preparation changes dramatically for the teacher in the "teacherless" environment. Since classroom decision-making is no longer "on-the-spot", teachers must anticipate the needs of the student beforehand and build in appropriate contingencies. In the "teacherless" environment, planning and preparation is different than the traditional classroom. It requires different skills and more time. Some investigators have estimated that it took roughly 40 % to 50% more time in preparation for online instruction (Brown, 1998) and classroom communications could take as much as three times more time than conventional delivery systems (Weisenberg and Hutton, 1995). Time is a major consideration because the instructor must not only identify and organize the content and skills to be learned, but they must select the most appropriate web medium (Listserv, e-mail, IRC, web site (HTML file), or downloadable or "streaming" text, audio or video files. (Driscoll, 1998). Instructors must also have support materials available on line to assist students with questions and problems. Having the right materials available, in the medium that most effectively communicates them, requires special talents, preparation and time.

Because of the nature of web-based distance learning, instructors must of communication skills. Questioning skills, and especially Socratic questioning skills, become a premium. Communication skills that promote student self-reliance, reflective thinking and active learning are also needed for the web-based, distance learning environment. While such skills are desirable in any classroom, the team felt that they were mandatory for on-line delivery.

To accomplish the above, the team discovered that an instructor must adjust his/her mindset. In effective web-based instruction, the instructor is no longer the "sage on the stage", giver of knowledge and center of class interaction. Instead the instructor becomes a facilitator, a guide, a communicator and a resource person. The primary role of the instructor, after organizing the learning environment and preparing materials, becomes one of supporting rather than leading learning. This change in roles requires the instructor to relinquish some of the control that has been historically given them in traditional classroom settings. This "relinquishing of control" was found to be extremely disconcerting to online instructors in the beginning.

Beyond the different teaching skills required for online courses, the instructor, as well as students, must have technology skills to participate, navigate the Internet and cope with technical difficulties (Kerka, 1996). For many instructors, this will be a formidable obstacle. The rapid changes in technology have caused the team to feel overwhelmed and unable to effective. Technical support is a necessity for instructors attempting to effectively utilize the Internet and the WWW for the purpose of distance learning. Without the assistance of computer support personnel within the college as well as at the university level, the team felt that the distance learning experience they were

involved in would have surely "died on the vine". Our lesson was learned well. Web-based, distance learning does not work without support.

Summary

It is the feeling of the faculty involved in this project that the delivery of web-based distance learning is both workable and productive. Bolstered by the results of three years of experimentation, the team is confident that learning is not only equal to that of the traditional classroom setting, but in some ways it has been superior. It is also the feeling of the team that the technology and instructional skills learned by the instructors have made them better teachers in both environments.

There were lessons learned that will help make future learning opportunities even more effective. We learned that distance learning must be part of a well-reasoned philosophy of instructional delivery; that doing it for fiscal reasons or just to be "cutting edge" will eventually doom the experience. We learned that instructional paradigms must match the technology and that time-honored methodologies such as lecture and direct instruction do not always adapt well to distance learning situations. We learned that not only do students' needs change due to the nature of the Internet and WWW, so do the needs of the instructor. A shift in the instructor's mindset about what his/her role is in the learning experience is required. Finally we learned that there is a significant body of knowledge left to be learned left to learn about this rapidly growing, but still imperfect, world of web-based distance learning.

The Internet and the WWW provide an opportunity for expanding the impact an instructor can have with an ever-growing number of students who have access to the Internet. With access to almost limitless information at their fingertips, the guidance of a

skilled instructor and a challenge to participate in carefully constructed experiences, one can only imagine what students will be able to accomplish.

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