Trials and Tribulations of an On-Line, Live, Interactive, Internet Course

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Abstract

Most of the instructor's colleagues who teach internet courses, put the course on the web for students to access, study and complete assignments on their own. Last spring, the graduate civil engineering course, "Pedestrian and Bicycle Facilities Design and Safety" was taught on the web interactively, i.e., a "Chat room" model. Our system allowed (when it worked properly) voice communication (lecturing, etc.) by the instructor. The students had to respond via a chat room. The paper describes our system, problems that had to be overcome, teaching techniques that were developed to promote feedback and interaction among members of the class and instructor. It also contains comments from two students that completed the course. Overall, it was a rewarding experience. One student claimed he learned more than from any course he had ever taken. The author concludes that this method for delivering course material, in spite of some problems, has great potential.

Background

Kansas State University (KSU) has off-campus, graduate degree programs in five areas of engineering. It is administered through the Division of Continuing Education (DCE). As stated in a Department of Civil Engineering (CE) brochure, Graduate Studies in Civil Engineering (1998):

> "Off-campus students will be allowed flexibility in designing their program of study based on course offerings. Off-campus students must complete a total of 30 semester credit hours of course work for the M.S. degree. Off-campus students are not required to prepare a thesis or technical report, but must submit a written report and an oral presentation describing a professional level project completed under supervision."

The off-campus Civil Engineering program was initiated in the late 1970's by faculty teaching evening courses in Topeka and Salina. This led to a program in Topeka in the 1980's, administered jointly by KSU and the University of Kansas (KU). Courses were cross listed and students could get graduate credit at either KSU or KU. Since the greatest demand were Kansas Department of Transportation (KDOT) employees, most courses were transportation and structures oriented. Faculty from CE at both schools alternated in teaching the courses. Courses were rotated so that a student could get an M.S. degree in five semesters by taking two courses per semester (30 semester hours). After the start of the joint Topeka program, the Salina program was phased out.

Concurrent with the Topeka program, a graduate degree program via videotape was started in the 1980's. Through this program, graduate degrees are available from several departments in the college of engineering. The courses are regular graduate courses taught in a room with a back window that gives visual access to a control room where a technician videotapes the class proceedings. The off-campus students receive the same course presentation, materials, etc. as the on campus, in-class students. Their only limitation is that they cannot ask questions "live," as can the in-class students. If the instructor gives closed book tests, the off-campus students must have made arrangements with a suitable monitor to proctor the test. How much time leeway is given the off-campus students for completing assignments is up to the individual instructor.

Initially, a "tutored video" concept was followed. With the tutored video model, videos of an on-campus class was sent to a paid monitor hired by the university. The monitor was generally a working engineer who had previously had the course or had expertise in the subject area. The monitor would meet at a predetermined location e.g., in a rented classroom in Kansas such as Wichita, Salina, etc., wherever enough students were registered.

Eventually there was not enough demand in any given location to keep using the tutored video model. Thus began the policy of sending course tapes to individual students. This allowed expanding the program to anywhere in the continental USA. Students outside the USA are not eligible because of problems and cost of shipping tapes.

The next step in the off-campus evolution was to teach courses via the internet. Starting around 1998, the author required all students in his video courses to participate in an internet chat room four to five times during the semester, in an attempt to promote interaction between on-campus and off-campus students and to provide feedback and help on the subject matter, assignments, etc.

The present distance education brochure for the M.S. in CE states that "all courses needed for the degree are offered via videotape, World Wide Web, or by other multimedia delivery methods."

Introduction

The authors were involved in an internet course as instructor, program director and students during spring semester 2000. It was the first time the instructor had attempted a live, interactive course via the internet media from his office computer. The students in this course were also experiencing this media for the first time. This paper will describe the experience from the standpoint of the author and two of the students: one in a distant state and one on campus.

The paper will briefly discuss the facilities, the available support, the "tool kit" sent to students, the course itself, the virtual classroom experience, the lessons learned and conclusions. It will stress the virtual classroom experience.

It should be pointed out that the instructor has over 35 years of traditional classroom experience, but has very little computer expertise. Although using one for the past few years, mostly for email and running a few simple programs, he can be considered an "old timer" who is still more at home with a slide rule than a computer. He approached the course with some apprehension but that was overcome with excitement over using the new media which may become the predominate teaching media of the future.

The instructor has had some experience with using LISTSERV (group email) and chat rooms to keep in touch with off-campus students in previous videotaped courses. One of his requirements in videotaped courses is that students must find a common time four or five times during the semester to discuss various aspects of the course or just to interact in a chat room on the internet.

Although some colleagues are getting into offering courses via the internet, they are mostly pre-recording lectures. The lectures are then archived on the DCE server, along with other course materials, for the students to access, individually at their leisure - or on the instructor's schedule. This instructor/author wanted to attempt to have real time interaction with and between the students.

Facilities

Since this paper is not primarily about the hardware or software used by DCE, no attempt will be made to describe the attributes or parameters of the system in detail. This information is, thankfully, not necessary to teaching a course. Minimal instruction plus the available support (both described below) is all that is essential. This should be comforting for those with little computer expertise.

The office computer used by the instructor is a Pentium II with CDROM, Zip Drive, "A" drive, sound card and good speakers. It has other features but only those mentioned are essential to teaching via the internet. It is not a new or particularly powerful computer. Peripherals provided by DCE for teaching were a microphone and a "white board" - a tablet that allows the instructors to transmit written material, sketches, etc. Software supplied was Real Producer, needed for live broadcast and recording audio files, and Real Player, needed for playing audio files. (Student requirements will be discussed below.)

Courses are set up on the DCE server. (discussed below.) Students and instructors can access courses at anytime after establishing an appropriate account number and password. Students access the internet via whatever local service is available to them.

The instructor's computer was connected to the internet through the university system via cable. It should be noted that at the time of the course, the instructor's office was in a building with old-type wiring and connectors. This caused some problems with transmission speed.

The K-State On-Line System

A simple command gets the user into the K-State On-Line system. There you can create an account or login with a user name and password. Students then get a list of all available courses in which they are currently enrolled. These are the only courses they have access to. The opening screen of each course gives the course name and instructor and any message the instructor previously typed.

From the opening screen there are six options: “class modules,” “discussion,” “message board,” “archives,” gradebook and “course organizer.” The last two are only available to the instructor. To start the session, both instructor and students click on “discussion” (other options will be discussed later).

Next is a screen welcoming users to the “K-State On-line Chat Room.” Clicking on “Enter Chat Room,” brings up the chat room screen. The name of the person logging in immediately appears. Screen options are “Message History,” “Live Lecture,” “Reload” and “Exit.” On the KSU system, only the instructor can transmit voice (with Real Producer configured properly and running in the background). Students communicate via typing on the chat room space. “Whiteboard” can also be activated, allowing the instructor to transmit preloaded electronic images such as slides and/or any scanned material or to draw sketches in real time with an electronic pen - analogous to writing on a blackboard in the classroom.

Instructors get a list of all courses they have created and have various options for editing, configuring, and deleting these courses. A new course is set up with the “Configure Course” option. That will not be discussed here. The “Edit Content” lets the instructor upload and “file” tests, archive all chat room discussions and live lectures, any form of electronic information (slides, sketches, pictures, text, etc.), and slideshows. This course information is primarily for students to access on their own, although theoretically any of it can be transmitted live during internet class sessions via the whiteboard when set up prior to the course to do so. The instructor has control of how much of the material can be accessed by students and when. Material put on the system is not available to students until the instructor checks “publish.”

Students are required to have minimum system requirements and, more than minimum is recommended. These are:

Computer Requirements:

Minimum System Requirements:
1. Personal computer (Pentium 120 or higher) running Windows 95, 98
2. Modem with a minimum 28.8 kbps transfer rate
3. Sound card and speakers
4. CD-ROM drive, 4X or higher
5. 16 megabytes of system RAM or more
6. Super VGA videocard supporting a minimum of 16-bit color at 800x600 resolution depth

Recommended System Requirements:
1. Personal computer (Pentium 200 or higher) running Windows 95, 98
2. Modem with a minimum 56 kbps transfer rate, or other network connection
3. Sound card and speakers
4. CD-ROM drive, 16X or higher
5. 64 megabytes of system RAM or more
6. Super VGA videocard supporting a minimum of 24-bit color at 800x600 resolution depth

Support

Training is available to instructors on setting up courses and course materials on K-State On-Line. It should be noted that the system and service is available to all instructors and all courses, and not just for internet courses or for off-campus students. For example, an instructor teaching a traditional face-to-face course could set up course modules

with assignments, reading materials, class notes, slideshows, etc., for the students to access and use. The system is valuable for supplementing videotaped courses. For example, the author (instructor) generally requires all students in a videotaped course to occasionally interact in the chat room facilities. This provides feedback to the instructor and an opportunity for off-campus students to interact as they would in a regular classroom.

DCE also has paid support staff to provide individual, hands-on, assistance to instructors. This service is generally by appointment, in the instructor's office. The service is especially helpful for setting up course materials prior to their use in the course. This service is especially valuable to an instructor with limited computer expertise.

DCE also has technical support (help desk) that is also available to instructors and students. Off- campus students can contact the help desk by a toll-free number or email. The help desk can provide both online automated and real-time personal assistance. Automated online support is available 24 hours a day, 7 days a week via the internet. The automated support provides access to FAQ, current software downloads, question and solutions databases, etc. If the automated service does not solve a student's problem(s), help desk staff may be contacted by phone. Support staff are available between the hours of 8 a.m. to 9 p.m. Monday through Friday and 8 a.m. to 5 p.m. on Saturday. After hours, calls are answered by voice mail and calls are returned during regular office hours.

Students are provided with a Toolkit CD-ROM. This is mailed to them after they register for the course. The Toolkit contains the software needed for the course and tutorials to help students get started using the software.

The Course

The course title was "Pedestrian and Bicycle Facilities Design and Safety." This course was developed by the Federal Highway Administration (FHWA) and given to college professors in the hope that they would use it, or parts of it. The desired result is to educate more people, particularly transportation-oriented graduate students, to the benefits of promoting non-motorized transportation. The course consists of a student course book, instructor notes, suggested assignments, two slideshows (pedestrian and bicycle) and graphics. It is distributed free in both hard copy and CD-ROM.

As stated in the FHWA course overview:

> "This manual can be used to train future professionals in a variety of disciplines including planners, engineers, landscape architects and others designers. Emphasis is placed on the importance of developing in interdisciplinary team approach to planning and implementing bicycle and pedestrian programs, and of the role played by each profession represented in this course."
>
> "This coursebook was developed by the USDOT, Federal Highway Administration for use in graduate level courses in non-motorized transportation planning and design. Several of the lessons address both bicycle and pedestrian issues, while others address one particular aspect or bicycle planning."

The author (instructor) decided that this would be a good course to offer for his first internet course. He had "visions" of sending all kinds of good material, already in electronic format, easily over the internet. This turned out to be very naive.

The Virtual Classroom Experience

Class Sessions

There were four students that completed the course. Two were Civil Engineering students on computers in the same building as the instructor (one in the next office). One was in Topeka, about 60 miles away. One was in West Virginia, several hundred miles away. Initial contact with the students was made via email. A LISTSERV address was set up for ease of communication with all students. Initially the course was scheduled for one evening per week from 5:30 p.m. to 8:00 p.m. to accommodate the two off-campus students who had full-time jobs.

The instructor had previous experience using the chat room in conjunction with a videotaped course. However, lecturing, using the whiteboard and live interaction with a class via internet were all new.

The student text, supplementary reading materials, etc., were mailed to the students. They could have been scanned and put in the "modules" file on the DCE system. Doing so can take considerable instructor time, particularly if the instructor has limited computer expertise.

All students were given the standard toolkit with the software, instructions and tutorials necessary to enable them to use the system. However, there definitely is a learning curve and students not used to the system need time to get familiar with the system. Lesson 1: spend as much of the first session as needed to get everyone comfortable with the system.

Initially, there were problems with everyone getting the sound working properly. The instructor logged on 10 minutes early and played music. Students knew immediately if they were properly logged on and receiving sound. It took two or three sessions before all students stopped having problems with sound at the beginning of the session.

There were additional problems with sound but most were on the instructor's end. As stated previously, the instructor's computer was in a building with old internet wiring and connections. All computers were connected to the same line in series, limiting capacity. Also, there was barely enough free disk space on the instructor's computer to run Real Producer.

In order to concentrate on student comments in the chat room, it was necessary to minimize Real Player and have it running in the background. There were several times when Real Player quit running and had to be restarted, and at least one session when it wouldn't run at all. (No one ever figured out "why.") During spring break the capacity of the instructor's computer was upgraded and the problem cleared up. Lesson 2: Be sure the computer is adequate.

There was one time the DCE server was down and no class was possible. It was necessary to contact students by phone and email and reschedule. A lecture could also be taped (without students on line) and "archived" on the system for students to access at a later time. This was done once when the instructor had to be out of town.

Due to the class being held in the evening, DCE computer staff were not available to correct problems such as the server being down, etc. That appeared to be one of the drawbacks of holding class in the evening. In regard to help desk personnel, arrangements were made to have someone on duty on class nights. However, it was understood that they could not or did not solve computer hardware problems or major problems with the system. Their main function is to give instructions in proper use of software, given that the hardware and system was operating properly.

The quality and usefulness of the help desk varied throughout the semester. It seemed to depend upon which person was on duty. Some nights they were absent or too busy to answer the phone. The best service was provided by two that periodically logged into the chat room to be sure everything was going well. Lesson 3: Good dedicated support staff are essential.

It was noted earlier that the instructor naively thought he could transmit slides, pictures, sketches and all sorts of scanned material. The first class where the whiteboard was used to try this put an end to that ill-conceived notion. The first picture slide that was transmitted took about 30 minutes to fully transmit to the two students in the same building. The student in Topeka got about one-half of the picture in that time and the student in West Virginia got something less. Word slides took somewhat less time but it was obvious that this approach was not feasible. Thereafter, slides, slideshows and other graphics were "published" in the system "modules" for the students to access and study between classes. Sometimes material was mailed to them so they would have it "in hand" during discussion.

Part of the problem of slow transmission was the state of the old wiring to the instructor's computer (according to university computer experts). The instructor is now in a new building where state-of-the-art wiring was incorporated into the structure. Still, it must be remembered that the speed of transmission is usually limited by students' computers (only a 28.8 kps modem is required) and/or local internet service. For example, the two off-campus students would occasionally encounter an overloaded, local server and be shut down (by their local service provider).

Audio was also delayed getting to the students and to different degrees. When asking for feedback, that is something that has to be allowed for and gotten used to. It was generally a matter of a few minutes at most. When students asked a question about some point made during the lecture, the instructor could be already on another point. Or a student, on occasion, would continue sending comments long after the instructor had moved on to other topics. This caused some confusion.

Without insisting on feedback, the instructor would never know if anyone was connected, awake or paying attention. After trial and error, both the delay and interaction were worked out. Students were instructed to type their questions and comments but not send them (by clicking "send" or hitting "enter") until instructed to do so. All students were obligated to send something, even if it were: "I have no questions." The instructor paused for this chat room discussion about every 10 minutes, and waited for responses. As in the classroom, students were frequently asked by name to respond to a question or to give their opinion on something. By the second half of the course discussion and interaction were as good as usually occurs in a regular classroom albeit somewhat slower. It does take more time.

Tests could be given online but the instructor only used this feature once. Tests could be set up as multiple choice, true-false or essay. To "experiment" the instructor gave a lengthy, 25-point, essay test near the end of the course. As one student commented, "it was a great review of the whole course."

Another technique to be sure the students were paying attention and/or getting main points, was to ask a series of questions which the students were to answer after the lecture and return via email or regular mail during the week. This was usually done near the end of a lecture.

After the first few weeks the 3-hour, once a week format was changed to two, one and one half hour sessions. This was for two reasons. First, three hours at a computer screen can be tiring. Second, when problems did occur, it was easier to make up one and one half hours.

It should be noted that when assignments were given, or some key points were summarized, the instructor typed them in the chat room in addition to the audio. At the end of each session, both the chat room and the audio files were archived and available for access at any time for students to review all chat room activity and/or the lecture.

Reading assignments, homework, projects and a term paper were assigned as in a regular class. These were returned by email or regular mail as appropriate. A term paper presentation on audio tape was also required. These presentations were recorded on the course internet site and students were assigned to listen to the other students presentations.

Off-Campus Student Perspective (written by one of the off-campus students)

Too often, students are located in areas that higher education classes cannot be accessed by traditional study. An on-line, live, interactive internet course provides a means of education to a student, who without this resource would otherwise not have the ability to engage in an education. As with any collegiate setting, the Internet courses present advantages and disadvantages.

The primary advantage of an on-line, live, interactive internet course is straightforward; it provides a formal education where one is not available, either geographically or due to schedule constraints. As long as a computer with an Internet connection is available, the student can attend class, which provides a great amount of schedule flexibility for the student. Surprisingly enough, class participation was very high. The professor promoted class participation, however, the mask of a computer seemed to release the tongues of the otherwise quiet students. The high level of class participation, with varying opinions on subjects, made the class a very enjoyable learning experience.

Unfortunately, distance learning also means distance from assistance, by both the professor and fellow students. Working with fellow students promotes better understanding of a subject and teamwork when working on group projects. However, with Internet courses, the student is pretty much "on their own" to learn the course material. Even though every effort is made by the professor to assist the students, in some cases, phone and email correspondence are not enough; the student has to see it "first-hand" to better understand the concept. In addition to the lack of "face to face" assistance, the technology implemented to deliver and receive the lecture was, at times, a disadvantage. The class was often interrupted or delayed by excessive Internet congestion, which was a result of server overloads of local systems. In this case, the chat room was used for both discussion and lecture, which is not an optimal situation for a lecturer unless they can type a hundred words a minute. The Internet class room was also equipped to view slide shows, however due to the size of the files, the slides could not be viewed in the interactive setting. As technology moves forward in this new educational arena it will begin to serve as an aid, not as a liability.

Even though some hurdles must be crossed to deliver and receive an Internet course, cooperation, participation, and patience of both the professor and the students decide whether class will be successful or not. While the hurdles at times delay the learning process, the integrity of the material and level of education were not compromised. This is illustrated by the required work for the on-line, live, interactive internet course, which included papers, homework, projects, and exams. On the surface the class exposed a new medium for education, however, under this surface, a traditional education presents itself.

On-Campus Student Viewpoint (written by one of the on-campus students)

The following is a summary of my viewpoint of the Pedestrian/Bicycle Course via internet:

What was good:
1. Reference to web sites, access to CD-Rom and relevant information for discussion.
2. Archived lectures. This helped in revisiting previous discussions, specially those topics in which I was less attentive or went for a break.
3. Being internet based, lectures could be attended from anywhere, especially from the home or library.
4. Tests and assignments were posted on the course web site and could be submitted through the internet. Therefore there was no limitation on submission time, place or postage.
5. Live interaction with off-campus students was possible.

What was bad:
1. Technical problems due to the network and the computer.
2. Sometimes there was no sound (lecture).
3. Face-to-face classroom interaction was not present, however, we could communicate through the chat room.

4. Posting pictures, slides, and other visual materials was difficult.

Overall View:
1. Excellent use of modern technology.
2. Need for faster network data processing (for pictures, slides, etc.).

Conclusions

The first conclusion is that problems should be expected, especially in the beginning, for a first time experience for instructors or students. Spend time practicing before hand if possible. Spend all or most of the first session with the students just getting used to the system and format. Good support personnel are essential. Get to know them well. The bottom line is that the process works and internet education is sure to become an increasingly more important segment of university education in the future.

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