Using Information Technology To Offer Undergraduate Distance Engineering Degree Programs On-Line

Hossein Salehfar, John Watson, Arnold Johnson
School of Engineering and Mines

Lynette Krenelka, Tim McCartney, and Dara Faul
Division of Continuing Education

University of North Dakota
Grand Forks, ND 58202 U.S.A

Abstract

As information technology is evolving, distance education is becoming increasingly important to the mission of many schools of higher education. As a result, non-traditional students now have enhanced opportunities in many academic fields, including engineering. In 1989 the School of Engineering and Mines (SEM) at the University of North Dakota (UND) established a distance education program to deliver Bachelor of Science engineering degrees to employees of participating companies. This program has recently expanded into open enrollments and is offered to diverse and geographically remote students. The program is now called the Distance Engineering Degree Program (DEDP) and it includes the Electrical, Mechanical, Chemical and Civil Engineering disciplines. DEDP offers the only ABET (Accreditation Board for Engineering and Technology) accredited undergraduate engineering program at a distance. Since its inception, the DEDP delivery mechanism has evolved through a number of enhancements to keep pace with advances in information technology and improved distance learning and teaching methods.

The first generation of DEDP course delivery method included conventional videotaped lectures, static Internet Web pages of handouts, e-mail, and on-campus condensed summer laboratories. Major limitations of this delivery format included an inherent delay in delivering the videotapes to the students and the asynchronous problems associated with faculty handling on-campus and distance students in the same class. To eliminate this delay in the lecture delivery times and to provide an optimal delivery method, the authors have tested and examined various ways to utilize the power of the Web to synchronize and to better integrate the DEDP students' learning activities with those of their on-campus peers. Using a combination of digital recording tablets, video cameras, white boards, and streaming servers, all of UND's DEDP courses are now offered on-line through streaming video and/or downloadable files. The audio, whiteboard, computer and video outputs from a course are condensed into a RealOne Player file that is placed on the Internet within hours and can be accessed with minimal Internet connectivity. With the new format in place, the quality of the lectures and course material presentations has improved tremendously. The recording and delivery mechanism is transparent, is adaptive to different teaching styles, and is widely accepted by the faculty. The new delivery mechanism has proved to be cost effective through the use of readily available software and hardware components. The students' response and feedback to

the new technology has been very positive. This paper presents detailed experiences, procedures, and demonstrations of the new delivery method currently being used in all DEDP classes at UND.

Background

In 1989, the School of Engineering and Mines at the University of North Dakota began delivering a distance education program through the Division of Continuing Education. Courses leading to Bachelor of Science engineering degrees were offered to employees of 3M. The program was later extended to employees of other member companies to form the Corporate Engineering Degree Program (CEDP). In 2001, this program was modified to serve other individual students, and it became the Distance Engineering Degree Program (DEDP) delivering chemical, electrical and mechanical engineering courses. To date the program has graduated 16 students, who completed lecture courses via videotape, and laboratories through on-campus summer programs. The program enrollment has risen from 8 in the Fall of 1989 to over 131 in the Fall of 2003. With the recent change to serve individual students and the introduction of a civil engineering program in the Fall of 2003, enrollment is expected to continue to increase. The average age of the DEDP students at UND is 34.9 years old. About 97% of these students are working full time professionals and the majority of them receive reimbursement from their companies if they receive a "C" or better in their courses. There are also a few military personnel in the program which also receive tuition reimbursement of 100% of base tuition up to $750/semester. There are 13 female students enrolled in the program as of Spring 2004. A summary of demographic information and other relevant data is included in the Appendix of the paper.

Currently the DEDP is also being considered as a potential supplier of distance engineering courses by overseas educational organizations, such as Academics International in Singapore.

In addition to investigating alternative delivery methods for lectures as described in this paper, SEM has a 3 year FIPSE (Fund for Improvement of Post Secondary Education) grant from the U.S. Department of Education to investigate on-line laboratories to further facilitate distance learning. Progress in developing electrical, mechanical, and chemical engineering on-line labs through this FIPSE grant is addressed elsewhere in another conference proceedings.

The DEDP at UND currently offers the only ABET (Accreditation Board for Engineering and Technology) accredited undergraduate engineering programs at a distance.

First Generation of Course Delivery System

The first generation of DEDP course delivery format included conventional videotapes of lectures mailed to the distant students, static Internet Web pages of handouts, e-mail, faculty/student correspondence, and on-campus condensed summer laboratories. This delivery format ensured that each distance degree program had exactly the same content as the on-campus program. One major limitation of this delivery method was that it normally took two to three weeks, sometimes even longer, for the video taped lectures to reach off-campus students. As a result, students enrolled in the DEDP were at times more than three weeks behind their on-campus peers in submitting the required assignments, projects, and tests. This delay generated additional load for faculty in terms of grading and advising on-campus and distance students at different points in the course. In general, faculty members considered that under these circumstances a distance student required up to 50% more time and attention than an on-campus student.

Second Generation of Course Delivery System

To shorten the delay in lecture delivery times, the authors examined various ways to utilize the power of the new information technologies and the Web to synchronize and to better integrate the DEDP student activities with their on-campus counterparts. In developing the on-line course delivery system it was important not to overlook student access. Hence methods investigated had to be compatible with minimum Internet access configurations.
One of the first on-line delivery methods that was investigated and tested by the authors used a combination of the Mimio™ text capturing device and the Camtasia™ on-screen video capturing software to dynamically (in real time) capture the text and other in-class visuals along with the accompanying (instructor's) audio[1,2]. The captured audio and video were then streamed over the Web in a RealPlayer™ or Windows Media Player™ format[3, 4]. The students were also given the option of downloading the files. Through this delivery format, the DEDP students had same day access (rather than a one to two week delay) to exactly the same class presentation material as their on-campus peers but with the added advantage of replay. Details of this delivery format and its mechanism are presented elsewhere[5].

Current Course Delivery System

There were some drawbacks to using the Mimio text capturing device and the Camtasia video capturing software in the second generation of the course delivery system. First, the instructors had to record their own lecture presentations locally using the personal computers in the classrooms. Then, the recorded materials had to be processed and uploaded to the course web sites. Depending on the visual and graphic contents of the lecture materials, processing and uploading the recoded lectures would take anywhere from one to two hours. The system did not have provisions for recording and uploading files remotely by DEDP technicians and staff. This approach thus created an additional responsibility for the instructors and often times it had the potential to distract focus away from their teaching responsibilities.

To improve the course delivery mechanism and to free the instructors from recording their own lecture presentations and in order to expedite access to the recorded lectures, the authors investigated alternative and more advanced delivery systems extensively. One of the main criteria and objectives of the new system was its remote, as well as local, recording capabilities. With these capabilities, student technicians or DEDP staff could record lecture materials remotely from a central control room, as conceptually indicated by Figure 1.

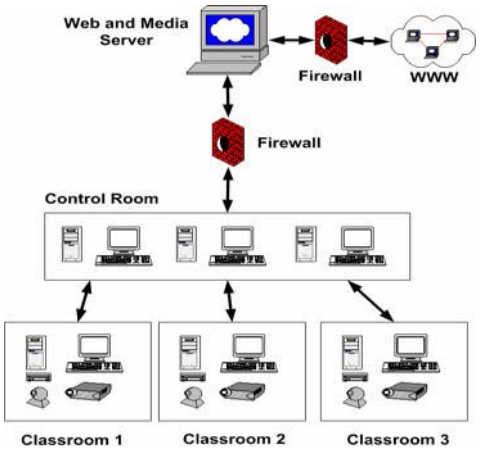

Figure 1: Conceptual remote course recording and delivery system.

Under this system, the presentations can remotely be recorded, processed, and published to the Web site of the courses by student assistants and/or technicians from the control room. The computers in the control room are connected to the computers in the classrooms either directly via CAT 5 communication lines or indirectly via the Internet. Each classroom is equipped with the software and hardware necessary to capture the instructors' audio and video activities in the classrooms. The captured media is directly monitored and recorded onto the computers in the control room in real time. At the end of each presentation, the recorded media can be processed immediately and uploaded to a Web and media server. Off-campus and on-campus students can have access to the uploaded materials through the Web site of the course within a few hours of the class being completed. This method and procedure is transparent to the instructors and allows them to focus on their normal teaching activities as usual.

To implement the conceptual design of the delivery system, several different "off-the-shelf" on-line lecture delivery tools and techniques were investigated and evaluated by the authors. It turned out that none of the current technologies alone met the DEDP course delivery needs at UND. With financial support from UND Student Technology Funds, the Dean of the School of Engineering & Mines, and the Division of Continuing Education, various software and hardware, including a streaming media server, were acquired and pieced together. Details of the final designed system are presented in the following section of the paper.

Designed System

A block diagram of the components installed in one of the state-of-the-art "smart" classrooms is shown in Figure 2.

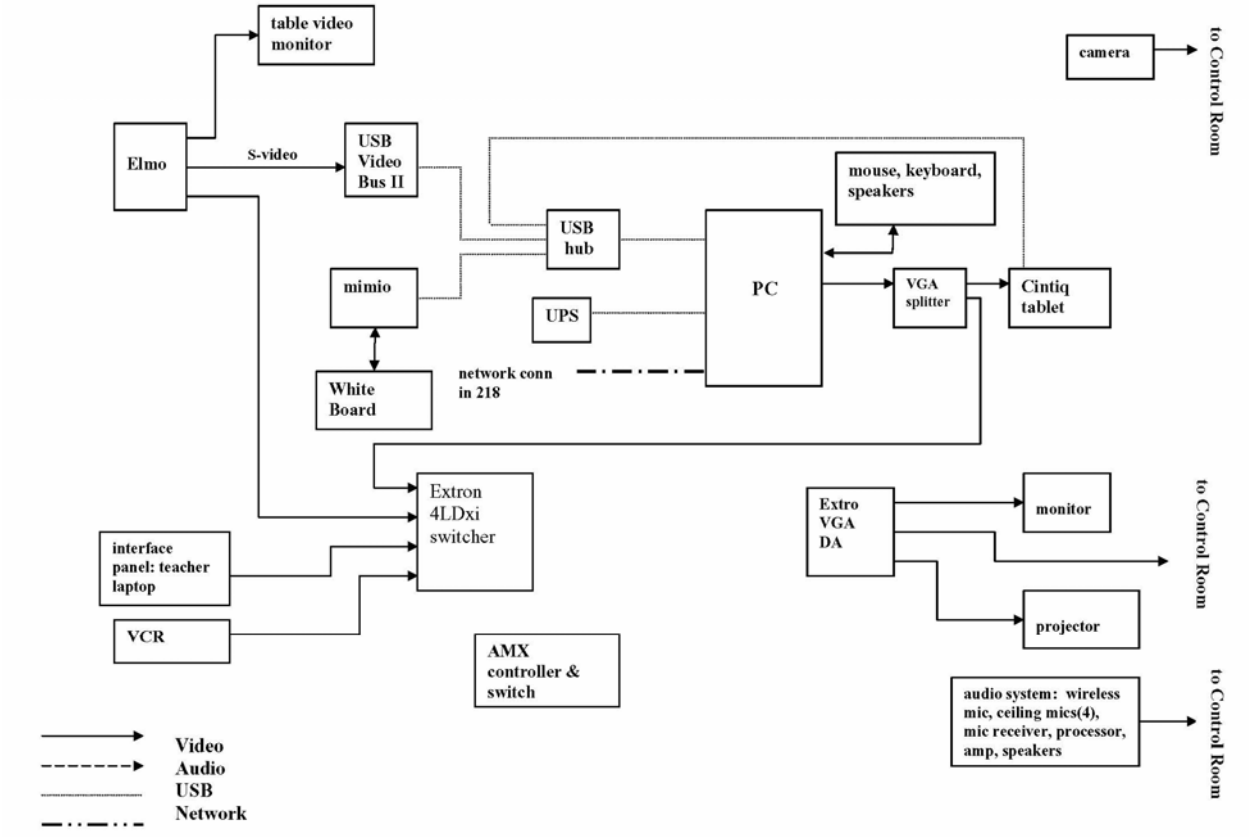

Figure 2: Various components of the designed delivery system in one of the classrooms.

Similar systems have been installed in two other classrooms where DEDP classes are held, with work underway on a fourth.

Figure 3 shows the components installed in the control room. This setup monitors and captures, in real time, the media from the equipment shown in Figure 2.

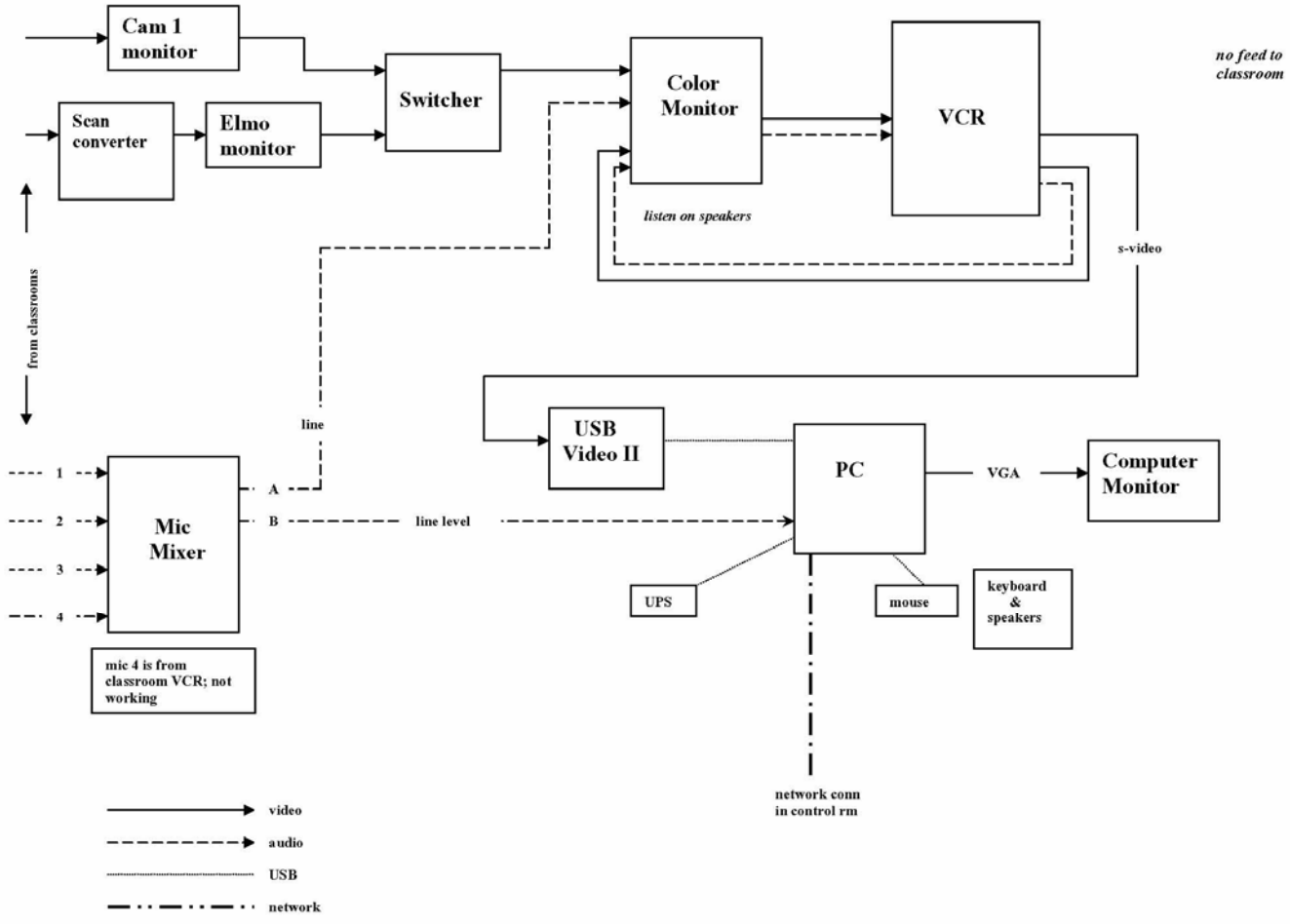

Figure 3: Equipment in the control room corresponding to those in Figure 2.

To dynamically capture the computer generated instructional materials and hand-written notes from standard whiteboards, an Elmo[6] document camera, a Wacom Cintiq digital tablet[7], a high quality computer projector, a Mimio capturing device, and other related components are integrated together through various peripherals, accessories, and a personal computer. This equipment is available to the instructors in each classroom. An instructor is able to use any or all of the integrated devices at any time during a presentation.

Using the Elmo document camera, images from physical objects and/or the instructors' hand-written notes are monitored, captured, and digitally recorded on the computer in real-time. A typical Elmo document camera system is shown in Figure 4.

Figure 4: A typical Elmo document camera[6].

Instructors can write on a Wacom electronic pen-sensitive Cintiq tablet as they teach. The Cintiq tablet is an interactive digital display that combines the advantages of an electronic pen and an LCD monitor with various controls similar to those of a screen-sensitive PC tablet. With the electronic pen, the Cintiq tablet is used as a controlled and colored electronic whiteboard during lecture presentations. Using the electronic pen, instructors can also annotate computer generated documents in Microsoft PowerPoint or other similar programs. Figure 5 shows the image of a Wacom Cintiq tablet.

Figure 5: Electronic pen and Cintiq digital interactive tablet[7].

The Mimio device can capture hand-generated notes that are written on any standard whiteboard or other smooth surfaces in a classroom. The Mimio device captures text and hand drawings in the same color as written on the board by standard color markers as shown in Figures 6 and 7.

Figure 6: Mimio™ capturing device and markers[1].

Figure 7: Mimio™ captured text on a laptop[1].

The instructor's audio is captured using high quality wireless microphones which provide freedom of movement during presentations. A high quality video camera with zoom, pan, and tilt capabilities mounted on the ceiling of the classroom monitors, captures, and transmits the instructor's video to the central control room. The video is then fed to the computer that records the presentation. The exact materials captured by Elmo, Cintiq tablet, or Mimio are also projected on large screens in each classroom as they are presented to in-class students in real-time. This allows for both in-class and off-campus students to see and hear exactly the same material presented in the classrooms.

The heart of the designed system at UND is the ScreenWatch[8] software program that resides on the computers in each of the classrooms and in the control room. The ScreenWatch program allows for remote recording of captured audio, video, and presentation materials and their immediate integration and processing for Web access in either Microsoft Windows Media Player or RealNetworks' RealOne Player format. Access to the recorded presentations is possible through a Web browser such as Netscape or Microsoft Internet Explorer in the form of either multi-rate progressive streaming or multi-rate real-time streaming optimized for 56k modems, cable/DSL modems, and T1 connections. The speed of the media streams is automatically negotiated and determined by the users' connection type. Progressive streaming is provided by any standard Web server. However, for real-time streaming a dedicated real-time server such as RealNetworks' Helix9 server is required. A discussion of advantages and disadvantages of either progressive streaming or real streaming is beyond the scope of this paper. In the UND designed system a dedicated Helix server is used to serve the presentation audio and video files through the RealOne player. To access the presentations, users are required to have the free RealOne player software and the free ScreenWatch plug-in installed on their personal computers. The ScreenWatch plug-in is automatically detected and installed when a student accesses any of the recorded materials over the Web for the first time. The necessary ScreenWatch plug-in, a Web browser software, the RealOne player program, and a set of simple instructions explaining the necessary procedures to access the on-line lectures are sent to registered students on a CD-ROM before the classes start each semester. The following figures show snapshots of the lecture presentations through the ScreenWatch program accessed over the Internet. These figures show the instructors' video, lecture materials, and various presentation controls including fast forward, fast backward, stop, pause, and slider navigator buttons.

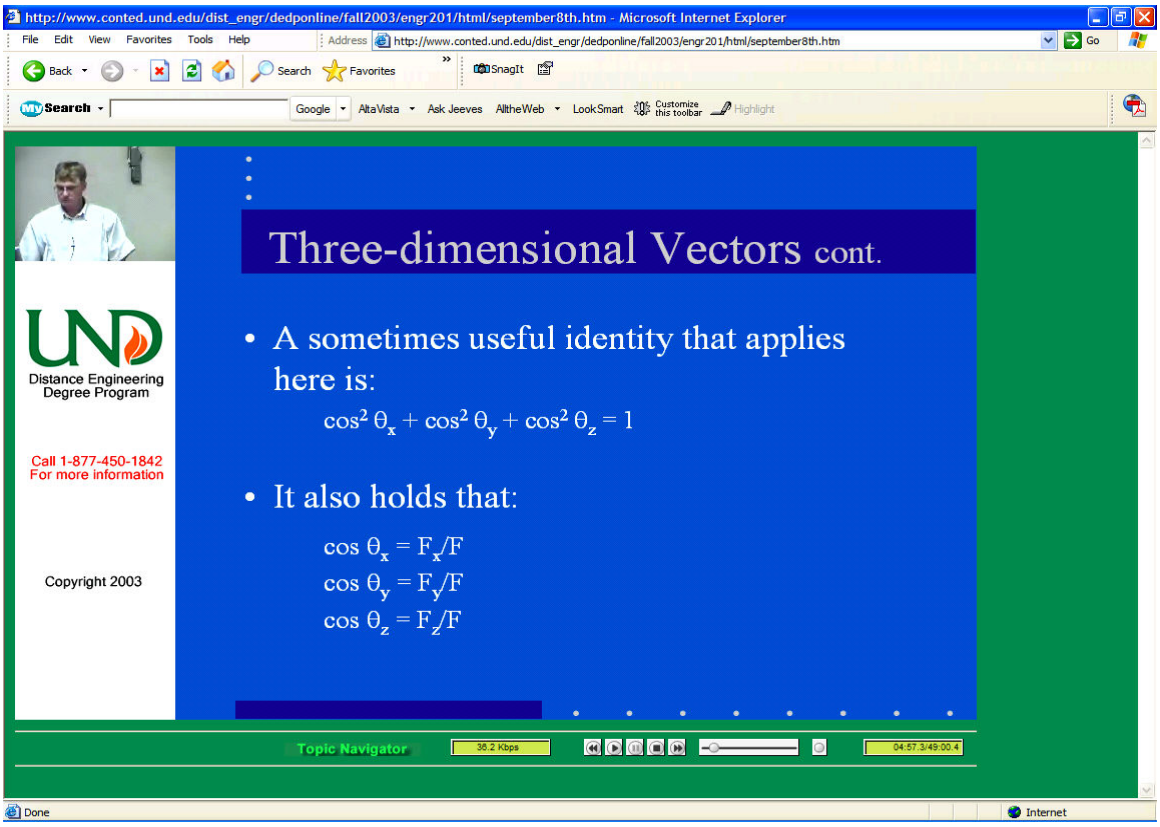

Figure 8: Web based snapshot of a PowerPoint lecture presentation with instructor's video.

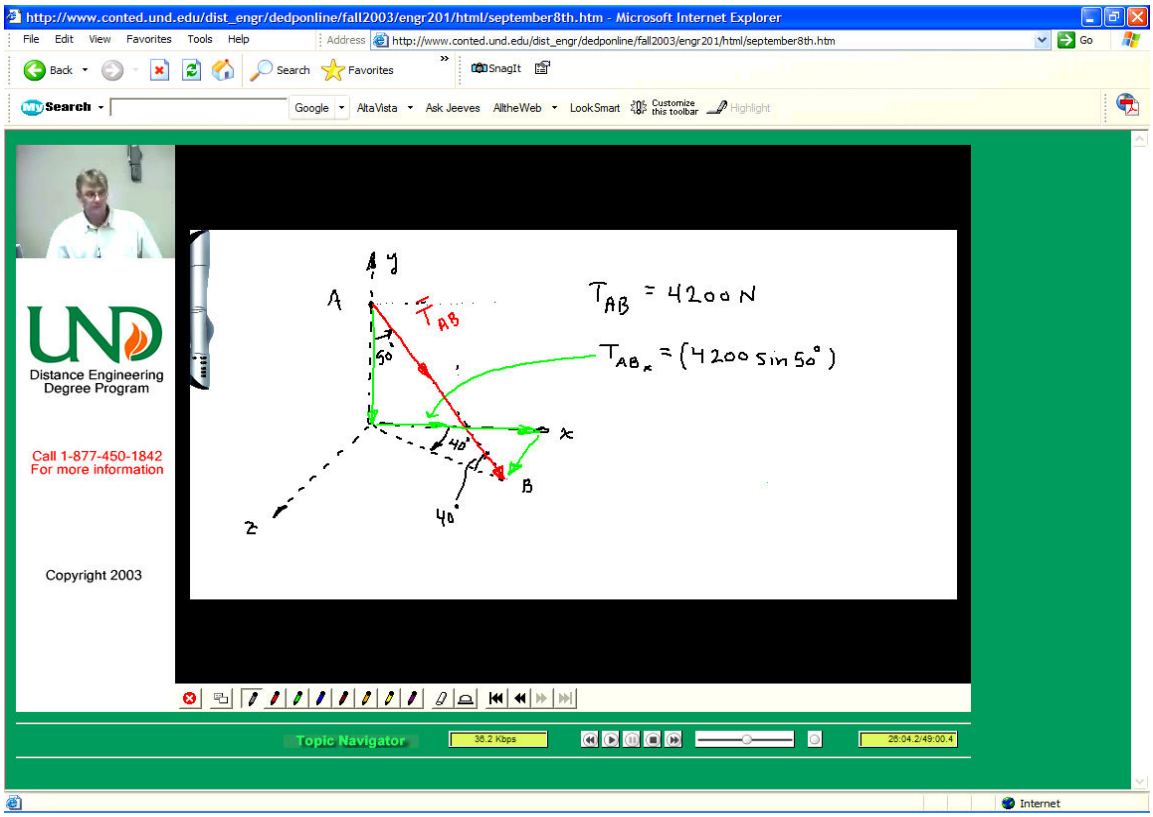

Figure 9: Web based snapshot of a hand-written lecture presentation with the instructor.

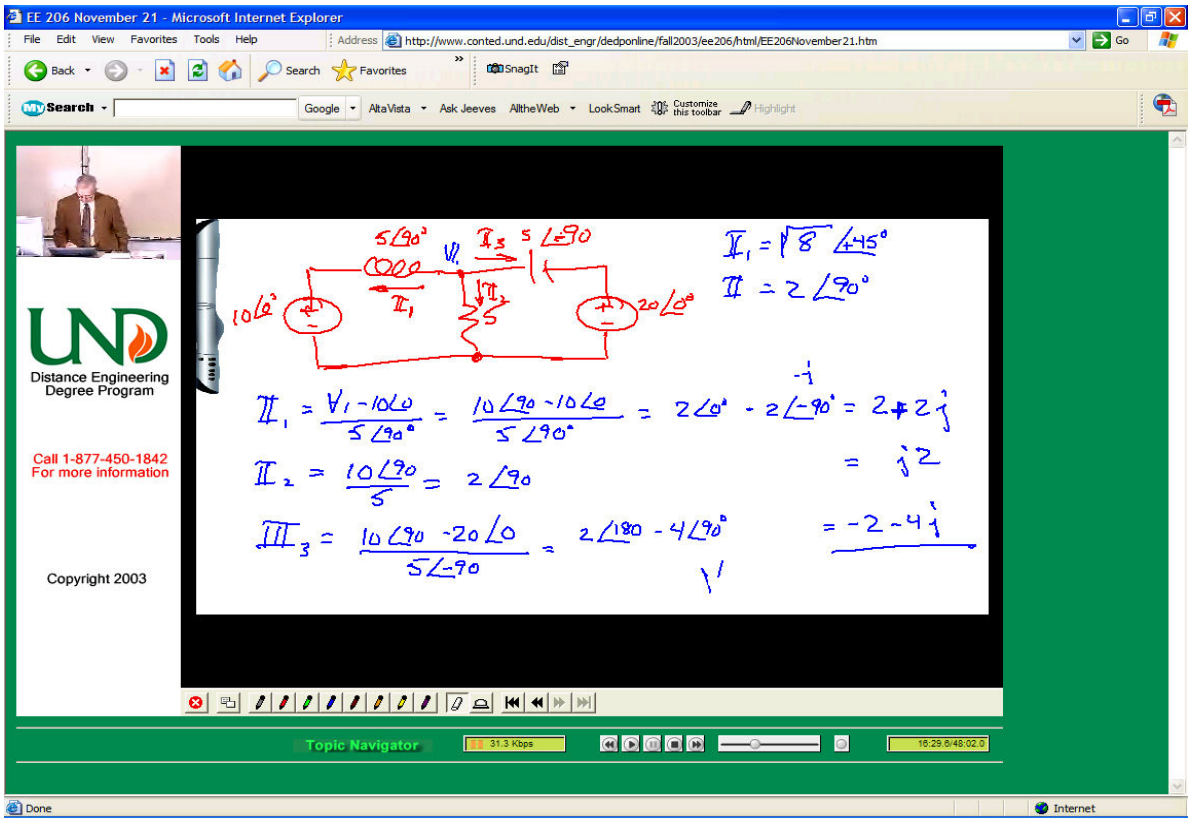

Figure 10: Web based snapshot of another hand-written lecture presentation

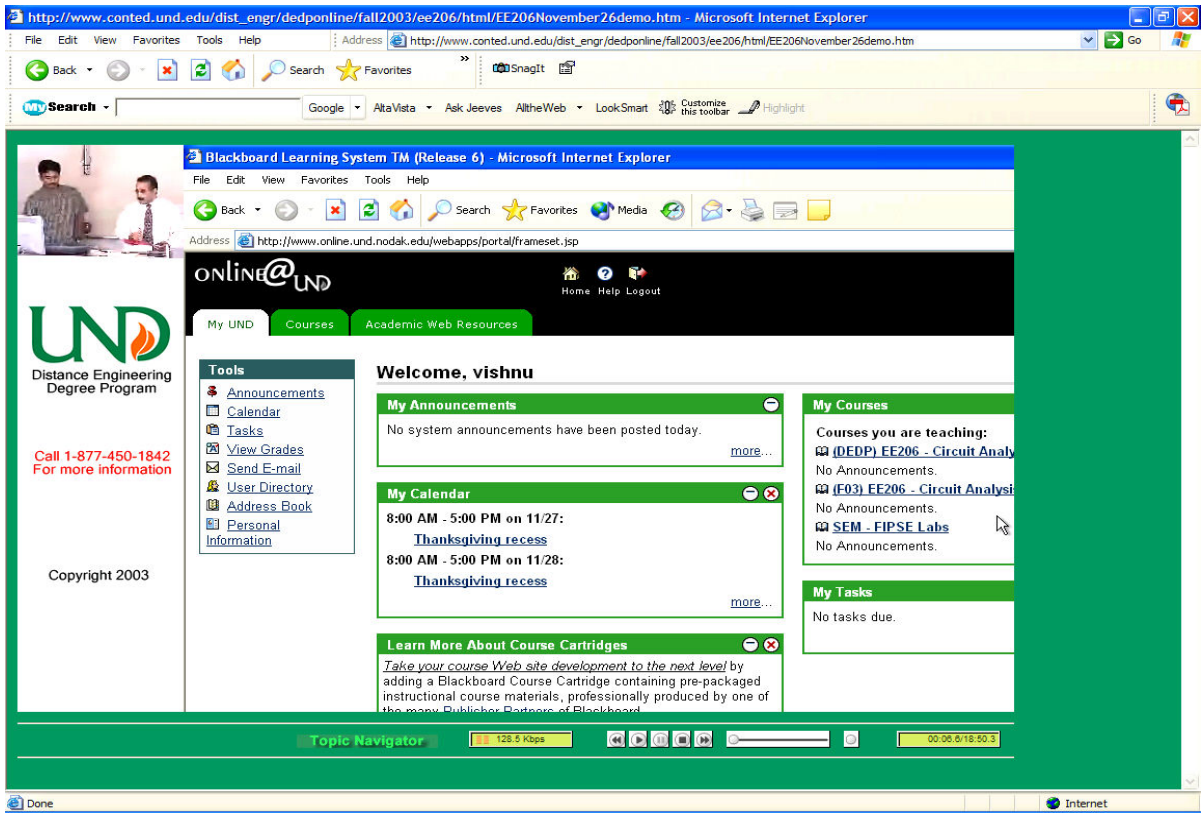

Figure 11: Snapshot of a Web based lecture presentation.

Student Assignments, Course Logistics, and Support

Students turn in their mandatory homework and project assignments either through e-mail or fax. Students can fax or e-mail their materials directly to the instructors or to the DEDP Program Manager for delivery to the respective faculty. Class exams are e-mailed directly to the proctors at student locations. The proctors are asked to administer the exams the same day they are held on campus. Distant students can contact the faculty on campus for questions or help directly via phone, e-mail, or fax during regular office hours or at other pre-arranged time periods.

Technical help with Web access to the lecture files and/or related issues is available to distant students on a continuous basis from DEDP Technical Staff through phone, e-mail, and the Web site of the courses. Key technical personnel are provided through the School of Engineering and Mines (SEM), the Division of Continuing Education, the Information Technology Systems and Services (ITSS), and the Center for Instructional and Learning Technologies (CILT). Several student assistants are hired to record, process, and upload all on-line DEDP classes. Over fifteen DEDP classes from various departments, including electrical, mechanical, chemical, and civil engineering, along with math and physics were recorded and uploaded each week during the Fall of 2003.

Estimated System Cost

Compared to its commercially available counterparts, the designed course delivery system is an inexpensive and affordable on-line course development system that can easily be reproduced and used by other interested users or institutions. The system is very flexible and modular. Components can be added or removed from the system as needed by the users without affecting the performance of the remaining subsystem. The following Table presents a breakdown of the estimated cost of each system component and that of the total system. It is assumed that the user already has access to a midrange laptop or desktop computer where the presentations are recorded.

Item	Estimated Cost in $
Mimio Capturing Device	850
Wacom Cintiq Tablet	1,700
RealNetworks Helix Server	5,000
High Quality Ceiling Video Camera and Controls	5,000
RealNetworks Helix Producer Plus Software	100
Elmo Document Camera	2,000
Computer Projector	2,000
ScreenWatch Software (two licenses)	600
High Quality Wireless Microphone System	500
RealOne Player Software	Free
MS Windows Media Player	Free
Total Estimate	17,750

Table 1: Cost Estimates of the Course Delivery System

As mentioned earlier, the designed system is configured to serve the recorded files in a "real" Helix streaming format. However, the recorded files can be served via progressive streaming on any conventional web server, which could be a standard mid-range personal computer running any of the freely available web server proxy software. Therefore, a user may not have a need for an expensive Helix server. Instead of a high quality and expensive video camera, a low cost (e.g., $80-$100) stationary webcam with a built-in microphone may also be used to capture the presenter's video.

A survey of DEDP students taking classes during the Fall of 2003 has generated very positive and encouraging comments about the new on-line delivery system. A small sample of the survey responses from DEDP students is included in the Appendix of the paper. Feedback from students indicates that this delivery method has an excellent potential as a replacement for the expensive, slow, and cumbersome delivery by videotapes.

Conclusions

Using a combination of the Mimio™ text-capturing device, the Elmo document camera, the Wacom Cintiq tablet, and the ScreenWatch software, the text and other in-class visuals along with the accompanying (instructor's) audio and video are dynamically captured and uploaded to the Web site of the DEDP courses at UND. The uploaded files are then streamed over the Web in a RealOne™ player format using "real" streaming. Through this delivery method, the Distance Engineering Degree Program (DEDP) students of the University of North Dakota have same day access (rather than a one to two week delay) to exactly the same class presentation material as their on-campus peers. Students' reaction to the new delivery method has been very positive. The system also benefits the on-campus students as the recorded files have very high quality and can be played as many times as needed. On-campus students may watch lectures they have missed or use them as a study aid. The majority of the faculty teaching DEDP classes enjoy using the state-of-the-art designed system as it is transparent to them. Many instructors have expressed their interest in using the system for their on-campus courses as well. The delivery system is adaptive to different teaching styles.

The School of Engineering and Mines and the Division of Continuing Education at UND have surveyed all DEDP students, and the feedback indicates that electronic delivery is acceptable and is well received by the students. The School of Engineering and Mines and the Division of Continuing Education at UND are committed to the further expansion and improvement of the program.

For an actual demonstration of two of the class materials using the system discussed in this paper, the readers are invited to visit the following Web sites. To view the files, *version 2 or higher* of the free RealOne Player and the ScreenWatch plug-in are required. The RealOne Player and the plug-in should be detected and installed automatically as soon as the user clicks on one of the following links. The files will play in the RealOne Player embedded in an html page.

http://www.conted.und.edu/dist_engr/dedpon-line/fall2003/ee206/html/EE206November21.htm

http://www.conted.und.edu/dist_engr/dedpon-line/fall2003/engr201/html/september8th.htm

References

1. Virtual Link Corporation, "Mimio," [On-line]. Available: http://www.mimio.com/index.shtml.

2. TechSmith Corporation, "Camtasia," [On-line]. Available: http://www.techsmith.com

3. RealNetworks, "RealOne Player," [On-line]. Available: http://www.real.com.

4. Microsoft, "Windows Media Player," [On-line]. Available: http://www.microsoft.com/windows/windowsmedia/download/default.asp.

5. Hossein Salehfar, John Watson, and Arnold Johnson, "Internet Based Class Presentations to Enhance Distance Engineering Degree Programs", Proceedings of the 2003 ASEE Annual Conference and Exposition, Session 2793, June 22-25, 2003, Nashville, TN.

6. VisualEdTech, Inc, "Elmo Document Camera," [On-line]. Available: http://www.visualedtech.com/Samsung/visual_presenters_index.htm

7. Wacom Technology, "CintiQ 18SX," [On-line]. Available: http://www.wacom.com/lcdtablets/index.cfm

8. OPTX International, "ScreenWatch Producer," [On-line]. Available: http://www.screenwatch.com/

9. RealNetworks, "Helix Universal Server," [On-line]. Available: http://www.realnetworks.com/products/server/

Biographies

HOSSEIN SALEHFAR is currently an Associate Professor of Electrical Engineering at the University of North Dakota. He received his B.S. in Electrical Engineering from the University of Texas at Austin, and his M.S. and Ph.D. degrees in Electrical Engineering from Texas A&M University in College Station, Texas. His teaching and research interests currently include fuzzy logic and neural networks application to renewable energy systems, power electronics, and electric drives. Dr. Salehfar is a senior member of the IEEE and the ASEE. He is the current Chair of the North Midwest Section of the ASEE.

JOHN WATSON was educated in the U.K, and has worked in industry and academia on four continents over the past 35 years. Prior to becoming the Dean of the School of Engineering and Mines at the University of North Dakota, he spent 20 years at the University of Missouri-Rolla with the last 12 years as Chair of Metallurgical Engineering. His teaching and research interests have included mineral separation processes, computer simulation and control, hydrometallurgical processing of metal wastes, and assessment of student learning.

ARNOLD JOHNSON is the Chair of the Electrical Engineering Department at the University of North Dakota (UND). He has been teaching since 1974 and has been a member of the UND EE Department since 1988. He earned his B.S.E.E. at UND in 1959 and his M.S.E.E. at Iowa State University in 1962. Of the 15 years he spent in industry, five were with Collins Radio (now Rockwell Collins) in their avionics department and the other ten were divided between a small computer firm and an image processing firm.

LYNETTE KRENELKA is the Director of Distance Degree Programs at the University of North Dakota (UND). She administers over 20 degree programs that are delivered off campus. She is active in the American Society for Engineering Education's Continuing Professional Development Division and has held the office of Secretary for two years. Lynette earned her MS in Research Methodologies and is working on a Ph.D. in Educational Leadership at the University of North Dakota.

TIM McCARTNEY works on technical projects for the University of North Dakota Division of Continuing Education, television and radio operations, as well as the Distance Engineering Degree Program. He received his B.A. in

Communications from Western Illinois University in Macomb, Illinois, and his M.S. in Training and Human Resources Development from St. Cloud State University in St. Cloud, Minnesota. His technical work includes audio, video and the transmission of radio frequency signals.

DARA FAUL is the Technical Manager of Distance Degree Programs for the Division of Continuing Education at the University of North Dakota. She received her B.S. in Management and her Master's in Management from the University of Mary in Bismarck, North Dakota. Her experience includes graphic design, video conferencing, and distance education.

Appendix

The following is a compilation of student demographic data, comments about the program, and a portion of the survey responses received from DEDP students who had accessed the on-line course delivery system described in the paper.

On-line Survey Results- 12/3/2003

Student Responses

The following is an overview of the results of an on-line survey (# of respondents is 30) that was distributed to the Distance Engineering Degree Program students in week nine (16 week semester) of the first full semester of the on-line delivery. Overall, the student results were very positive. As with any new project, there were some "glitches" in the beginning of the semester with the server housing the on-line courses. But, the issues were taken care of very quickly. When asked, "how would you rate the quality of the sound, picture, navigation components of the on-line lectures," 74% of the students responded that the quality is above average to high quality. The full results of the question are:

High quality	37%
Quality is above average	37%
Quality is average	20%
Quality is below average	6%
Quality is poor	0%

When asked about the type of Internet connection, 13% of the students responded that they were accessing the Internet connection from a dial-up modem, 63% were accessing the Internet from a cable modem or DSL, and 23% were accessing the Internet from an office LAN. The students also reported that 13% of them were choosing the "play or streaming" method to view the lectures and 87% were choosing the "download" method to view the lectures. The rating students gave to the "ease of use when 'playing' or 'downloading' the lectures were reported that 84% of the students rated that the lectures were very easy to play or download or that the lectures were played or downloaded with minor (fixable) problems; 11% said that the lectures were somewhat difficult to play/download and the remaining 5% said that the lectures could not be played and/or downloaded. Although, there were a few students that reported they could not play or download lectures, it can also be reported that once the technicians worked with the few students that were having difficulty over the phone or e-mail, that all students were able to either download or play the lectures successfully and the students did not fall behind within the semester.

In rating the quality of support the students received when they contacted the technical support staff, the students rated the support in the following ways:

Technical support was very helpful and resolved my questions/problems	35%
Technical support was very helpful but not all technical issues were resolved	7%
Technical support was not helpful and I still have technical problems	0%
I did not contact technical support, I resolved the technical problems on my own	15%
I did not have a need to contact technical support	43%

The technical staff developed an on-line feedback form and posted it within the Learning Management System, Blackboard that was used for each course. Only 4% of the students said that they had filled out the on-line lecture feedback form, 32% said that they had located the on-line feedback form, but did not have a need to use it and 64% of the students reported that they did not know an on-line feedback form existed.

When asked if the instructions for accessing the on-line lectures were clear and helpful, 76% of the students said that yes, the instructions were very clear and that they accessed the lectures successfully, 9% of the students reported that the instructions were clear, but they had to call for assistance, no students reported that the instructions were unclear and that they had to call for assistance and 3% of the students said that they did not use the instructions for accessing the lectures (just figured it out on their own).

Specific Student Comments

With their permission, the following are names and comments from some of the students regarding the online courses.

Name of the student: CALVIN O. COBBS:

I am extremely pleased and thrilled that I have been given the opportunity to participate in the University of North Dakota's Distance Degree Program within the Division of Continuing Education. Moreover, I am enrolled in the Distance Engineering Degree Program, where I am pursuing a degree in Civil Engineering. This opportunity to complete my degree on-line gives me a chance to enhance my value to my organization, while continuing to work full time and support my family and reach my personal goals. More importantly, my organization encourages self-improvement and upon successful completion of the degree will award me with upward mobility through their Merit Promotion Program. The excellent and challenging instruction and the method of delivery are effective and user friendly. I encourage everyone who may have thought that attending school was difficult while supporting a family and working full time to take advantage of this fine program that allows you to be successful and be all that you can be.

Name of the student: Cullen Longman:

Without the Distance Degree Programs offered via the University of North Dakota, my educational goals would be at a stand still. I am in the United States Air Force stationed in Europe, and have no other options available for me to continue my quest towards a bachelors degree in mechanical engineering. UND takes full advantage of internet technology to provide me classroom lectures as if I were sitting in class. Thanks for providing an excellent service.

Name of the student: Jim Oberbroeckling:

I'm in the Distance Degree Program at UND. This program is a great way for me to get my BSEE degree while I work. The best part of this program is it is flexible with my work and family life. I do not have to hold to a rid get schedule (i.e. I don't have to worry about being at a class lecture on MWF at 10:00am). I can watch lectures when is fits my schedule. If it is a busy day at work and family, example need to work late, attend my son's soccer game plus be at my daughter's dance lesson and I also had class lecture I need to watch, I can wait till the next day to watch the lecture. If I'm on business travel for a couple of days, UND gives me a two week buffer time to get caught back up on my class work. I'm easily able to communicate with my instructors and class mates by e-mail or phone so I don't feel all alone when it come needing help. This program is very flexible with my already busy life and still allows me to get my BSEE degree. What a great program.

Name of the student: Kevin Houser, P.E.

I am what one would consider a non-traditional undergraduate student (18 years in industry with a Master's in Mechanical Engineering). I am currently working on a Bachelor's in Electrical engineering to widen my knowledge base. I have been very impressed with the DEDP program. Having been through an undergraduate program and physically attending courses at a university, I can definitely say that the experience is similar. Through e-mail, I feel that I have even better access to my professors now than I did then. I have found the coursework interesting and challenging, two things I look for in an education program. With two kids at home, spending time away at classes was not an option for me. By bringing the classroom to my home through the DEDP program, I can expand my knowledge and still have time for my family. When you mention to someone that you are getting your Bachelor's in a distance program, they think of some of the online "degree factories", but once I explain the DEDP process to them, their attitude changes and they tend to be quite impressed with the delivery format. Additionally, UND is well know for its Electrical Engineering program and this tends to make people notice. All in all, the program provides a challenging, comprehensive education in a manner that fits my schedule.

Name of the student: Mark Surface

The web site is what got my attention. The program coordinator, Courtenay White, has been helpful and always quick to respond to questions. The most difficult part of the program, as with any online program, is learning material by yourself. A chat room might be beneficial.

Student Demographics (Headcount Fall 2003) By Country

Country	*Count*
APO	2
US	82
CANADA	6
Kuwait	1
Nicosia	1
Taipei	1

Table 2: Approximate DEDP Student Demographics (Headcount) By Country