

2006-2187: A HYBRID COURSE IN FUNDAMENTALS OF BUILDING CONSTRUCTION USING A COMBINATION OF ARCHIVED VIDEO AND LIVE SESSION DISTANCE LEARNING

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A Hybrid Course in Fundamentals of Building Construction using Combination Archived Video and Live Session Distance learning

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Abstract

A course in the Fundamentals of Building Construction has been a curricular requirement of the Civil Engineering Technology Program (CET) since its inception. This course was taught traditionally as an on-campus class. Over the last ten years, the CET program has expanded to contain an extensive distance learning component, with at least half of the enrollment located off campus. The model for the typical distance-learning class is to meet for three hours, once a week, with a fully interactive (voice) live class.

In consideration of the demand of a growing distance learning system, it was decided to restructure this class into a hybrid class using archived video segments available online for student access through a distance learning system. A limitation of the system is that the fully live interactive courses require a separate classroom with special configuration at each remote site. Limitations on the number of the available classrooms at remote sites hinder the expansion of all programs. This change in format will permit a reduction in the time allocated to the live interactive component, with associated advantages and disadvantages for both the student and the system. This paper will discuss the presentation and organization of the hybrid class, the advantages and disadvantages of the approach and an assessment of the hybrid class outcomes compared o the fully interactive model.

Introduction

The Engineering Technology Program at Old Dominion University offers ABET accredited options in Civil, Electrical and Mechanical Engineering Technology. In recent years this offering has been expanded to include emphasis areas in Surveying/Geomatics, Computer Engineering Technology and Nuclear Engineering Technology, one each under the umbrella of the three original programs. The Civil Engineering Technology (CET) curriculum is one of the degreed programs that are offered through the Old Dominion University Distant Learning (TELETECHNET) system. This distance learning program is one of the largest degreed distance education programs in the United States. The university is committed to providing our distance learning students the same educational opportunities that are available to our on-site students.

Distant students typically earn an associate degree at their local community colleges and then attend Old Dominion University through the distance learning program (TELETECHNET) to earn their Baccalaureate degree in CET. The typical lecture courses are delivered in the synchronous mode and the students have great success in this manner.

A typical class meeting in TELETECHNET is for three hours and meets once a week. Exceptions exist, but most classes meet this model. In the summer of 2005, The Department of Engineering Technology was approached by the TELETECHNET administration and asked to share one of our three-hour slots with another department that did not require a full three-hour slot and wanted additional time between course meetings for review of written assignments and student feedback. The motivation for this change was not that the learning experience be enhanced, but that the student would receive an equal experience with a shorter real-time allocation of time and the released time could be used by another course, thus expanding the system. This effort was not considered by the faculty for only this one reason of time allocation. The Old Dominion University distance learning program has experienced success for several reasons, one of which is that the student-faculty classroom interaction is preserved at a distance, even though some students may be attending by synchronous streaming video. However, it has been determined that scheduling has become limited by the number of receive-site classrooms available at any one time (usually three classrooms) therefore limiting the number of classes that can be offered at one time. A proliferation of distance learning programs has become available recently, most of which do not have this limitation on classroom time. There are many instances where a web component has been added to instruction^{1,2}. To remain competitive in this environment and expand our offerings, TELETECHNET is exploring ways to increase their class offerings while maintaining the essence of the original operating mode.

It should be noted that the department has tried using hybrid instruction in the past without optimum results. It was concluded at that time that the subject matter was an important parameter in the decision to use this type of delivery. Classes that involve large amounts of mathematical analysis appear to be less suited to this method. This class in building materials did not involve intense mathematical analysis.

Presentation and Organization of the Class

The key elements of the class were lectures, a written synopsis of four industry journal articles, two tests, one final examination, and research paper on an assigned topic that included a presentation by the student via videotape.

The class was scheduled to meet for three hours on alternate weeks. During the time between class meetings, the students were assigned text readings and archived video segments to view covering the course lectures. These archived lectures were based on recorded lectures from the previous year. It is the practice of TELETECHNET to record the live televised class lectures to provide a record of the class transactions and to provide information for the improvement of faculty. Since the time period available for development of the new format did not permit the recording of new lectures, it was decided to use these previously recorded lectures. It should be noted that the lectures presented in this manner retain the flavor of the live classroom since during the lectures the faculty member responds to questions from students in the campus classroom. The lectures are and should not be an uninterrupted stream of conversation by the faculty³.

In order to provide an incentive for the students to view the lectures, a brief quiz was assigned that was to be completed prior to the review session during the next live class meeting. The quizzes were structured to be learning experiences, rather than assessment tools, but were given a total of ten percent of the credit for the class in order to provide the aforementioned incentive to view the lectures. Our experience indicates that if there is some method of compelling students to participate in an exercise, they would be more likely to do so. Most of the credit for the class was allocated to test scores and other written and oral assignments. The formal assessment for the course was based on the results of proctored testing since it was felt that rigorous enforcement of academic honesty was not possible with the on-line testing method.

Busy students often put off doing work until the last minute. In this case, if a student failed to view the archived lectures in a timely fashion, they were likely to find insufficient time before testing to complete the viewing. The quizzes were taken on-line through the learning management system and the grades automatically recorded. An examination of the grades for these exercised indicates that most students participated in the quizzes.

When the student accesses the video archive the screen below is displayed. Links for the chapter segments are shown. The video for the 16 chapters covered were broken down into segments averaging about 12 minutes. There were a total of 107 segments. The number of segments in

The screenshot shows a Blackboard Academic Suite interface in Microsoft Internet Explorer. The browser address bar shows the URL: http://blackboard.odu.edu/webapps/portal/frameset.jsp?tab=courses&url=/bin/common/course.pl?course_id=_83935_1. The page title is "CET310 - Fundamentals of Building Construction - Selected Topics".

The main content area contains the following text:

The selected topics listed below were originally part of a televised version of CET 310 delivered Fall Semester 2004. These topics are organized by chapter. Refer to the current course schedule for the appropriate due date for viewing any of the lecture segments.

Technical Requirement: [RealPlayer](#). Note: While you may elect to purchase a version of the RealPlayer, the *free Basic Player* is adequate to complete your assignment.

The page is organized into a grid of chapters and their respective segments:

Chapter 1	Chapter 2	Chapter 3
<ol style="list-style-type: none"> Steps in Building Design Constraints on Building Systems Other Legal Restraints Informational Resources Choosing Building Systems Review 	<ol style="list-style-type: none"> Foundations General 1 Foundations General 2 Foundations General 3 Soil Definitions Subsurface Exploration Excavation 1 Excavation 2 Excavation 3 Shallow Foundations Deep Foundations 1 Deep Foundations 2 Underpinning Retaining Walls Waterproofing with Drainage Review 	<ol style="list-style-type: none"> Parts of a Tree Sawing/Seasoning/Surfacing Wood Defects 1 Wood Defects 2 Strength Dimensions and Panels Grade Stamps and Lumber Treatment Wood Fasteners Manufactured Building Components Review
Chapter 4	Chapter 5	Chapter 6
<ol style="list-style-type: none"> History and Code 	<ol style="list-style-type: none"> Characteristics 	<ol style="list-style-type: none"> Roof Details

The left sidebar contains navigation links for Announcements, Course Information, Faculty Information, Course Documents, Student Responsibilities, Assignments, Quizzes, Communication, Grading, Discussion Board, Schedule, External Links, and Tools. The Tools section includes Communication, Course Tools, and Course Map. The bottom of the page shows "Powered by Blackboard" and "Internet".

Each chapter varied in proportion to the amount of material covered in each chapter, with some chapters being much longer than others. The total archived video viewing time was about 1300 minutes. The live interactive portion of the class was 150 minutes for each of the seven bi-weekly meetings. During the interactive portions topics were reviewed, questions asked, tests taken and student presentations given. Summarizing the time issues discussed in this paragraph, the students were actually engaged for a total of 2350 minutes for the entire class. This is about 250 minutes (a little more than four hours) longer than the students in the normal class lecture time.

A course pack of PowerPoint slides used in the lectures was prepared for each text chapter. These slides and other information used such as charts and diagrams provided by the faculty were posted in the learning management system for student use. A test/examination review guide for tests and examinations was posted prior to each test.

In order to view the lectures, a high-speed internet connection was required. One concern with this process was the availability of this high-speed connection for students, most of whom were located off-campus. However, of the 75 students enrolled, only one student presented a concern, but followed the concern with a statement that his employer had agreed to allow him to use his company's resources. No other concerns or complaints from students were expressed during the entire semester.

The Role of the Center for Learning Technologies.

Although using archived video may seem like a very easy approach, it was not. Each lecture had to be reviewed to edit out material not pertaining to the lecture itself, such a discussion of class performance on assignments, questions and answers not related directly to the discussion at hand and other miscellaneous material. A log of each archived lecture was prepared indicating the time to start and stop each lecture component and key words spoken at each juncture.

The ODU Center for Learning Technologies (CLT) then edited the lecture components into topical segments. Each text chapter has multiple segments (up to 15) and if any segment became too long it was broken into two parts of no more than about 20 minutes. Segmenting the lectures provided an opportunity for incremental viewing and permitted easy access to the segments by topic for review.

In addition the Center for learning Technologies posted the quizzes and assisted with learning management system administration. The department of Engineering Technology acknowledges the contribution of the Center to the success of this endeavor and to the overall success of the distance learning components of the CET program.

The Advantages of a Hybrid Course

It has been demonstrated that the optimum time of day for student learning varies with students. This approach allows the student to obtain the lecture at his or her optimum time. Many

distance learning students are employed and often have class scheduling difficulties with employers. In fact, one of the original reasons for the establishment of the distance learning program was to make classes available to those that could not travel for full-time educational activities. The hybrid class does not completely solve this problem, but it eliminates half of the potential scheduling problems.

If a person travels for business, he can view the lectures in any location where a high-speed connection is available. Our observation is that this capacity is often available and is constantly becoming more so. Also, most of the TELETECHNET remote sites are located within one hour of students. Based on student comments, it is our observation that many often drive at least this far to attend classes. With the increasing cost of fuel, decreasing driving time to the remote site classrooms is becoming a valid concern.

Disadvantages of a Hybrid Course

Another aspect of TELETECHNET is the increasing attendance by video streaming students. These students regularly attend the live class sessions by streaming video, delivered over the Internet. Our undocumented observation is that these students usually fit into one of two categories: They are diligent and successful, or they do not possess the discipline to work independently without direct faculty guidance. Most video streaming students do not fall into the "average performing student" category. A concern is that the hybrid mode may produce the same results, but as of this time an analysis of this issue has not been made. Certainly these students still have direct faculty guidance, although it is not as intensive as received by the typical TELETECHNET student.

A manifestation of this problem is that with a two-week space between classes, it is relatively easy to put off viewing of the archived video until it is too late. The live sessions include a review of the material covered on the assigned lectures, with an emphasis on topics that have proven more difficult with past classes. If the student has not viewed the lecture, this review becomes meaningless.

Assessment of Student Performance

An assessment of the course objectives was made and the results shown in Table 1 below. The assessment was based on the final comprehensive examination. The examination was multiple choice and questions grouped by course objective. The results are shown in the table below. A comparison is made with the fall 2001 class, which was offered in the traditional lecture mode with the fall 2005 hybrid class.

The result indicates that the student performance was similar in the two classes. With the exception of objective one, the results are not statistically significant. If Objective one is not considered, the average overall is almost equal (68.0 for 2001 versus 67.8 for 2005). An examination of the final examination indicates that only four questions were on the examination in 2005. This small number of questions is not sufficient to adequately judge knowledge of a single objective.

Table 1

Objective #	Objective	Fall 2001 Results (%)	Fall 2005 Results (%)
1	Introduce shallow and deep foundation building systems and geotechnical investigations	80.7	56.6
2	Introduce concrete building systems	68.7	61.6
3	Introduce steel building systems	53.6	62.7
4	Introduce wood building systems	77.4	67.6
5	Introduce masonry building systems	57.5	60.6
6	Introduce waterproofing systems	70.7	70.0
7	Introduce doors and windows	82.5	81.7
8	Introduce finishes and vendor-supplied systems such as glass curtain walls, precast concrete systems	65.6	70.0

Review or Student Evaluations for the Course

Old Dominion University seeks student evaluations of courses in the fall and spring semesters. The values for the overall effectiveness of the course were compared for the fall of 2004, the semester in which the video archive was recorded, and the fall of 2005, when the video archive was incorporated to create a hybrid class. It was found that the value for fall of 2005 was 4.56 on a scale of 1 to 5. For the fall of 2004, the value was 5.12 on a scale of 1 to 6. The scale was changed after the first evaluation, but the overall effectiveness question was retained. Adjusting for the different scales, the evaluation for fall 2005 hybrid class was about seven percent higher than that the evaluation for the fall 2004 course.

Written comments were also recorded. Frequently mentioned positive issues included the use of the course management system, the relevance of the quizzes, the accessibility of the course material on-line, and having the ability to review the archived lectures after the original viewing but just prior to tests and the final examination. Less than favorable comments included not being able to ask questions live during the lectures and that the videos were too long. We would point out that the students had the opportunity to ask questions during the review sessions, but concur that some questions may be forgotten or lose their context if not asked immediately during the lectures. Overall, the review comments were very favorable.

Conclusions

Based on the above assessment and the students' comments, it is our conclusion that the hybrid model is acceptable as a mode of delivery for distance learning. It is our intent to improve the class at its next offering with modest changes. First, the quizzes will be increased in overall value as a percentage of the final grade. The learning management system tracking tools do not allow a fair assessment of the student's activity while connected - it only tells us that they were connected and accessed particular items in the course.

Another concern is future revisions in the current text or the switch to a new text. Normally an archived lecture should not be keyed to a certain text in an effort to keep the lecture usable for a longer period of time. In this case, changes to the textbook requirement could potentially require an update of the video component of the archived material to maintain the current standard of quality and relevance of the lecture to the student materials.

Bibliography

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