Enhancing Senior/Graduate Education through Inter-University Course Sharing

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Abstract

The Electrical Engineering Department at the University of Nevada, Reno (UNR) is a participant in WestVEC, a consortium of western universities experimenting with sharing senior/graduate courses in electrical engineering. Current WestVEC participants include the University of Idaho, Idaho State University, Boise State University, Utah State University, the University of Utah, Northern Arizona State University and Montana State University. Based on our participation in spring, 1998, we have identified several advantages and some disadvantages that arise from participation in the consortium and these will be the topic of this paper. More specifically, the paper discusses the experiences associated with importing a videotaped course from another university for a course the instructor typically taught. The justification was to provide a course-load reduction so that the instructor could team-teach a new course in the department.

Introduction

For the spring, 1998 semester, the author was scheduled to teach two classes in the department. The first was a senior-graduate elective in Integrated Circuit Engineering and the second was a graduate class in GaAs Circuit Design. At the same time, the department was interested in introducing a new class in Electromagnetic Compatibility (EMC) that complements an existing instrumented antenna anechoic chamber in the department. A local company had expressed interest in having us videotape the EMC class for their internal use and a new faculty member was available to team teach the class if the author was also available.

To keep the teaching load down and still participate in the EMC class, the author took advantage of the department's participation in WestVEC (1), a consortium of western universities interested in exchanging classes at the senior/graduate level. Participating schools included the University of Idaho, Idaho State University, Boise State University, Utah State University, the University of Utah, Northern Arizona State University and Montana State University. We opted to import a videotaped class from the University of Idaho entitled EE 445 "Introduction to VLSI Design". Dr. Jake Baker taught the course. The class originated in Boise, Idaho and was taught through a live videoconferencing link to students at Moscow, Idaho. The videotaping took place in Moscow and tapes were then sent by overnight mail to UNR and other sites. There are three factors that made this experience unique. The first is that the course was very similar to one taught at UNR and both schools used the same textbook (2). The second factor was that Dr. Baker was a Ph.D. graduate of UNR and the author was his research advisor. The third factor was that while Dr. Baker gave the exams, graded homework and assigned course grades for all of

the other participating sites, at UNR the author opted to give his own exams, assign and grade the homework (using a student grader) and assign the final course grades.

Lessons Learned

There were several benefits and a few drawbacks to this experience that will now be discussed. Several of these are based on input from the students as the result of a written survey about two-thirds of the way through the course.

Ordinarily when you think of importing classes from another school, you tend to think in terms of obtaining expertise not available on your own campus. This is a major reason why WestVEC was formed since most of the participating departments are relatively small and limited in areas of expertise. This approach would work especially well if one of the faculty members were interested in developing a new area of expertise. In this case, the videotape material was in an area of expertise of the receiving instructor. Nevertheless the author found that he gained new insight and teaching ideas from the material. Dr. Baker has maintained close ties with semiconductor companies in the Boise area and could provide some of the latest industrial innovations in the class. Reno does not have any local semiconductor companies so it has been more difficult for the author to keep up with the most recent industrial advances in the field.

A second benefit was that the students were able to obtain the perspective of two instructors rather than one. Homework assignments and solutions were posted on the Web and the students were readily able to contact Dr. Baker by email. Locally the author maintained normal office hours for the students. A grader was used for homework assignments while the author made up and graded the examinations and assigned the final course grade. Both the Moscow class and the UNR class worked on integrated circuit design projects capable of being submitted to MOSIS for fabrication.

The third benefit was the considerable savings in time associated with not having to prepare daily lectures. Only about three lectures were prepared to supplement the videotaped material. The instructor attended all of the lectures and was available for questions both before and after the class. At a recent WestVEC meeting, the equivalent teaching load was discussed for this level of effort and there was consensus that a three-credit course taught in this fashion should count as a two-credit course load for the instructor.

A fourth benefit and perhaps the most significant was that the students were able to make up missed classes and revisit material that they did not absorb on the first pass. This was especially appreciated by some of the international students who were still struggling with English. The class consisted of 16 students who took the class for credit and 2 who were formal auditors. The latter two signed up because of the videotape medium, as their schedule required that they miss at least one class a week. Unlike most auditors who drop out after a few weeks, both students stayed with the class for the full semester. The videotapes were available to all 18 students on an honor system basis and (amazingly) none of the tapes disappeared during the semester. In the future, we would recommend that a tape checkout procedure be implemented with the engineering library.

At UNR, many of our graduate students work full or part time and have to miss classes from time to time because of their work schedule. Having a reserve of videotapes that they can watch when they miss a class provides an inducement to take graduate classes and can lead to increased graduate registration.

A fifth benefit of this approach is that we were able to offer the EMC class for the first time. Team teaching worked our very well as one instructor could cover for the other when one was out of town and the students again benefited from the insight of two instructors. The class will become a regular part of our curriculum this next year.

The sixth and last benefit that I would like to cite is that the students were able to virtually attend a class at another university. This broadened their perspective and helped to reinforce the concept that "they were learning the right things" at their home institution.

There were a few negatives associated with this experiment that also deserve mention. The first is that because of the videotape delivery, the students were not able to interact live with the instructor and so spontaneous class interactions were not possible. We could have stopped the tape and had the local instructor respond, but the time constraints were typically too tight for this option. Since the class was transmitted live to the students in Moscow, they could and did ask questions which did help. Also Dr. Baker was very good at periodically asking questions of the students in Moscow. Unfortunately this also had a negative side, as several of the UNR students noted that their attention tended to wander during these question-answer interactions.

Other negatives include the additional costs involved with videotaped or videoconference presentations, the time scheduling issues and the issue of whom receives credit for the class. These are discussed in more detail below. We have also noticed a reluctance among some faculty to participate in the program because of the "not invented here" syndrome and perhaps a fear of being replaced by a videotape.

Scheduling, Credit and Cost Factors

Scheduling can be a problem since some schools are semester based and some quarter based and classes start and stop at different times on different campuses. In this case, the University of Idaho started one week earlier than UNR so we received the videotapes in a timely fashion. The local instructor gave one introductory lecture and then the videotapes were initiated. Unfortunately, because of exam schedules we were not able to cover the last three lectures but this could have been handled by setting up extra class sessions. The videotapes were between 45 and 50 minutes long so another constraint is that the receiving school should be on the same class schedule for maximum benefit.

As part of the Westvec experience to date, we find that best results are achieved when there is a facilitator at the receiving site. Even the students in the class commented that they would use this approach again only if there is local facilitator to respond to questions. Thus far the credit issue is handled by letting the host school receive all academic credit for the class. Each receiving school sets up a course number to be used and the students register for credit at the host school. Ideally this will work best when there is a balance between received and transmitted

classes for each participating school. The additional costs for the class are based only on the cost of the videotapes and the mailing charges. The class discussed in this paper incurred an extra cost of $600. As we look to the future, typical costs of $800 plus $350/student seem more appropriate when the originating instructor handles homework and exam grading. At the University of Idaho, the instructor receives a rebate from the per-student cost that acts as an incentive to offer videotaped and videoconference courses. The per student fee was waived in this case since most additional work was handled locally.

Conclusions and Recommendations

We have found this experiment to be a positive experience that we would like to continue in the future. It provides a mechanism for importing expertise not existing on a particular campus, for handling the absence of expertise during sabbaticals, for assisting faculty in exploring new areas, and for improving classes in areas of expertise normally taught by existing faculty. The preferred medium of delivery would be compressed video and two way audio. This would lead to better real-time interaction between the students and the instructor. The sessions should still be videotaped and made available for students to check out. Ideally each school would originate and receive one class each semester that would result in minimum costs to any school as long as the video production costs are covered as part of the normal school operation. Finally we note that instructors involved in video based courses tend to be better prepared and better organized than those involved in non-video based classroom sessions.

References

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