Share the Cost, Maximize the Return

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Abstract: This paper discusses the cooperation of five small higher education institutions providing Information Technology courses to each other through interactive video. Each institution supplies two or three courses a semester. Any student may enroll in any of these without being admitted to the supplying institution. Without this cooperation many of the courses would be too small to offer. This provides advantages to each of the schools, but also places challenges on the students who take the courses and the faculty who teach them.

Introduction

North Dakota is a sparsely populated state. It has eleven state supported institutions of higher education, four of which have enrollments less than two thousand students (Copas, 2011, p. 13). This is problematic for class sizes in courses outside of the traditional liberal arts domain. Information Technology is an important field with clear ramifications for our society, but suffers from a lack of students in these smaller colleges. The state also lacks colleges that have excessive funding, so this places the faculty members and administrators on the horns of a dilemma. Potential graduates are sorely needed by society, classes of six to ten students are not cost-effective. Such problems require creative solutions.

The Northern Information Technology Consortium (NITC) is one such solution. It is a coalition of several small state colleges that collectively offer classes in remote locations to solve this problem. The member institutions include Dakota College at Bottineau (DCB), Lake Region State College (LRSC), Turtle Mountain Community College (TMCC), Valley City State University (VCSU) and Williston State College (WSC). All of these are mainly two year schools except VCSU which is a four year college with a few master's programs. TMCC is a tribal college largely offering AA and AS, but with a BS in Teacher Education. None of these exceed two thousand students.

Another thing that the NITC colleges have in common is access to the North Dakota Interactive Video Network (IVN). This allows a class to be taught at one site and have students in other sites. Each site offers two audio and video, as well as the option to record the proceedings at a central location and make the recordings available over the web. Unlike many video conferencing products, IVN requires dedicated hardware and software. Thus, a specially equipped room is required. None of these campuses have fewer than two such rooms. Most of the courses offered by NITC utilize an IVN component although a few are in pure distance education mode, with nothing resembling a face to face presentation.

The financial arrangements are very easy to administer. Each college incurs all the costs necessary for each course offered by that campus. Each campus retains all of the tuition costs for its own students, regardless of where the course originates. A schedule is agreed upon for the courses to be offered in each semester. Typically, each college offers three courses per semester in this mode. There is no limit on how many students from a campus may take any course or how these courses factor into the various technology majors. These courses are freshman and sophomore level classes in the Computer Information Systems or Computer Science areas.

The North Dakota University System (NDUS) had previously implemented a common course numbering system, which made most of the courses offered in this way to have the same numbering and the same number of credit hours. There were a few courses, where the number of hours or the name needed to be adjusted, but this was a relatively minor consideration. The NDUS schools also possess a common calendar, but TMCC starts and ends a

week earlier, which is a complication. It should surprise nobody that there are complications in getting five institutions to cooperate.

At the Professional Development Conference of the North Dakota Department of Career and Technical Education, the NITC was awarded the Director's Award of Excellence for Information Technology (ND CTE, 2012).

The IVN Classroom

The North Dakota University System (NDUS) oversees the eleven campuses, but also provides a number of services to each campus. The Advanced Learning Technologies department of NDUS supports IVN, among other services (NDUS ALT, 2012). IVN is available on every NDUS campus, tribal colleges and most high schools throughout the state. It is extensively used for classes as well as meetings.

IVN rooms have dedicated communications hardware and software. Each campus has an IVN coordinator, who manages the rooms, including scheduling, regular and unscheduled maintenance, as well as the first line of trouble shooting. Depending on the how recently the room has been upgraded a technician might be required, with the more recent rooms no longer needing this.

The typical IVN room has tables and seating for ten to forty people. There are two or more large video monitors and a sound system. Each room may either host or receive an IVN session. In the case of classes, the host site contains the instructor and any students at that site. If the local class population exceeds the capacity of the host room, other IVN rooms on campus may join the session.

Scheduling is controlled at the central IVN site. A scheduled class or meeting will be started remotely with the host first and then connecting sites joining the session. A typical class starts the connection process at about ten minutes before the class start time. Should the connection be lost, the system will generally restart the connection process automatically.

Many different sites may be connected to the same session. The host site is viewed on one monitor and the other is used for all the other sites. Each table has a microphone, so when a person at a another site asks a question, the second monitor automatically displays that site and remains there until another audio moves the video to another site. Alas, the system does not distinguish questions and comments from random noise, so noise of any type will move the video. Despite this technical issue, having a conversation with a student is not particularly different from the same process in a large classroom.

Most sites are equipped with a variety of input modes for the instructor, giving some display flexibility. The video sent out from the host may present the camera shot of the instructor, camera input such as a drawing on a paper or the display of printed matter, input from a laptop such as a presentation or the demonstration of software. Overall the experience is quite comparable to the process of giving a lecture in a large lecture hall. Figures 1 contains a picture of a typical North Dakota Interactive Video Network room.

There are a few issues that may cause consternation for the classroom instructor as well. There is always the problem of technical glitches. There are occasional communications failures that tend to ruin a class. Analogs exist in conventional classroom, such as power failures, fire drills and the like. This type of class has all of these and adds any number of communication failures. There may have been a scheduling error so one day is left out, the fiber optic cable may have been cut by a construction crew and many similar issues. The instructor should ask for the remote sites to announce themselves and this is helpful but does occupy a short amount of class time. The more pernicious problem is when a remote site drops out after class is started. The IVN Central software should reinitiate communication, but the instructor is not usually informed that a site is down. Partial site loss may be ameliorated by recording the sessions, but a recording is not interactive.

Another irritation is the time issue. A classroom lecture may go over a minute or two without much inconvenience. In contrast to this is IVN time, which is absolute. The remote sites are connected automatically about eight minutes before the scheduled starting time, but according to the time of the central controlling site. They are also disconnected automatically by a central controlling site. Unlike in American football there is no two minute warning. Thus, a problem may arise if an instructor does not monitor time closely the session will be cut off without warning.

Figure 1: A typical IVN room. The instructor is at a remote site.

Image resolution may also be an issue. The video image produced by cameras in an IVN room is excellent. Participants at either the originating or remote sites are recognizable, even when not particularly close to the cameras. Alas, the system was designed prior to the near universal computer access present today. The resolution of the room monitors is always less than that of a recent laptop. The signal quality is reduced prior to display or transmission, so that even in recordings from a laptop may be difficult to read. This is usually countered by setting fonts sizes in demonstration programs larger than would be normally used.

Out of Class Experience

It should be rather obvious that there is much more to a course than presenting the content in a lecture. The problems that need to be confronted outside of class tend to be more daunting than those that occur during class.

An issue with any class that operates at a distance is the relational distance between the instructor and student. A large but traditional class will always have a certain number of students who, for a variety of reasons, never make much of a relationship with the instructor. They seldom ask questions during the course, never visit during office hours and do not become well known to the teacher. In most cases this is regrettable. Some of these students do well and others poorly. At least local students had the opportunity and chose not to exercise this opportunity. The opportunities for relationship with the instructor are much more problematic for students at a distance.

There is substantially more social pressure to **not** ask questions during an IVN class. In general, people are reluctant to ask questions and thus show their ignorance, in front of people they do not know. A student will become acquainted with those in their classroom, but will never meet those in the other sites. The normal classroom is much more intimate than the IVN classroom. An experienced instructor may often recognize the confused look and take action. These actions are less threatening as the instructor and student know each other better. In an IVN environment, only the local students and the remote site that spoke last will be visible. This makes that recognition of confusion much harder and there is less personal relationship. For these and other reasons, students are less likely to ask questions and more likely to suffer in silence during class.

The antidote to the relational distance problem is good communication. Since the face to face mode of communication is not usually available, it must be replaced by more feasible techniques. These include emails,

telephone calls as well as Skype or other one to one video conferencing. Email is the weakest of these for establishing relationship, but is often the most frequent. The written words of an email lack the inflections of a call and the facial expressions and body language seen in video conferencing. The asynchronous nature of email makes it advantageous when schedules cannot be meshed, but this in turn tends to increase the response time. In order to establish and maintain that relationship, the weaker modes must be used more frequently to compensate for the lack of information exchanged. NITC instructors, like other distance instructors, typically have longer electronic office hours than faculty that only teach face to face classes. These may be in their institutional provided offices, but these faculty are much more likely to check email from their homes during non-business hours.

Just as one might expect, there is some variance of usage of these distance communication modes among the instructors in the consortium. All of the NITC instructors anticipate running conversations with their students, via email. Some, but not all, publish their cell phone numbers to their classes, in order to maximize their availability. A few instructors go so far as to mandate that any remote students have or create a free Skype account, while others prefer BlackBoard Collaborate (BlackBoard 2012a).

Most instances of a distance education course rely heavily on another component, the Learning Management System or LMS. Even here there are unforeseen problems. The typical distance student is dealing with one institution and thus only needs to master one LMS. The NITC experience is quite different, for the institutions have chosen for themselves different Learning Management Systems, as this choice was made prior to the formation of NITC. These include BlackBoard, Moodle, eCompanion and Jenzabar, among just five institutions (See citations to each of these in references).

This situation makes for hard choices. Either the instructor foregoes the use of any LMS, he or she forces all of their remote students to have an account on the local LMS or they maintain the same course on each institution's LMS. All of these are detrimental in some way.

Depending on the particular brand of LMS, they will provide a number of useful features. These include: a common way to publish documents or announcements to the class; a secure way for students to access their current grades; a secure dropbox for handing in electronic documents, such as assignments; online quizzes and tests; discussion boards; as well as other useful functions. The instructor who does without an LMS, must also do without these functions or find an alternative way to accomplish the desired ends. Posting documents on publicly available web page is comparatively easy, although it does not limit the distribution. Most of the others are more difficult, yet still useful.

Providing accounts for remote students on the local LMS is also problematic. One of the authors was unable to get this request fulfilled. For those instructors who do, this puts a small but significant disadvantage on the remote student. The remote student is already at a disadvantage, so will this extra work lessen that? This also tends to limit how the instructor uses the LMS. Using a particular feature of the local LMS often entails no extra work for local students, for they will use this feature in other classes. That is usually not the case for the remote student.

Creating parallel courses on each institution's LMS could be the best solution. However, it burdens the already overworked instructor. Typically the instructor's compensation for an NITC class is identical to that of a fully local class. In general it is harder to create an LMS course than to use it. Moreover, some things like topical discussions would never span different Learning Management Systems, so it also is sub-optimal solution. With no surprises, none of the instructors are using this option.

The question of tests should be considered. Even experienced LMS users often prefer a traditional written test. The types of questions that are available, the possibility of server, communications or power failure are among the reasons cited for this preference. The typical procedure is to send the electronic form of the test to the coordinator at each site. They in turn reproduce sufficient copies, provide for proctoring of the test and send the results back.

The unexpected test problem is the date and time of the final exam. Each institution has its own schedule for final exams, usually relative to the time of the first class meeting. To no one's surprise these schedules do not agree. The common compromise results in two final examinations. The local students take their final examination at the time mandated by their institution. All the remote students take their examination at the first class time that falls within the week designated for finals.

Most of the courses have no corresponding laboratory component. However, there is a Microcomputer Hardware class that does require a separate lab. Clearly the students are not going to commute to the originating site, so each campus that has students enrolled in this class must designate a faculty member to oversee the laboratory. The instructor for the course determines the topics, the individual plans for each lab, the equipment needed, etc. This reduces the requirements on the local instructor, who may actually be an upper classman rather than faculty.

Future Work

There is a saying: if it is worth doing, it is worth doing wrong, until you figure out how to do it right. We believe that the educational experience that is being provided is good, profitable for both the students and the institutions. The alternative is often no class at all. Yet, we also believe that it is possible to improve the experience and are always looking for new ways to improve our classes.

One possibility worth noting is clicker software. The traditional clicker has been shown to increase engagement, especially in large classes. However, the traditional clicker is a one use device that only works in a single classroom. In our case our classrooms are more than a hundred miles from each other. We are now looking into web based or mobile device (Schafer, 2012) software that would overcome the geographic issues, without our students incurring further cost.

Another issue that needs some work is communications at the faculty and administrative level. The faculty members who teach these classes seldom meet more often than semiannually and academic deans even less often. In the grand scheme of things, the 15 courses per semester offered in this mode are a small fraction of any of the institutions offerings, yet they are preserving several programs of study.

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