

Overcoming Time and Distance: Teaching Geography by Interactive Video

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The mandate of the University of Northern British Columbia is to provide post secondary services to all of the northern half of the province. This was first implemented through the delivery of courses via telephone conference lines. The lack of a visual component created student dissatisfaction.

As an alternative, instructors have been placed at regional campuses from which they both deliver courses and drive to more distant sites. Class size is small, and the travel is both costly and time consuming.

In January 1995, UNBC undertook an ambitious project to provide courses at three sites via interactive video communications. Instructors and students can see and hear each other. This should eliminate the major problems identified with both teleconferencing and in-person delivery.

Two geography courses were among those selected for this project. This paper will present a preliminary report on the development of the "virtual classroom" at UNBC.

Introduction

Northern British Columbia has an area larger than Germany, populated by just over 300,000 people. This population is widely

dispersed and geographical distances have always been a problem. This problem is reflected in lower levels of post-secondary attainment in the region when compared with the southern part of the province.

The University of Northern British Columbia was created in 1990 with a mandate to provide post-secondary services to all of the northern portion of the province. The university's operational approach to accomplish this was to develop regional centres at existing community colleges across the area. The desire was to do more than have a main campus and offer distance delivery programs to off-campus sites. It was hoped that as many aspects of university life as possible would be made available in as many communities as possible. The achievement of this goal of being a "regionally relevant" university is seen as contingent upon the ability to sustain, both financially and in terms of student numbers, regional operations on a long-term basis (Weller, et al., 1992).

With respect to university students, many are currently in university transfer programs at the existing community colleges: New Caledonia (CNC), Northern Lights (NLC), and Northwest (NWCC). The university did not want to cause dislocation of these students, yet realized the need to find sufficient students to be economically viable itself.

The development of an integrated region-wide voice and video network was one of the original plans of the university. However, as a first step, courses were offered using telephone conference lines (Weller, et al., 1992). The lack of a visual element created some student dissatisfaction (Doerksen, 1995; McDonald, 1995).

As an alternative, instructors have been placed at regional campuses from which they both deliver courses and drive to more distant sites. Class sizes are small and the travel is both costly and time consuming. One instructor, teaching one course, used 25 per cent of the geography department's travel budget in one term (Hall, 1995). This instructor's travel time was equal to the instructional time for the course and winter driving conditions were an added hazard.

In January 1995, UNBC undertook an ambitious project to provide courses at three sites via interactive video communications. BC Systems Corporation, the Provincial government's central information technology coordinator, provided the technology to link classrooms in Prince George (UNBC), with Quesnel (CNC) one hundred kilometres to the south, and Terrace (NWCC) six hundred kilometres to the west.

Background

Recognition that not everyone who wants to attend university is able to do so is not new. The first correspondence courses were offered by the University of London in 1887 and by the University of Chicago in 1890. Mail service overcame the barrier of distance but created time delays between the instructor and the learner which are not found in face-to-face learning (Moore, 1987).

In 1950, television was first used to deliver courses on a standard one-way broadcast system. Television was more instantaneous in its delivery but there was no return connection. It could not be stopped to answer questions, thus it did not adjust to the needs of individual learners. Further, the student had to be available at the broadcast time.

Nevertheless, Moore (1987) states that the modern age of distance education began in 1971 when the British Open University first offered a full undergraduate degree program via television. The use of previously recorded television programs as a method of instruction is the most commonly used method of distance instruction used in North America today. British Columbia and other provinces have developed Open University agencies for this purpose.

The major drawback of this system is the lack of learner participation or opportunities for independent thought. Students tend to be passive watchers and are not critical of the material being presented. They also have difficulty generalizing from specific examples. Additionally, a British Open University study found that drop out rates were as high as 25 per cent (Moore, 1987).

The introduction of VCR technology has overcome the constraint of broadcast times and allows the learner to stop the program as required. Studies show, however, that most learners do not stop the tape unless a cue, such as a question being posed, is built into the presentation. As with correspondence courses, television and VCR programs do not provide for student interaction as part of the learning process.

Presenting material by telephone conference allowed for instant learner response at the expense of visual cues. Providing learning packages to the participants only partially overcame this problem. The degree of concentration required detracted from the learning experience (McDonald, 1995).

The logical next step was the combination of live video broadcasts to classrooms containing telephones which allowed audio return communication. In the mid-1980s, this type of system became popular in the United States. These interactive systems usually op-

erate using local cable television systems as program carriers (Robinson and West, 1987).

Live interactive video teaching is the closest to traditional face-to-face teaching one can obtain. A variety of options exist including freeze frame (still pictures), compressed video (partial motion) and full motion. The latter is the most expensive because of the transmission space required.

In 1991 the University of Hawaii introduced an interactive video system joining sites on six islands, although specific equipment at each site varied such that all were not interactive video. The initial evaluation of the project suggested that the technology overpowered the instructional component (Nahl, 1993).

The Project

In January 1995, UNBC offered twelve courses by interactive videoconferencing. For teaching purposes, UNBC used a 384 kbps Integrated Backbone Network which provided full motion two-way contact via BC Telephone's microwave towers. In addition to UNBC's three sites, connections could be made to Victoria, Vancouver, and Cranbrook. Access to other locations across Canada, the U.S., and the world were available at the slower 112 kbps which diminishes the audio and visual quality, but is still suitable in situations that do not involve much on-camera motion (BC Systems, 1994a).

The technology in each of UNBC's three "virtual classrooms" included: two monitors, one showing what was being transmitted from the delivery classroom and one showing a "far-end" classroom; a video camera with pan and tilt controls which allowed viewing of any part of the room and could be preset to four locations; a document camera which could be used with 35mm slides, overheads, or opaque materials; a standard VCR which could both play tapes and record lectures; a voice-activated microphone system which allowed all students to participate without pushing buttons; a fax machine for hard copy transfer between classrooms; and a backup conference telephone system.

The fact that there were only two monitors in each room meant that when three classrooms were connected one classroom would be off camera at any given time. The monitors were voice activated so that any two sites could see and talk to each other, while the third class were unseen observers.

A variety of support staff were placed in each classroom. These included faculty members who sat in on classes at Prince George when it was a far-end site, and a technician at each site to solve

equipment problems, do photocopying, operate the fax, and operate the far-end cameras if necessary. In most U.S. situations the instructor had to deal with a camera operator or a program producer (Connected, 1992; Nahl, 1993). At UNBC the instructor had control of the camera equipment and there was no producer.

All of the U.S. studies involved teaching from a central site to distant satellite sites. The unique and innovative aspect of the UNBC system was the placement of instructors at all three sites. All sites transmitted lessons to the other two. Four courses originated in Terrace, including two geography courses. There is no evidence in the literature that this is common. Indeed, the usual goal seems to be to eliminate the need for instructors at distant locations (University Affairs, 1996).

Evaluation

Instructors and administrators gathered in mid-February, via videoconference, to make a preliminary evaluation. The following comments are based on the minutes of that meeting (Wiltse, 1995). Later comments made in an end of term report which included student evaluations are also presented below (Willick, 1995).

Student involvement was one issue that was identified. Students at all sites tried to interact with the instructor and occasionally with class members at their own site, but there was little interaction between sites. Student comments and earlier studies such as Silvernail and Johnson (1992) suggest that it takes time for students to become comfortable with the technology. Those who had previous experience tended to be more outspoken in class. Nahl (1993) argued that performing in front of a camera is a high anxiety act for which students may not be psychologically ready. She argued that forcing students to participate by putting a camera on them raised ethical questions.

Another problem identified at UNBC was a two-second delay which existed in the transmission between sites. This was due to the microwave transmission system being used and can be eliminated when fibre optic cable becomes available.

One instructor commented on the small size of individual images on a class shot, saying, "I wouldn't recognize these people if I met them on the street." Speaking on the same theme, another instructor commented on the loss of non-verbal cues, especially in the large classroom in Prince George. One instructor, however, pointed out that the face-to-face students in the delivery classroom can provide these cues. Robinson and West (1986) noted similar problems

and that this tended to prevent the sense of group identity between classrooms. Indeed, the voice-activated camera meant that usually the largest class was on the screen. It was agreed that a split screen, so that both far-end classes could be seen simultaneously, would be an improvement. This again would be possible with fibre optic transmission. Kitchen and Fredericksen (1987) reported that, in their Minnesota study classrooms, two cameras and up to eight monitors were used to achieve full participation.

Camera manipulation also became an issue. The need to focus the camera on a person who is speaking requires a technician in the classroom, the current system being used at UNBC, or a camera which can do this automatically, as is being used in Alberta (CBC, 1995). Some instructors felt that the camera should follow the instructor automatically. The preset camera positions did allow for some limited mobility. Kitchen and Fredericksen (1987) used a lavalier microphone and a camera operator. Nahl's (1993) study demonstrated the danger of letting the technology overpower the teaching. The producer was telling the instructor what to do.

UNBC offered opportunities for instructors to test the equipment prior to the beginning of term in a half-day orientation and practice session prior to the start of term (Willick, 1995). The literature encourages initial training. Viewing a video of a micro-lesson appears particularly useful. Moore (1987) suggested that experience is the best teacher. Instructors who monitor their performance either by videoing classes or having discussions with students do better the next time. UNBC faculty also relied on the first two weeks of actual classes to learn the necessary skills (Willick, 1995). The year-end survey reported 67 per cent of students felt that instructors required more training. Students also felt that they should have had training at the start of the course. They recognized problems with using the technology and with student participation (Willick, 1995).

The peripheral equipment and configuration of the furniture in the room were viewed as more important in the videoconferencing setting than in a regular classroom. Nahl (1993) suggests a U-shaped classroom provided more interaction than the theatre style. A board-room style was used in Terrace and Quesnel. Prince George had flexible seating using individual seats with arm tables which were tried in a variety of arrangements. No comments on the best arrangement were recorded.

The major technical problems with the system were with starting it up. The practice at UNBC was to turn the system on in the morning and to leave it on all day. This eliminated the problem but it did not allow the equipment to be moved. The equipment was on

mobile cabinets and other rooms were wired to allow a transfer of technology by plugging in a single cable.

The literature emphasizes the need for video courses to be highly structured and, therefore, planned well in advance. This time was not available in the UNBC case and instructors had to adapt courses designed for regular face-to-face presentation to the new technology as they went along.

Two geography courses were among those selected for this project. The visual nature of geography provided an opportunity to give the students much more than a "talking head." The equipment was well suited for showing large mat photographs—30 cm x 40 cm reprints were used—and for showing 35 mm slides. Small colour photos from textbooks tended to be glossy and glare too much to be useful. Place names on published maps were usually not large enough to be readable on the television screens. Similarly, graphs had to be simplified and tables retyped or photo-enlarged. Thus, the requirements of the medium inflicted considerable additional preparation time on the instructor. The lack of pre-course preparation time created a problem which could be easily remedied in future.

The need to "keep the show moving" may have induced the instructor to present material too quickly. Visual cues were, therefore, more important, and the class at the delivery site was vital to this process.

Most of the comments made in the general discussion above applied to the geography courses. Restrictions on movement due to the camera and microphone system limited what the students could see and the level of the instructor's animation. Students in the UNBC distance sites did come to know the other classes as groups if not as individuals. Concern that the delivery site class was being ignored in an effort to reach the other groups seemed to be unfounded and was certainly cancelled out by the face-to-face opportunities after class.

Some concern was expressed about the reaction of students on the main campus to having their instructor at a distance rather than face-to-face. Student evaluations completed at the end of the course clearly indicated that a television instructor was not as desirable as face-to-face instruction but was acceptable.

Part of the problem may be that students are familiar with the high standard of commercial broadcast television. Cuffman and MaCrae (1993) suggest dividing the lesson into segments and moving around the classroom to increase variety. This may be futile. A live, single camera production can never duplicate the standard of commercial television.

Silvernail and Johnson (1992) found that students who like the technology also liked the courses delivered. Further, acceptance of the technology grew with the number of courses taken using it.

Robinson and West (1986) report that student performance in video and face-to-face classrooms is not significantly different. Connected (1992) also reported no significant difference in an Iowa college study. This would also seem to be the case at UNBC.

Connected (1992) points out that there are other factors which influence results other than delivery technique. Distance students are often older and have more family and employment commitments to manage. His distance students had higher grade point averages going into the videoconference experience, possibly a result of greater motivation. Distance students are also predominantly female. Statistics Canada (Galt, 1995) reports 80 per cent of Canadian distance education students are employed and the majority are over age 25. The UNBC group had 66 per cent over the age of 24 and 71 per cent were female (Willick, 1995).

Instructors and students agreed that the new technology was an improvement over the other distance options used at UNBC during its first two years of operation. Specifically, they mentioned telephone conference calls, where the visual portion was lost (Doerksen, 1995; McDonald, 1995), and videotaped lectures, where interaction was not possible (Altar, 1995). The new technology also relieved instructors of the expense and hardships of travel, and the students, many of whom are married adults, the hardship of being away from home. Indeed, videoconferencing has always been sold on the argument that it is cheaper than the cost of bringing many people to a central conference location (Kitchen and Fredericksen, 1987; Nahl, 1993; Connected, 1992; Terrace Standard, 1994).

The financial considerations are of some importance and are consistently presented in the literature as the major reason for turning to interactive video. Increasing the class size by combining classrooms creates viable numbers to allow upper level courses to be offered and, in UNBC's case, allows instructors to be posted in regional locations so that face-to-face contact is available to regional students. This is a part of the UNBC mandate.

The danger, of course, is that video instruction will be seen as a cost-cutting means of reducing the number of instructors, as is, apparently, the case in Alberta, according to a report on CBC radio (1995). UNBC's policy statement has been that videoconferencing will not be used as an alternative to face-to-face instruction where the latter is possible (Weller, et al., 1992).

The cost of UNBC's system has not been put to a full cost-benefit analysis study as this first year of operation was financed through a provincial grant of \$120,000. Published rental rates from BC Systems for outside groups are set at \$125/site/hour plus a connection charge of \$75/hour (BC Systems, 1994b). At this rate, a normal three-hour course would cost \$1350/week or \$18,900 per term. One would expect a large block user to negotiate a discount on this figure but Willick (1995) concludes, "On a straight dollar basis, face-to-face instruction is more economical." In this case, the two additional instructors needed for face-to-face presentation at all sites, would cost about \$10,000/course/term and support staff costs would be reduced.

On the benefit side, one must again turn to the larger class sizes which videoconferencing can create. UNBC, as a new institution, still suffers from very small class sizes. Videoconferencing is making classes available to students and creating jobs, not eliminating them.

From the point of view of the instructors (Wiltse, 1995), and this is supported in the literature, videoconferencing is harder than regular teaching. It requires more preparation, greater concern about the visual content of the presentation and greater concentration during the presentation as attention has to be split between classrooms.

A fear was expressed that teaching videoconference courses would be seen by instructors as a sort of ghetto or punishment and that they would request some additional benefits for performing this service. Any reduction to the workload of regular faculty would have to be added to the cost of videoconferencing (Wiltse, 1995). Instructors at the University of Hawaii receive additional benefits for videoconferencing (Nahl, 1993). On the positive side, quality faculty are provided to regional sites which would not otherwise be there (Willick, 1995).

Conclusion

UNBC placed sufficient value in the videoconferencing process to schedule further classes for the 1995–96 terms. Terrace and Prince George continued to be linked as discussed in this paper. Quesnel and Prince George were linked via BC Tel Ubiquity System. This employs fibre optic lines which provide broadcast quality video and manually, rather than voice-activated, audio. This reduced many of the complaints discussed above.

Videoconferencing allows the students in the regions to have face-to-face instruction and to meet, at least vicariously, students on

the main campus. Instructors have been involved in less travel and have had an opportunity to experience a new form of lesson presentation.

Northern British Columbia is clearly a large area where geography has been a barrier to accessing education. The introduction of videoconferencing is not, and will never be, the solution to all of the area's educational challenges. It does, however, provide access to quality education that is not limited by time or space.

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