

The Art and Science of Videoconference Instruction

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Abstract

Videoconference instruction is a relatively new addition to the portfolio of delivery modes for instruction. This article summarizes recommendations from the literature and the experiences of faculty and students with the goal of providing both technical and pedagogical guidance for future successful learning experiences and the expansion of this modality.

Introduction

City University of Seattle (CityU) began using videoconference instruction for instructional delivery in 2003 in its Bachelor of Arts

in Education program in Hawaii with the purpose of developing Certified Special Education Teachers who were residents of the state and were located in geographic areas that were difficult to reach. Due to the networking of all of the public schools throughout the state, the Hawaii program used both the Local Area Network (LAN) and the Wireless Access Network to provide direct videoconferencing instruction at school district offices, school libraries, school classrooms, or other available sites on the islands. CityU is currently engaged in efforts to utilize this delivery mode to enhance instruction in other locations and other programs throughout the university. Videoconference equipment linked through the K-20 system in Washington State was installed in two locations in 2009. This system provides a high speed connection between sites for both video and data. It is part of a network that connects all K-20 school locations in the state of Washington as well as all libraries and hospitals in the state. CityU expanded the installation of supporting equipment to three additional sites in 2011. It is increasingly being used to enhance meetings and conversations among faculty located at those sites as well as for course delivery. Through this network, members can videoconference multiple locations by accessing the network or can conduct point to point connection without a direct connection to the network. Thus, participation in this consortium provides flexibility for a variety of uses, including individual and large group meetings as well as the conduct of classes and workshops from both internal and external locations.

Following a brief definition of terms and a review of the field of videoconference instruction, this article will focus on two areas: (1) instructional strategies teachers can use to establish effective learning in this environment and (2) effective utilization of the technical environment unique to this delivery mode.

History of Distance Education

"Distance Learning in general has been around for over 100 years, beginning in the 1980s as a means for (mostly) women to take advantage of educational opportunities and have access to

learning that was otherwise denied them" (Greenberg, 2004, p. 6). Since then there have been a variety of methods for delivering education at a distance, beginning with correspondence courses in which students studied independently and submitted assignments by mail. The first public use of video communication itself was the unsuccessful motion video telephone developed by AT&T and shown at the New York World's Fair in 1964, and the earliest instructional use of television systems (videoconferencing) was in the late 1960s by Stanford University (Noll, 1997). New technologies now offer the opportunity to extend the power, efficacy, and reach of distance learning to individuals and groups of students of all ages, all locations and all learning styles through a variety of synchronous and asynchronous delivery modes.

Lawson (2010) defines videoconferencing as "synchronous audio and video communication through computer or telephone networks between two or more geographically dispersed sites." It can be used one-to-one, one-to-many, or many-to-many. At City University of Seattle, a university with multiple campuses across Washington State and around the world, the use of videoconferencing has many applications, including small and large group meetings, classroom instruction, conferences and workshops, and special events such as guest speakers for courses offered in different locations. It brings another synchronous dimension to the asynchronous technology-supported instruction that has been introduced in recent years, primarily through the university's learning management system.

Experiences with videoconferencing document some advantages over other instructional technologies in use. It can increase access to education for small groups of geographically dispersed students and enable small cohorts or individuals to participate at multiple sites and be aggregated with one instructor to meet minimum effective class size. It can provide expanded access to excellent teachers or guest lecturers in specialized content areas. In Hawaii nationally recognized content-specific instructors who were located on the various islands throughout the state provided a strong and diverse team of instructors, benefitting the students on all the islands. This reduced travel requirements and costs. Another advantage of videoconference instruction is that class

sessions can be auto-recorded and made available for repeated practice or learning by students. Participants were able to access replays of any of the lectures, debates, and student project presentations throughout their program as they prepared for examinations, reviewed research projects, or made up for a missed class. One instructor in Hawaii commented, "In tandem with the Polycom system, every session was secured and stored for later use and review by the instructors, students, and others via the CD and DVD formats. Through the use of the videoconferencing Polycom system, all barriers for instruction and learning were lowered for students."

As an instructor review tool, recorded sessions can give valuable feedback to faculty on which to base future modifications to the curriculum or instruction. It is also "environmentally friendly" as reported by another Hawaiian instructor, as most of the major parts of the instruction were done in a paperless format. All instructional materials, student presentations, assignments, projects, and papers were presented and submitted electronically. The environmental savings in travel alone, in addition to the time, cost, and family disruption associated with it, were substantial factors. A third instructor and field supervisor commented that, "The videoconferencing capability provides opportunities to recruit a wide diversity of potential Special Education teachers on all of the islands. Without the technology used in videoconferencing, these same students would not have had the opportunity to complete their professional teaching degree."

Instructional staff can also use this mode to interact with each other and share resources and strategies. In Hawaii the faculty conducted interactive meetings with the benefit of conducting administrative work efficiently and also of sharing specific instructional strategies with each other throughout the four cohorts conducted there.

Videoconferencing has other uses which can provide valuable support or access to instruction for students. Through video-chat systems such as Skype individual students can sometimes access classes that they cannot attend in person because of an emergency or other planned absence if an instructor is willing to set up and support that access.

The effectiveness of the videoconference delivery mode relies on the application of sound instructional techniques as is true in face-to-face instructional delivery, along with adaptive techniques to maximize its potential and minimize any perceived disadvantages. The body of research supports the premise that learning can occur just as well through videoconferencing or other technology-supported distance learning as it can face-to-face (Webster & Hackley, 1997). Spooner (2009) found that student ratings of instructor effectiveness were not affected by delivery mode, with distance delivery instructors rating no worse than the same instructor in a face-to-face classroom format on campus. Greenberg (2009), in examining the body of research on videoconferencing, reports that results indicate that videoconferencing stacks up well against traditional classrooms for delivering instruction. It can create a social presence and more comfortable learning environment for learning (Tyler, 1999). The synchronous nature of videoconferencing makes it a superior distance-education technology for business, education, and other social disciplines in which interpersonal skills are a large component of the learning outcomes expected of students (Olson, 2003).

Experiences with Videoconference Instruction

Ensuring effective teaching and learning begins with the selection of courses within programs that best lend themselves to a videoconference environment. Attention to content and pedagogy, in addition to careful selection of the teaching faculty, help maximize this opportunity for success. Courses previously taught face-to-face or in mixed mode will likely need modifications when taught using videoconferencing, so advance planning is critical. The university has moved gradually over the past three years to introduce new elements of technology-supported learning into all of its courses. This has helped prepare instructors and students for alternative modes of delivery, and many are now ready to take the next step to synchronous technology-supported instruction. Admittedly, the decision to offer a course via videoconferencing may at times be influenced by the number of students enrolled at

various sites or by instructor availability. Curriculum needs to be evaluated to determine when, where, and if to offer courses either fully online, mixed mode, or through videoconferencing to select the best delivery modes for a particular course or activity.

When selecting a course to offer through videoconferencing, it is important that faculty carefully select the course content that would most effectively be delivered in that medium. University experience in the Hawaii program required that all courses be delivered via videoconferencing since students from the different Hawaiian Islands needed to network for their entire program. When implementing videoconferencing in Washington where instruction was traditionally offered in locations face-to-face, faculty had more opportunity to individualize the selection process. They analyzed course content in an effort to identify courses that would most lend themselves to a successful first experience for instructors and students. The selected courses were taught, monitored, and subsequently evaluated by students, instructors, and administrative faculty. Experiences in these courses will continue to enhance familiarity with equipment, course preparation, and delivery.

As faculty prepare to deliver videoconference instruction, the principles of effective teaching which influence and affect learning in all delivery modes have relevance and importance. Instructors in all modalities seek to build this relevance and meaning into instructional activities through creating a set for learning; providing for formative assessments throughout the course; providing dispersed individual and group practice of new skills; and providing active, student-centered learning.

Many universities use videoconference instruction as a way to deliver lectures to wider audiences or to make lectures available to students who wish to watch them again. However, when the expectation is that all learners will be actively engaged in the learning process rather than passive recipients of lectures or instructor presentations, the passive approach to just watching a lecture is insufficient. One of the major challenges faced by those faculty members who wish to utilize videoconferencing with these expectations is to introduce as much interactivity into the instruction as possible—both between instructor and students and among stu-

dents. There are sound pedagogical reasons for this approach. The literature consistently documents that students in more interactive courses have more positive attitudes and that these attitudes influence their learning (Rangecroft, 1998). Hayden (1999) supports student-centered learning and suggests that the technology needs to be paired with “constructivist instructional strategies”—strategies that promote active learning and lead students to construct new concepts based on their current and past knowledge. Some effective constructivist learning strategies include shared discovery, team learning, collaborative learning, distributed communities of practice, and accessible experts. Students can also view “real-life” filmed experiences during videoconference sessions, enhancing the relevance of their learning. For example, in teacher preparation programs, they can view prerecorded learning and teaching experiences in real K–12 classrooms to support their classroom-based learning.

The structure and use of time is key to designing student-centered lessons. Amirian (2003) as cited in Greenberg (2004) posits that interaction is the key component to support a more social learning environment as it facilitates the formation of a sense of community using the technology. One way to achieve that is for educators to use the “fifteen-minute rule,” limiting lecture time to no more than fifteen minutes and following these sessions immediately with activity involving the students. Cyrs and Conway (1997) further recommend that students should be involved in interactive activities from 30 to 50 percent of the time.

Planning the Lesson

Preparation time for a first-time videoconference instructor may be more time-consuming than for a class that was previously taught in face-to-face format. It may take three to five times longer, and for a repeat instructor two to three times longer, to allow for the preparation of visual materials and creation of interactive experiences (Cyrs & Conway, 1997).

The University of Malta (2007) recommends that videoconferencing lessons always be planned with *interaction* in mind. The

videoconference lesson has the potential of being able to focus more on collaborative learning than on the traditional didactic process. A lesson plan for a videoconference session should include the following:

- Expected learning outcomes
- Methodology and activities
- Materials and audiovisual resources
- Time (duration of each planned activity)
- Notes (support handouts and additional notes to be supplied before or after the session)

Faculty at CityU are expected to incorporate this lesson planning and also to embrace principles of student involvement in their planning. They receive their initial training in this through the New Faculty Orientation (NFO). There they complete an Instructional Plan and also have students complete a mid-course evaluation which, in addition to an observation of their teaching by their Primary Supervisor, gives them guidance upon which to adjust instruction if needed. This feedback is used by instructors and administrative faculty as they make modifications to the delivery of future videoconference courses.

Faculty are encouraged to schedule videoconference sessions with short breaks each hour. Lectures, if used, should be a maximum of fifteen to twenty minutes in duration followed by a change element, such as a learning activity or a shift of focus to another location (Davies, n.d.). Audiovisual materials prepared for students should either be projected on a separate screen at the videoconference locations and/or posted and available to students on the learning management system well ahead of the class session so they can be retrieved and printed before class if necessary, avoiding the experience of some students in earlier sessions who reported that materials were posted as they were driving to class in the morning and therefore unavailable for them to access and print if needed.

Conducting the Lesson

Generally recognized aspects of effective instruction apply to videoconference instruction as well. Instructors should carefully prepare the lesson opening and closing (set and closure), beginning each lesson with an activity that engages student interest and increases motivation for ensuing parts. At the beginning of the course, this activity should help to create a sense of community among all participants by helping them get to know each other. Other important practices to incorporate include planning for dispersed practice sessions; providing formative feedback; asking direct and indirect questions to both check for understanding and provide for reflection; and closing the lesson with an opportunity to summarize and reflect on learning.

Instructors can build on student engagement in a variety of ways. As in face-to-face classroom sessions, guest speakers can provide interest and relevance, provide real life examples, and make a significant contribution to student learning when aligned with the course goals. Local and nationally recognized experts are sometimes available through videoconference that would otherwise be inaccessible to instructors and students. Other strategies to consider incorporating into lessons include involving students in demonstrations or presentations; analysis of case studies; using cooperative learning techniques; and conducting peer teaching one-to-one or in small groups during the session. These strategies help to break up long class sessions into manageable segments with a variety of activities. Interactivity can be a key component of videoconference instruction. One instructor says, "While I was not at first in favor of teaching via videoconferencing, I did not realize at that time the opportunities that the use of technology provided me in preparing my lessons for instruction. The interactive opportunity especially went far beyond my expectations."

Technical Recommendations for Teachers and Students

Managing the technical environment is an area of concern to potential instructors who may have limited experience using videoconferencing in the classroom. Students who have taken videoconference classes also confirm that the technical skills of the instructor are very important to the quality of their experience. That has implications for the selection of instructors as well as their training and preparation. While the optimum situation is to have a technical consultant available and actively involved at each site, that is not always possible and can become cost prohibitive. At some universities students manage the equipment.

Advance preparation is as critical as having the right support structures in place. Instructors should master the use of equipment at their site (Park & Bonk, 2007). This is best done by conducting a trial run to become familiar with how the equipment works and what the display looks like to remote users. For example, it is helpful to have the camera preset to a small group of participants using the preset function. For small groups of three–four, these can be set to zoom to individuals, which helps to personalize the environment. Nearly every instructor has had something go awry technically at some point in each course. Prior preparation and trial runs can prevent some of these, and having backup systems and technical expertise available can remedy others. A definitive “systems down” plan should be developed in consultation among administrative, instructional, and technical staff as well as with students who may be managing their own site to minimize the loss of class time and the stresses created by breakdowns.

Students are an important consideration also. They need to become familiar with the equipment, with the instructor, and with each other. Meeting with students prior to the first videoconference class and demonstrating to them their options for manipulating the equipment can be helpful. Students are then capable of adjusting the volume and zooming the camera to targeted speakers at their discretion.

Davies (n.d.) recommends dedicating a portion of time during the first meeting for all students to be on camera to help build

interpersonal connections. During this time the instructor can build a set of expectations or protocols with students regarding their conduct during class sessions. For example, it is particularly important in this environment not to interrupt or talk out of turn. The establishment of protocols and etiquette for communication between locations can include how students at remote sites will let the instructor know when they have a question or when they wish to contribute to the discussion. Establishing and enforcing a method of gaining recognition is important to the maintenance of a respectful classroom environment.

The following tips for students may be of value as an instructor develops protocols and agreements with them about their participation and interaction during course sessions:

- Sit within view of the cameras and close to the microphones.
- When you have a question, identify yourself and your location so that people at other sites know who is speaking.
- Keep microphones muted until you wish to speak.
- Notify the instructor immediately if you are experiencing any difficulty with audio or visual portions of the course.
- When preparing for presentations in class, post materials ahead of time in the learning management system and arrange for their display during the presentation in a format that is visible to those in another videoconference location.

Guidelines for videoconference instruction at St. Leo University (2008) recommend that instructors keep a list of student names and their site location handy so they can readily call students by name, ask them questions to engage them in the learning process, and involve them in presentations and group collaborations. Keeping a record of student interaction also helps to ensure that all are taking part. One method for gaining attention that has proven effective is to use a visual symbol such as a small flag that the participants can raise in front of them to be recognized. This creates a stronger visual symbol for the presenter than simply raising the hand.

The careful preparation of materials can be a time-consuming but essential element for success. Simple and clear visual content using graphics and large font sizes (36–72) with limited text and easy-to-see colors enhances learning. Landscape view is preferred. Presentations should avoid using too many slides to prevent confusion and any one image source or slide should not be on display for more than five minutes. In videoconference instruction it is particularly important to provide complex material in a step-by-step sequence that is easy to follow (Davies, n.d.; Park & Bonk, 2007).

While appropriate preparation and display of materials are an essential component of effective instruction, an instructor's consideration for his/her personal visual and auditory presentation also influences the student experience. The level of animation and excitement that an instructor conveys contributes to the motivation and engagement of students (St. Leo University, 2008; Park & Bonk, 2007). Varying facial expressions, tone of voice, body movements, and eye contact with the camera can enhance verbal conversation (Davies, n.d.). Long Island University (2006) recommends that instructors consciously adapt their teaching style to the camera. One strategy to accomplish this is to pretend that the camera is a student and to look at it regularly to connect with students at other locations. Making eye contact with the camera helps students feel that they are being communicated with and that they are important.

Visual elements also affect attention and learning. Some skills that can be used and developed include avoiding moving around the room a lot; decreasing gestures; using hands as indicators accompanying speech; and avoiding distracting movements, such as tapping a pencil or swiveling in a chair. Using a pointer on displayed visual material can help focus learners if not overused. Instructors are encouraged to wear solid-color clothing; blues, dark, and neutral colors work well (Long Island University, 2006). Presenters should avoid rapid motions and be aware of the visual range of the camera.

Effective auditory skills include developing the ability to speak naturally, slowly, and clearly, knowing that students at other locations may experience short audio delays. It helps to eliminate

noises, such as paper shuffling or finger-tapping (Long Island University, 2006; Saint Leo University, 2008). Clanking jewelry can also be distracting. Instructors should use effective verbal skills, such as taking time to pause, demonstrating enthusiasm for the subject matter, and avoiding speaking in monotones. Instructors should periodically check in with students at other locations to confirm they can hear the discussion and questions that are shared. It may be more important in this environment than in a face-to-face class for the instructor to repeat or rephrase student comments to ensure that all participants have heard them correctly. Active use of the “mute” function enhances engagement when appropriate as long as well-established signals are in place for gaining instructor and student attention when needed.

The importance of the skills and attitude of the instructor in establishing and maintaining a friendly, collegial, and respectful environment cannot be overstated. In an optimal situation, the instructor would teach from rotating sites so that each group has the advantage of face-to-face instruction at some point. When this is not possible, it is especially important to give students opportunities for personal contact with the instructor by telephone, e-mail, or personal appointments.

Lessons Learned

With several dozen courses (including Hawaii) now having utilized videoconferencing at CityU, the body of experience is beginning to inform practice. Additional recommendations from administrative and teaching faculty involved in these courses are helping to inform our future practices. They include:

- Instructors should set their operational protocols ahead of time and do at least one practice session before meeting with the class to test audio and video connections as well as gain personal experience and feedback about their own auditory and visual communication skills.
- Appropriate and effective audio is critical. Having a cordless microphone “unleashes” the instructor. Multiple

microphones should be well positioned among the participant groups.

- Careful selection of instructors is important, with enthusiasm and active engagement perhaps more important than prior experience. Ability to effectively use and manage the learning management system is also very important to students and the success of the class.
- Having backup systems in place is important. At a minimum there should be a telephone contact at each site, whether it is a phone in the room or simply the sharing of cell phone numbers. In the event that a network problem occurs, people need a way to contact each other. In addition, a computer in the classroom or nearby with a printer is desirable.
- Especially when networking with sites external to the system, it is important to identify and involve a network team at each site to test equipment ahead of time. Problems with firewalls can arise and can recur when systems refresh, so permanent as well as temporary solutions need to be put into place.

Future Research Directions

While the experience, the research, and the literature are beginning to inform practice, there are still rich opportunities to contribute to this field. Following are three ideas that may inform future research efforts.

Networking for classroom learning experiences, as well as consultation, decision making, and problem solving in business settings, increasingly links individuals and groups from disparate geographical, cultural, and political settings. To what extent does the utilization of videoconferencing enhance cultural understanding and appreciation for different points of view and experiences over other modes of communication? Is it more effective than an online discussion or a strictly auditory means of communication? What, if any, other advantages accrue to groups who use videoconferencing as a means of communication.

The literature suggests that the success of videoconference instruction may depend somewhat on the number of sites connected for a single section, with the selection of two or three networked sites for course instruction at any one time considered to be the maximum. Additional sites for group setting instruction may lower the participants' impression of personal interaction (Gowan & Downs, 1994). Experience indicates that the number of sites should be limited to four or five, both for instructional and equipment reasons. The downtime interruptions at any one of the sites tends to create disturbances and stresses on both the students and the instructors. It would be helpful to further explore and document the relative success of various numbers of sites.

While the literature and individual experience seem to suggest that the preparation for and conduct of videoconference instruction is more time consuming than face-to-face instruction, what are the particular dynamics and implications of this commitment, and how can they be better managed to attract and retain the best instructors for this environment?

Conclusion

While the utilization of videoconference instruction is relatively new, faculty have and are continuing to learn a great deal about how to utilize it effectively with the belief that it is making a positive contribution to the portfolio of delivery modes. With excellent curriculum and excellent faculty, a university can educate students well anywhere in the world through face-to-face, mixed-mode, online, and now videoconference-supported instruction.

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