



Interactive Videoconferencing in Distance Education

Distance Education at a Glance, Guide 10, October 1995

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Why Interactive Videoconferencing?

Interactive Videoconferencing (IV) is an effective tool for use in distance education settings and is designed to support two-way video and audio communication between multiple locations.

It is especially popular among educators who feel the need to interactively include remote participants in "real time" meetings and class sessions.

The Technology of IV

Most IV systems utilize compressed digital video for the transmission of moving images over data networks such as high capacity Integrated Services Digital Networks (ISDN). The video compression process decreases the amount of data transmitted over the lines by transmitting only the changes in the picture. By minimizing the bandwidth required to transmit the images, video compression also reduces the transmission cost.

Interactive videoconferences are often transmitted on dedicated T-1 phone lines. These high speed lines are very effective for videoconferencing, but they are typically leased circuits with an expensive monthly cost. The fixed monthly charge is usually based on distance, not usage. Therefore, the cost effectiveness of IV systems increases with use. Interactive videoconferencing systems can operate at different data rates, at various fractions of T-1 capacity, enabling the transmission of multiple simultaneous videoconferences over the same T-1 circuit. An IV system can also share a T-1 circuit with other digital data uses such as Internet transmissions or file transfers.

Point-to-point

Interactive videoconferencing is commonly used to connect two locations using sophisticated computer technology. The core of IV is the codec (coder/decoder). This is the electronic device that transmits and receives the video signals that the class members will see on their television monitors (Galbreath, 1995). It may be easier to think of the codec as an extremely sophisticated modem. A modem takes digital data and transmits it over regular phone lines. The codec takes analog signals, compresses and digitizes them, and transmits the signals over digital phone lines (Woodruff and Mosby, 1996).

Other types of equipment, such as television monitors, are needed to make IV successful. In addition, various forms of instructional technology can be incorporated into IV, including video cassette recorders/players, microphones, additional cameras, and computers (Reed and Woodruff, 1995).

Point-to-Multipoint

Some systems are also capable of simultaneously connecting more than two sites through the use of a multipoint control unit, or MCU. Multi-point conferencing can be effective although the scheduling, technical, and logistical

dimensions of MCU conferences can be imposing.

Dial Out Capability

A relatively new "dial out" feature allows the use of multiple phone lines to connect two or more sites in the same conference. Simultaneously accessing multiple lines may be difficult in small areas. In addition, the cost of the telephone line usage may be prohibitive since the cost of the call would be multiplied by the number of lines utilized in the conference.

Advantages of Interactive Video

Interactive video can be effective because it:

- Allows "real time" visual contact between students and the instructor or among students at different sites.
- Supports the use of diverse media (Reed and Woodruff, 1995). Blackboards, handwritten and computer documents, and videos may be incorporated at all sites.
- Enables connection with experts in other geographical locations (Reed and Woodruff, 1995).
- Can provide access to at-risk or special needs students (Woodruff and Mosby, 1996).
- Provides additional access to students at remote sites.

Limitations of Interactive Video

As with any technology, interactive video has its limitations:

- The initial cost of the equipment and leasing the lines to transmit conferences may be prohibitive.
- Companies which produce codecs have each developed unique methods of compression which are incompatible, although protocols have been established to allow communication among brand names. However, this "universal standard" compromises resolution and quality to a certain degree.
- Unless a strong effort is made by the instructor, students not located with the instructor may remain uninvolved in the course.
- If visuals, like handwritten or copied materials, are not properly prepared, students may have a difficult time reading them.
- If the "pipe" that carries the transmission among sites is not large enough, the students may observe "ghost images" when rapid movement occurs in "real time" (Reed and Woodruff, 1995).
- If the system is not properly configured, class members may observe an audio "echo" effect (Reed and Woodruff, 1995). The result is audio interference that detracts from the learning environment.

Types of Videoconferencing Systems

- *Small room videoconferencing.* This system is designed primarily for small groups (1-12 participants) seated around a conference table (Woodruff and Mosby, 1996).
- *Classroom videoconferencing.* This type of system usually uses high quality AV components, codecs, and an interface that allows all participants to be seen on the monitors.
- *Desktop videoconferencing.* This system utilizes a personal computer and videoconferencing software. These systems are less expensive, but offer limited resolution. They are most effective for individual and small group use (Woodruff and Mosby, 1996).

Designing Instruction for Interactive Video

When designing instruction to be delivered over IV, the instructor should focus attention on all students, not just those at the "home" site. Lessons should incorporate a variety of activities for all students at the various sites. Use small group activities, student presentations, and an occasional break to add variety to the lesson. As a rule of thumb, instructors should change instruction methods every 10-15 minutes. In other words, switch from lecture to question-answer to small group activity on a regular basis.

It is often helpful to bring guest lecturers into the classroom. It may also be helpful to have guest speakers at one or more of the distant sites. This will encourage involvement of the distant students, as well as allowing the students at the origination site to "see what it is like" to have the teacher at another location.

When preparing class visuals, keep in mind that small fonts and light colors do not show up well over the monitors. A variety of formatting will also assist in maintaining student interest and attention. When formatting visuals, keep in mind the 2:3 aspect ratio required to "fit" all information on the television screen (Reed and Woodruff, 1995).

Instructional Strategies

Establish Class Expectations

In the distance education classroom, some students may adopt the "TV" attitude, expecting the course to be entertaining, not educational (Reed and Woodruff, 1995). Address this attitude through well planned and focused presentations with emphasis on teacher-student interaction.

Reduce Distractions

Students should also be forewarned to minimize extraneous noise and activity (Reed and Woodruff, 1995). Both detract from the quality of the course.

Use Variety and Interaction

The instructor should begin the course by preparing the learners for an active experience. Videoconferencing is interactive, unlike regular television, and students can make the class much more interesting by being actively involved.

Encourage Dialogue

By asking questions and noting body language, instructors can ascertain the interest and comprehension of the students at all sites. This kind of attention will make all students feel more comfortable.

Training for Instructors and Students

It is important that an instructor be taught how to use all features of the equipment. A short session (30 minutes) should be sufficient to give the instructor a "hands-on" overview of the equipment features. It would also be helpful to provide the instructor with a quick reference sheet outlining major functions.

Some of the critical operations that an instructor should be capable of performing are:

- Turning on the codec and the monitors
- Dialing the distant site(s) to establish a link
- Controlling camera focus and field at the origination site and at the distant site(s)
- Adjusting the volume to an acceptable level
- Dialing out to a remote location
- Selecting the appropriate data rate
- Re-setting "echo canceling" capability
- Switching to and from the document camera
- Switching to and from the computer output
- Utilizing a computer to generate and display multimedia presentations
- Using the VCR to broadcast a video for all locations
- Terminating the link with the distant site(s)
- Shutting down the equipment

Some institutions have technicians who will assist the instructor in setting up or monitoring the videoconference. However, the instructor should still be aware of the process because the technician may not always be available.

Student training may also be critical since they may be called upon to operate the equipment if the instructor is at another site, is unavailable, or if a guest speaker needs assistance.

Interactive videoconferencing can be an effective instructional tool for the distance educator. As with other technologies, its usefulness is directly related to the instructor's understanding of its benefits, limitations, and utilization strategies.

References

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