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Using interactive video conferencing and internet for distance learning strategies in higher education

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Abstract
The education system is challenged with providing increased educational opportunities, within a context of rapid technological change and shifting market conditions, without increased budgets. Many educational institutions are answering this challenge by developing distance education programmes. Distance education takes place when a teacher and students are separated by physical distance, and technology, i.e., voice, video, data, and print, often in concert with face-to-face communication, is used to bridge the instructional gap. 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. The mix of internet services and the relative traffic associated with each service continue to change as well. The services representing the majority of the traffic are FTP and WWW. The internet is a network infrastructure that was originally sponsored by a variety of federal agencies, including the NSF and the Advanced Research Project (ARPA). The internet was intended to be a network that would facilitate communication and collaboration among researchers and educators in universities, government agencies, and industry. Now a days all the universities are offering wonderful computer programmes. This emphasizes on growth of the education sector. People are working in different places even though they are continuing their education through distance learning programmes. This distance education programme are useful for those who are house wives and working persons. Distance education takes place when a teacher and students are separated by physical distance, and technology i.e., voice, video, data and print often in concert with face to face communication, is used to bridge the instructional gap.

Keywords: Interactive video conferencing, higher education, distance education

Introduction
The education system is challenged with providing increased educational opportunities, within a context of rapid technological change and shifting market conditions, without increased budgets. Many educational institutions are answering this challenge by developing distance education programmes.

Distance education takes place when a teacher and students are separated by physical distance, and technology, i.e., voice, video, data, and print, often in concert with face-to-face communication, is used to bridge the instructional gap. These types of programmes can provide adults with a second chance at a college education, reach those disadvantaged by limited time, distance or physical disability, and update the knowledge base of workers at their places of employment.

Research comparing distance education to traditional face-to-face instruction indicates that teaching and studying at a distance can be as effective as traditional instruction, when the method and technologies used are appropriate to the instructional tasks, there is student-to-student interaction, and when there is timely teacher-to-student feedback.

Interactive video conferencing
Interactive Videoconferencing (IV) can be integrated into the distance education programme with minimal adaptation to the curriculum and course and is designed to support two-way video and audio communication between multiple locations. Most IV systems utilise compressed digital video for the transmission of motion images over data networks such as high capacity Integrated Services Digital Networks (ISDN).

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The video compression process decreases the amount of data transmitted over the lines by transmitting only the changes in the picture. By minimising 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 ar€ 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.

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. 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 digitises them, and transmits the signals over digital phone lines. 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, cameras, and computers.

Some systems are also capable of simultaneously connecting more than two sites through the use of a multi-point control unit, or MCU. Multi-point conferencing can be effective although the scheduling, technical, and logistical dimensions of MCU conferences can be imposing. A relatively new "dial out" feature, allows the use of multiple telephone 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 utilised in the conference.

The major categories of videoconferencing systems are:

- **Small room videoconferencing:** This system is designed primarily for small groups at all sites seated around a conference table.
- **Classroom videoconferencing:** This type of system usually uses high quality IV components, codecs, and an interface that allows all participants to be seen on the monitors.
- **Desktop videoconferencing:** This system utilises 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.

While 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 colours do not show up well over the monitors. A variety of formatting will also assist in maintaining student interest and attention. When formatting visuals, be sure that they will fit on the television monitor.

Instructional strategies for videoconferencing systems include

- **Establish class expectations:** In the distance education classroom, some students may adopt the TV attitude, expecting the course to be entertaining, not educational. Address this attitude through well planned and focused presentations with emphasis on teacher-student interaction.
- **Reduce distractions:** Students should also be forewarned to minimise extraneous noise and activity. 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. Interactive 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 both all sites. This kind of attention will make all students feel more comfortable.
- **Training for Instructors and Students**: 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.
- Resetting echo cancelling capability.
- Switching to and from the document camera.
- Switching to and from the computer output.
- Utilizing a computer to generate and display multimedipresentations.
- Using the VCR to broadcast a video for all locations. Ng) 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 utilisation strategies.

Interactive video has the following advantages
- Allows real time visual contact between students and the instructor or among students at different sites.
- Supports the use of diverse media. Blackboards, handwritten documents, and videos may be incorporated at all sites.
- Enables connection with experts in other geographical locations.
- Can provide access to at-risk or special needs students.
- Provides additional access to students at remote sites.

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 codec's 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.
- If the system is not properly configured, class members may observe an audio echo effect. The result is audio interference that detracts from the learning environment.

Educators have witnessed the rapid development of computer networks, dramatic improvements in the processing power of personal computers, and striking advances in magnetic storage technology. These developments have made the computer a dynamic force in distance education, providing a new and interactive means of overcoming time and distance to reach learners.

The computer
The application of computer for distance education
- **Computer Assisted Instruction (CAI):** Uses the computer as a self-contained teaching machine to present discrete lessons to achieve specific but limited educational objectives. There are several **CAI** modes, including: drill and practice, tutorial, simulations and games, and problem-solving.
- **Computer Managed Instruction (CMI):** Uses the computer's branching, storage, and retrieval capabilities to organise instruction and track student records and progress The instruction need not be delivered via computer, although often CAI (the instructional component) is combined with CMI.
- **Computer Mediated Communication (CMC):** Describes computer applications that facilitate communication. Examples include electronic mail, computer conferencing, and electronic bulletin boards.
- **Computer-Based Multimedia:** HyperCard, hypermedia, and a still-developing generation of powerful, sophisticated, and flexible computing tools have gained the attention of distance educators in recent years. The goal of computer-based multimedia is to integrate various voice, video, and computer technologies into a single, easily accessible delivery system.

The major advantages of computers are
i) Computers can facilitate self-paced learning: In the CAI mode, for example, computers individualise learning, while giving immediate reinforcement and feedback.
- **Computers are a multimedia tool:** With integrated graphic, print, audio, and video capabilities, computers can effectively link various technologies. Interactive video and CD-ROM technologies can be incorporated into computer-based instructional units, lessons, and learning environments.
- **Computers are interactive:** Microcomputer systems incorporating various software packages are extremely flexible and maximise learner control.
- **Computer technology is rapidly advancing: Innovations are constantly:** emerging, while related costs drop. By understanding their present needs and future technical requirements, the cost-conscious educator can effectively navigate the volatile computer hardware and software market.
- **Computers increase access:** Local, regional, and national networks link resources and individuals, wherever they might be. In fact, many institutions now offer complete undergraduate and graduate programmes relying almost exclusively on computer-based resources.

The major limitations include
- Computer networks are costly to develop. Although individual computers are relatively inexpensive and the computer hardware and software market is very coin petitive, it is still costly to develop instructional networks and purchase the system software to run them.
- The technology is changing rapidly. Computer technology evolves so quickly that the distant educator focused solely on innovation not meeting tangible needs will constantly change equipment in an effort to keep pace with the latest technical advanCements.
- Widespread computer illiteracy still exists. While computers have been widely used since the 1960s, there are many who do not have access to computers or computer networks.
- Students must be highly motivated and proficient in computer operation before they can successfully function in a computer-based distimce learning environment.

The internet is the most powerful computer network in the world. It encompasses 1.3 million computers with internet addresses that are used by up to 30 million people in more than fifty countries. As more and more colleges, universities, schools, companies, and private citizens connect to the internet either through affiliations with regional not-for-profit networks or by subscribing to information services provided by for-profit companies, more possibilities are opened for distance educators to overcome time and distance to reach students.

The internet continues to grow rapidly. The mix of internet services and the relative traffic associated with each service continue to change as well. The services representing the majority of the traffic are FTP and WWW. The internet is a network infrastructure that was originally sponsored by a variety of federal agencies, including the NSF and the Advanced Research Project (ARPA). The internet was intended to be a network that would facilitate communication and collaboration among researchers and educators in universities, government agencies, and industry. That, however, is no longer the exclusive role of the internet. Two growing roles of the internet are supporting electronic commerce and providing distance learning solutions to schools.

The internet supports an increasing number of services, some of which are described below.

- **Logon services:** Logon services are offered by internet providers through two types of TCP/IP-based protocols: Telnet and Rlogin. The Telnet command has the advantage of being available on any host that allows remote login capability.
- **E-mail:** E-mail is the most commonly used application on the internet. It is used by researchers in universities, government agencies, and corporations as part of their collaborative research process. It is supported by a wide range of delivery agents and delivery mechanisms.
- **Bulletin boards:** Many bulletin boards can be accessed through the internet. Two common public bulletin boards on the internet are USENET and LISTSERVE. USENET is a collection of thousands of topically organised newsgroups, covering everything from supercomputer design to bungee cord jumping, and ranging in distribution from the whole world to single institutions. LISTSERVE also provides discussion forums on a variety of topics broken out by topic or area of special interest.
- **File transfer:** File transfer services is used to transfer files between internet hosts. Researchers at universities, corporations, and government agencies can use FTP to download as well as upload files to supercomputer centres. Anonymous FTP is a simple extension to the basic FTP protocol that enables students and researchers to create and share public archives with others on the internet.
- **World Wide Web:** The WWW is a system that links information stored anywhere on the internet in a mesh of hyperlinks. These hyperlinks enable an educator or a student equipped with a suitable client to navigate through a distributed information resource by simply following pointers from one hypermedia document to another. The hypermedia document may include text, sound, still images, and video. The WWW makes information resources on the Internet accessible to users who are not experienced in UNIX-based commands.

- **Electronic whiteboards:** Electronic whiteboards allow a speaker's notes to be shared in real time with viewers over a wide area. This tool makes the dialogue among researchers, educators, and students more interactive and more effective, enhancing the collaborative research and learning process.
- **Videoconferencing:** Videoconferencing is an emerging internet service that enables students to establish low-end two-way video and audio connections with teachers and other students around the globe. This service originated as part of the Global Schoolhouse project. When available on a large scale, will provide a measurable benefit to students, because it provides them with international exposure.
- **Directory services:** Directory services provide users with the ability to locate information about other users, services, or service providers. Directory services are often divided into "white pages" and "yellow pages" services. The white pages service provides information about individual users, while the yellow pages service provides information about services and their providers.
- **Gopher services:** Gopher services allow students and researchers to browse through information across the Internet without having to log in or know in advance where to look for information.

The WWW provides Internet users with a uniform and convenient means of accessing the wide variety of resources (pictures, text, data, sound, video) available on the internet. Popular software interfaces, such as Mosaic and Netscape, facilitate navigation and use of the WWW. The central organising feature of the WWW is the home page. Every organisation and even every individual user of the WWW can create a home page that contains whatever information they want to present. The hypertext capabilities of the WWW facilitate linking of information within your own home page and with all other home pages on the WWNV.

Distance educators can use the Internet and WWW to help students gain a basic understanding of how to navigate and take full advantage of the networked world into which they will be graduating. Some instructional possibilities of the Internet include:

- Using e-mail for informal one-to-one correspondence. Feedback from the instructor can be received more quickly than messages sent by mail. Students can read messages at their convenience and easily store them for later reference.
- Establishing a classroom bulletin board. Distant students often work in isolation without the assistance and support of fellow students. Setting up a class bulletin board can encourage student-to-student interaction. With a class computer conference, individual students can post their comments or questions to the class, and every other individual is free to respond. The conference can also be used to post all modifications to the class schedule or curriculum, assignments/tests, and answers to assignments/tests.
- Engaging students in dialogue with other students, faculty, and researchers by encouraging them to join a bulletin board(s) on topic(s) related to the class.
- Developing a classroom home page. The home page can cover information about the *class* including the

syllabus, exercises, literature references, and the instructor's biography. The instructor can also provide links to information on the WWW that would be useful to students in the class.

Conclusion

The interactive video conferencing and internet facilities are more valuable in the field of distance Education learning programme. Now a days all the universities are offering wonderful computer programmes. This emphasizes on growth of the education sector. People are working in different places even though they are continuing their education through distance learning programmes. This distance education programme are useful for those who are house wives and working persons. Distance education takes place when a teacher and students are separated by physical distance, and technology i.e., voice, video, data and print often in concert with face to face communication, is used to bridge the instructional gap.

Society has been credited with creating internet technology, but it is simultaneously creating society. Maintaining quality presupposes building a code of ethics into the internet infrastructure, just as science without responsibility is like a sword without a sheath, so too, internet based distance learning without ethics will lead to gross debasement of human energies.

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