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# VIDEO CONFERENCING AND ITS APPLICATION IN DISTANCE LEARNING

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**ABSTRACT**

For the past decade, video conferencing (VC) has become more popular and more reliable as a tool to bridge the distance gap when travel is not an option, impractical or undesired. Video conferencing uses audio and video telecommunications to bring people at different sites together. Understanding what are required for videoconferencing and its application has become one of the major researched topics by various learning institutions and businessmen. In this paper, an introduction to video conferencing is presented with the emphasis on its application in distance learning.

***Keywords****:* Video Conference (VC), Distance Learning.

## 1.0. INTRODUCTION

It is only recently that technology has reached a level of stability, usability and affordability which permits its use in real teaching scenarios rather than research projects. The use of video is being hailed as the next advance in electronic communication. Many companies are developing systems to support such concepts as virtual teams, telecommuting, and remote conferencing (Sami, 2008).

Video conferencing has recently become increasingly popular and disperse in the wake of faster and cheaper internet connections and better technologies. Modern standalone video conferencing units provide advanced video and audio quality due to more efficient compression and can function over normal broadband internet connections. Growing processing power and cheaper accessories, such as webcams, have also made it possible to participate in a video conference using dedicated software on a normal personal computer without any expensive special hardware. With the budget stretched to the breaking point, a number of business premises and institutions are settling aside their travel plans and turning to web conferencing in order to save money and time (Roberts, 2009). Video conference

participants use either VC system, web based application or on premise software to interactively communicate with co-workers, students and others in virtual meetings or classrooms. This approach is easier, cheaper and much more convenient to use while also providing easy access to file sharing and variety of others collaborative services.

With the explosion of bandwidth, the resources are now available to provide more interaction in the virtual classroom via video conferencing (Dr. Lynne, 2007). Using the various technologies available for video conferencing, educators can provide a more interactive distance learning experience by delivering real-time, bidirectional video, voice, and data communications to their distance students, rather than just the standard electronic media.

## 2.0. VIDEO CONFERENCING

Videoconferencing is a method of communicating between two or more locations in which sound, vision and data signals are conveyed electronically to enable simultaneous interactive communication. Much more personal and effective than audio conferencing, all parties involved can see the facial expressions and body language that are so vital to the way we communicate (JNT Association, 2007). Video conferencing works by using a few different technologies. Some of these technologies are hardware while others are software related. A Video conference can be between two sites, i.e. locations which are connected to each other via the video conference, or the conference can connect multiple locations. The communication can take place in a special video conferencing studio, or on a normal home computer equipped with a webcam or even a video call on a modern 3rd generation mobile phone falls into this scope (Roberts, 2009). Besides the audio and visual transmission of meeting activities, allied videoconferencing technologies can be used to share documents and display information on whiteboards as shown in figure 1 below.

Figure 1: A Video Conference Lecture in Session

## 2.1. Components of Video Conference

Videoconferencing has three essential components:

- The Hardware.
- The intervening network that carries the signals between sites.
- The conference environment or room.

### 2.1.1. The Hardware

Basic equipment needed for a video conference session include a camera, microphone, a video conferencing unit, display unit, and audio system (JNT Association, 2007; Alan, 2009).

**Camera** – A camera to capture images and convert them into an electrical signal. Location of the camera must be ideal to allow for realistic eye-contact. Also, good quality and functionality of the cameras should be able to provide a sharper, more colourful image, with less visual noise.

**Microphone –** Microphones used in VC are usually very sensitive and should be placed away from equipments like projectors which can produce some background noise.

**Video Conferencing Unit** – The VC unit usually referred as the codec (Coder/Decoder) accepts the vision and sound signals (video and audio) and processes them into a suitable format for transmission through the network to the remote site. To receive information the Decoder does the reverse: it accepts the digital signals from the remote site over the network and decodes or converts these into video and audio. Finally this video and audio are fed to a display unit and speaker to display the pictures and reproduce the sound from the remote site respectively.

**Display Unit** – A display unit can be either a TV unit or a projector projecting onto a surface. The display unit is connected onto the codec.

**Audio System** – A good audio system is ideal for video conferencing. In some instances, TV speakers are used but in most instances (i.e. classroom, boardrooms, etc.), a good audio system with mixer, amplifier and speakers might be required.

### 2.1.2. The Network

Video conferencing technology works across internet protocol (IP) networks and integrated system digital network (ISDN). Through these vast networks, videoconferencing has the capabilities for connectivity to worldwide audiences. With IP transmission, the results can be variable as the videoconference data has to compete with other computing data. ISDN guarantees connections at the selected quality, giving more reliable conferences, but as call charges are levied it is also more expensive than IP (Byrne and Staehr,

2002). A simple video conference can be initiated with as low as 384 kbps with 30 frames of video per second real-time.

### 2.1.3. The Conference Environment

Lighting is an easy way to improve picture quality. If the room is not specially built or equipped for video conferencing, it is probable that there are not enough lights to provide the optimum quality for the video conference cameras. The result is a flickering visual noise seen especially when the cameras are zoomed in (Sami, 2008). Another result is a lack of colour saturation. Thus proper lightning is an easy way to improve video quality. Also, the room should be well acoustically designed to avoid the echo.

## 2.2. Benefits of Video Conferencing

- Sharing of presentations
- It allows immediate, full two way communication of content; verbal, pictorial objects etc.
- Greater access to experts/specialists (nationally and internationally)
- More productive use of time (eliminates wasted travel time) and significant travel cost savings.
- Reduced environmental impact through less travel and reduced pressure, stress and fatigue from travel.
- Facilitating short notice meetings between individuals in distant locations thus decisions can be made more quickly.
- Increased meeting attendance by participants who would otherwise be unable to join in
- Greater accessibility and allows geographical reach even to rural or remote locations.
- A conference session can be saved for future reference e.g. class notes can be saved and distributed via network for references by students (Alan, 2009).

## 2.3. Disadvantages of Video Conferencing

- It may lead to laziness with some students as they can have their classes while at home thus lacking self discipline.
- Lack of interpersonal relationship between students and teachers or between students themselves.
- The technology may degrade the received images and sound. Body language can be lost if image movement is jerky. There can be a delay on the sound too.
- The atmosphere of a face-to-face meeting is lost.
- For meetings, videoconferences are more effective if the participants already know each other.
- The security may be compromised as one can hack onto a private VC session (Alan, 2009).

## 2.4. Application of Video Conferencing

As discussed in various papers (Chris, 2010; Polycom inc., 2010) some of the applications include;

***Teaching:*** VC allows easy access to remote expertise. When the number of expertise is small, one lecture can teach various virtual classes at a go thus, travelling to various campuses is significantly reduced.

***Meetings:*** Using VC leads to cost savings on travel, accommodation and staff time. Several sites can be linked together. Having a set time and duration for a meeting encourages punctuality and focused discussion.

***Data sharing:*** Images from a personal computer (PC), such as spreadsheets, PowerPoint illustrations etc. can be shared to enhance a presentation.

***Interviews***: Cost savings can allow more candidates to be interviewed from remote locations. With data sharing, CVs can be viewed and discussed online.

***Telemedicine:*** In rural areas, specialist medical help may not be available on hand. By linking to a regional centre, cottage hospitals and clinics can receive help in diagnosing patients' disorders.

***Legal work:*** VC helps reduce intimidation of vulnerable court witnesses. Particularly sensitive cases e.g. children or rape cases can be made more acceptable by separating the victims physically from the court.

Other applications include;

- Remote staff training
- Thesis defence at another institution
- Supervision of students on work placements
- Within institutions, videoconferencing may benefit many different user groups such as:
    - Academics and researchers collaborating and teaching
    - Administrators and managers working with colleagues to find solutions
    - Students accessing external expertise, conducting research or staging interviews.

## 3.0. LEARNING

Learning is a social process involving the active construction of new knowledge and understanding through individual learning and group and peer interaction. This means that a key learning skill is that of communication. Clear communication, effective communication tools and channels are necessary pre-requisites for effective collaborative learning. One form of communication is dialogue. Dialogue, refers not only to the interactions between the learner and teacher(s) but also interactions between learners (Dr. Lynne, 2007). There are mainly three categories of learning namely;

- **Traditional learning** – students turn up to lectures and take notes, attend tutorials, seminars or laboratories. Their learning is timetabled for them by the Institution.
- **Distance learning** – In this scenario, the course and degree is location independent. Students may undertake the course from any location. Distant learners have less opportunity for interaction with peers or tutors.
- **Open Learning** – Students undertaking an Open Learning Program have neither time nor location dependencies. Thus the opportunity of interacting with peers is extremely limited.

### 3.1. Distance Learning

Distance Learning is a relatively new educational field that focuses on delivering classroom content/instruction to students who are not physically on site. Instead, teachers and students communicate either asynchronously (at a time of their own choosing via email or other text based communication), or using technology that allows them to communicate in real-time (synchronously) (Gillies, 2008; Greenberg, 2004). Web based classes are the most prevalent method of delivering distance classes today. These classes utilize various applications of the Internet (instant messaging, email, file upload/download, message boards, etc.) to distribute classroom materials and help students and teachers interact with one another. In some cases, students connect to a live video feed of a live classroom streamed over the Internet. Using the various technologies available for video conferencing, educators can provide a more interactive distance learning experience by delivering real-time, bidirectional video, voice, and data communications to their distance students, rather than just the standard electronic media.

### 3.2. Why use Video Conferencing for Distance Learning

New communication technologies are blurring the distinction between traditional and distant teaching. It has potential uses in both situations. Video conferencing should be used to facilitate the best of distance and conventional teaching. Distance learning is normally associated with more class materials and better preparation of teaching materials. Video conferencing provides a means to get both students and tutors to a central location, all be it virtually. Below are some of the benefits (Sami, 2008; Roberts, 2009; Polycom inc., 2010; Greenberg, 2004).

#### 3.2.1. VC and Distance Education In Classroom

Increasing numbers of educators have used VC to improve learning and communication between their students and others within local and wider communities and this has the power to open the eyes of students to a whole new world of learning. The ability to participate in face-to-face audio and visual

contact engages students and allows them to gain a greater understanding of subject matter due to their immersion within the lesson. This can bring lessons to life, make demonstrations easier to digest and supplementing discussions with guest speakers. VC has mostly been implemented within the higher education sector.

Figure 2: Students Studying using Web Conferencing

### 3.2.2. Teaching Benefits

Educational video conferencing provides teachers with more flexibility as they are able to convey ideas and subject matter without the boundaries of distance. The daily commute that some teachers typically make to reach their place of employment is eliminated when their options for reaching students are expanded. For example, one lecture could teach to all forth year university students in four different school buildings across campus simultaneously. Time and money can be saved along with the same subject matter not having to be taught to each class independently. Evening lessons may be provided as teachers could provide lessons via VC from home.

### 3.2.3. Real-World Education VC Benefits Enabling Better Course Delivery

- Allows collaboration with other schools and students worldwide
- Organisation of projects based around overseas schools and their communities
- Low Cost Single Site-to-Site Setup, easily call other schools via dial codes
- Utilises one originating teacher and a facilitating teacher at each connected site
- Small and Large Scale Solutions to suit primary, secondary or higher education
- Requires that students and the facilitating teacher be active participants in the learning experience
- Face-to-Face communication allows students better appreciation of other cultures, languages & dialects

- Provides lessons (such as specific foreign languages) which would not normally be catered for due to staffing requirements or facilities
- Allow teachers to attend meetings without the need for travel & spend more time lesson planning etc.

## 4.0. CONCLUSION

Video conferencing could lead the way for a dual approach, giving students more responsibility for their learning, working in groups, and doing educational tasks; all of which would benefit conventional teaching, but video conferencing provides an opportunity to implement them. It does not replace the use of print or other methods used in the conceptualization process. It can be used to encourage construction and its true use lies in encouraging dialogue and increasing the scope for dialogue. With the advancement and ease of availability of high speed and cheap internet connections, it is expected that video conferencing will increasingly become popular thus, leading to more interest and use of distance learning. In this paper, an introduction to video conferencing and its application in distance learning was presented as an effective way of delivering subject matter in classrooms.

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