Distance education and new convergent technologies: video conferencing

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Summary: A description of the role of information technology, in particular video conferences, in helping scattered healthcare students in a rural area. The advantages and disadvantages of video conferencing are given.

RATIO (Rural Area Training and Information Opportunities) is a part European funded project aimed at the economic regeneration of the South West of England. Focused on Cornwall, Devon and West Somerset, RATIO will establish 40 innovation centres throughout the region, giving individuals and small businesses the opportunities to train for new qualifications or conduct business using the very latest information and communication technologies. Each centre will be equipped with computers, digital satellite television and data reception, video conferencing and Internet connectivity. Individuals and small groups will be able to gain access to training courses delivered from a distance, provided by further and higher education institutes from inside and outside the region.

Alongside these developments, the Institute of Health Studies (IHS) at the University of Plymouth is planning to create its own network of innovation centres across the region. The rationale is similar to that of RATIO. Previous articles by the author have described the logistical problems of delivering training to health professionals distributed across a large rural setting. Student nurses working on clinical placement within locations such as community hospitals are often disadvantaged due to lack of access to resources at the Institute's main teaching sites. Once the new network infrastructure is in place, students will be able to access electronically mediated course material and tutorial support, without the problems of having to travel substantial distances. Similarly, trained staff undertaking post-basic training or professional updates will be able to enjoy access to course material and tutor support without having to leave their place of work. The cost benefits of this mode of training delivery are obvious, and as Stevens (1994) has argued, the advent of telematics is set to revolutionise the way professionals distributed in remote rural areas work and learn.
Telematics

The term Telematics describes the convergence of a number of technologies, and primarily it is concerned with the merging together of computers and communications. This technological convergence has come about largely due to the increasing miniaturisation of electronic components together with a commonality of functional attributes. For example, web pages and video conferencing both rely heavily on communications technologies, video cards and computers to function. The two technologies, although evolved separately and with different functional attributes, now continue to develop on a common pathway, using identical end-user equipment.

Layers of technology

Although convergent technologies follow similar routeways, they tend to be deployed in multiple layers or levels. Using the RATIO / IHS model as an example, four levels exist. At the foundation level, stand-alone computers are used to perform a variety of tasks, including access to local information such as CD-ROM or intranet material. At the next level, computers are networked to provide access to remote databases, internet connectivity and elementary conferencing using electronic mail, web based conferencing and software such as First Class which enables both synchronous and asynchronous interaction between users. At a higher level, users can enjoy full interaction at a distance by the use of multi-sensory communications, for example videoconferencing or satellite TV conferencing. At the highest level, full interaction is achieved, along with other features such as high speed transmission of text, graphics and sound. These can be referred to as hybrid systems (figure 1) due to their mixed modes of application. The multiple layers of technology currently being employed by RATIO and soon to be introduced at IHS out-centres, include: digital television, satellite TV and data transmission, world wide web pages and internet development, and video conferencing. The latter is the subject of this article.

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<td>4</td>
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<td>Satellite TV and data transmission with video conferencing</td>
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Figure 1. Increasing levels of complexity and convergence

Video conferencing

To achieve effective delivery of training courses to students living in remote rural areas, training providers should consider several key factors. Firstly, they must provide high quality, informative and stimulating course material. Secondly, due to lack of physical staff presence, the material should be highly interactive and dynamic in nature. Lastly tutorial staff must offer students regular, high quality learning support. Tutorial support can be achieved through a number of methods including conventional telephone and by synchronous or asynchronous conferencing. Arguably the most effective method of tutorial provision within open distance learning (ODL) is video conferencing.

There are two video conferencing configurations available:
• Analogue video conferencing employs conventional telephone lines and uses a modem to interface the computer to the network.
• Digital video conferencing uses ISDN2, and is of a higher quality than analogue systems, providing higher definition pictures and faster data transmission rates.

Both systems can operate using conventional conductive materials to transmit and receive. This normally means, copper wire' systems, used by the nation's telecommunications infrastructure. Increasingly however, major providers such as British Telecom and Mercury have committed to installing photonics based or fibre optic cable technology. This technology has proved to be faster in terms of speed of data transmission, and offers greater bandwidth available for data traffic. This means that computer data, text and graphics, sound, video and fax can all travel along the same digital highway simultaneously.

The standard desk top video conference system resides in a stand-alone p.c., and consists of a camera, p.c. card, application software and telecommunications links. Analogue video conferencing configurations also require a modem and conventional exchange line connection.

Benefits for students

Training providers wishing to use video conference technology to provide learning support for ODL often work on the basis of providing their students with daily time slots in which tutors will be available on the network. Tutors remain at or near the video link workstation during these prearranged times, armed with course material and related software with which to answer student queries. Students who experience difficulty at any point in the course are able to dial up their tutor with a few mouse clicks, and are in visual contact within half a minute of initiating the call.

Students are then able to gain access to:

• Learning support
• 'Trouble shooting’ help and expert advice
• Direct instruction
• Assessment of work

Teachers using video conferencing can offer students information on the selection of appropriate courses, enrolment guidance, access to membership of professional organisations, careers advice, and other study related topics.

Advantages of video conferencing

There are many advantages of video conferencing over conventional phone tutorials:

• Tutors can more easily detect non-verbal cues, such as lack of understanding, confusion or anxiety, which may not be as forthcoming using audio information alone.
• Tutors can access other useful visual information, for example, a student who is having difficulties using a printer. The camera on the student's p.c. can be angled down and the tutor can perform a visual check on the equipment, and perhaps offer a solution.
• Students can give tutors access to their software applications, the tutor’ taking control of the screen’, to facilitate synchronous interaction within a spreadsheet, database, or word processor. This is known as applications sharing.
• Tutors and students can send large amounts of data to each other at high speed, enabling assessment and feedback at a distance to take place quickly and effectively.
• Whiteboard facilities enable tutors to create remote drawings or diagrams on the student screen to demonstrate pictorial concepts.
• Students can enjoy greater learning autonomy as they become the initiators of the contact between themselves and their tutor.5

Disadvantages with video conferencing

There are of course, also drawbacks to the use of video conferencing in learning support:

• Costs may be prohibitive to some potential users, due to extra charges for ISDN2 use, and protracted on-line tutorial time. ISDN2 uses two telephone lines, and therefore incurs twice the cost. Video conference kits, although constantly reducing in price as the user base expands, are still relatively expensive, currently retailing at between £1300 and £2500.
• A small amount of time lag occurs during conferencing, which can be disconcerting and even confusing, if not handled effectively.
• Some students experience anxiety when using the system, particularly when using video conferencing to dial up an unknown tutor. As Hilton has suggested, a period of adjustment and familiarisation may be necessary.4
• Lack of familiarity with the capabilities and functionality of the technology or perception of threat, can lead students at remote centres to ask the student next to them for the answer, instead of remote tutors. This may be a desirable occurrence, with students reinforcing their own learning by ‘teaching’ others. Conversely, it can also be a disadvantage as some students can be side-tracked from their own studies to help others.

Applications

Examples of the use of telematics in ODL abound 6-1 and the variations in application of the technologies appear to be limited only by the imaginations of those using them. Two examples below indicate some of the scope and promise of Telematics:

Example 1

A private training company decides to deliver a Windows 95 based software course to the entire network. It creates paper based open learning material which is presented in a ring bound folder. Several folders are stored on shelves in each RATIO centre. Students may come into the centre and enrol at any time, where they can use the folders and a p.c. loaded with the Windows 95 software. A facilitator is on hand at the centre to welcome students and show them how to switch on the computer and
initiate the software. The training company announces that for two hours each day, tutors will be available at the end of a video conference link for consultation, trouble shooting, tutorial advice, and assessment of student learning.

Example 2

A nurse teacher wishes to deliver a course to seven remote sites using video conferencing. The teacher arranges for her groups to gather at a prearranged time at the seven participating centres. She also books a video conferencing bridge, hired by the hour from British Telecom. Throughout the conference, the tutor is able to use the bridge to switch between sites in order to view her distributed audience as they perform group work or ask questions. At one point in the session, the tutor uses the whiteboard facilities to demonstrate an important concept in diagrammatic form, which the students can save to hard disk and print out for later reference.

Evaluation and conclusion

Many students who use video links to their tutors eulogise over the benefits of the system. Those using the centres are free from the time constraints and stress associated with long distance travel. Although there are limitations to ODL technologies, these are far outweighed by the flexibility of delivery and diversity of applications on offer. With good quality learning materials and tutorial support, course providers have the opportunity to exploit and further develop new emerging technologies, for the ultimate benefit of the student.

Some students have child care commitments or suffer physical disabilities, and therefore undertake home based training. Indeed, some mature students experience a great deal of stress due to family responsibilities such as organising child care during study, 11 and ODL can offer some of the answers. From the author's own experience, some home based students have reported that the social contact provided by videoconferencing not only provide high quality learning support, but is highly welcome and even therapeutic. Some tutors, conversely, have complained that their students spend far too much time relating details of their social life and not enough time concentrating on their work!

In conclusion, the author remembers visiting a technology exhibition in Holland, during a school trip in 1971. One of the exhibitions on display was an early version of a 'video phone'. The exhibit consisted of two rooms, connected to each other by a closed circuit television link. Participants were able to converse with each other and see each other at the same time. At the time, this was a novel experience for everyone who tested the system, and the author was convinced that a glimpse into the future had been enjoyed. Twenty-five years on, we watch science fiction programmes such as Star Trek, in which people can video conference across vast distances with no degradation of quality, in full motion colour vision. Such programmes have served to embed the concept of the videophone into our collective consciousness. Although this capability may still be a distance off, and the technology is not yet available for domestic consumption, it may not be too long before we have to be careful what we are wearing when we answer our telephones!

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**Glossary of terms**

Asynchronous Conferencing Electronically mediated interaction achieved by the use of mailboxes or bulletin board systems, where participants are not simultaneously at their work stations.

ODL Abb. Open Distance Learning. Flexible learning methods delivered at a distance from the parent organisation. Photonics Technology enabling transmission of data using light based technology, e.g. fibre optical cable.

RATIO Abb. Rural Area Training and Information Opportunities. European funded project aimed at economic regeneration of the Objective 5b rural areas of S.W England by provision of training and information.

Synchronous Conferencing Electronically mediated interaction between users when all participants are at their workstations simultaneously.

Internet International network of computer based information. The internet is accessible throughout many countries across the globe, and is essentially public domain. However, no regulatory bodies exist to police content and information is therefore unvetted.

Intranet Network of information set up within an organisation for the benefit of internal users.

ISDN2 Abb. Integrated Service Digital Network 2.
FE Abb.  Further Education.


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