

Contents

Summary

Research evidence about video conferencing can be found across the educational sectors and includes the following key benefits

- allows interactive access to experts
- enables collaboration by teachers and learners with peers
- enriches the experience of distance education by reducing feelings of isolation and encouraging interaction
- raises student motivation.

How teachers can maximise the impact of video conferencing

- establish pedagogical outcomes
- exploit the motivational effects on students
- seek partnerships with other schools.

What the research says about video conferencing in teaching and learning

This report is based on an analysis of research into the use made of video conferencing and its impact on teaching and learning. It summarises the key findings and suggests resources for further reading.

What is video conferencing?

Video conferencing allows people in different locations to see and talk to each other. It may also support the electronic exchange of files, sharing of computer applications and co-working. Distinctions are becoming blurred by technological developments, but three types of video conferencing system exist:

- desktop units
- roll-abouts
- room systems.

Desktop video conferencing involves each individual using a computer, with one on-screen window for each site. A roll-about system stores all the equipment required in a wheeled cabinet. A room system includes the same equipment, but housed in a permanent installation.

There are three ways of making the connections required for a session to take place:

- over the internet, using either an analogue or digital telephone line
- across a network within an institution
- using dedicated cables, radio waves or microwaves.

The quality of sound and vision during a video conference will deteriorate if the speed of the connection becomes too slow. Internet connections involve varying bandwidths and consequently are unreliable for teaching purposes. Long-distance video conferencing usually uses an integrated services digital network (ISDN) connection over digital phone lines.

To judge whether video conferencing has the potential to enhance teaching and learning, it is necessary to examine the available research evidence.

Key research evidence about video conferencing in teaching and learning

On the basis of Becta's analysis, video conferencing can have positive effects in the areas outlined below (there are references for further reading supplied alongside most of the findings).

General benefits

- It supports distance learning by linking up tutors and students, and also offers a means of reassurance and social contact for students (Hearnshaw 1997).
- Subject teaching can be enriched by input from experts or practitioners, as in mathematics and the Motivate project (Gage *et al.* 2002).
- Students can develop communication and social skills by collaborating with their peers in other institutions.
- Students who normally stay in the background participate more; they are motivated to take part in video conferencing.

Benefits for students

- Collaboration with schools where the pupils come from different cultures leads to the development of multicultural relationships and understanding, while enriching traditional activities (Cifuentes & Murphy 2000).
- It provides enhanced opportunities for language students to interact with native speakers (Kinginger 1998; Wright & Whitehead 1998).
- It offers an alternative outlet for expression by those normally hampered by poor literacy skills (Eales *et al.* 1999).

Benefits for teachers

- Academic aspirations are raised amongst those students communicating with more assured students, who become positive role models (Cifuentes & Murphy 2000).
- Strong relationships are fostered with peers when working with other schools on collaborative projects (Cifuentes & Murphy 2000).
- The audience for courses can be increased by teaching face to face with one group and simultaneously transmitting to a second centre elsewhere (Gilbert 1999; Carville & Mitchell 2000).
- Clips from sessions may be used as material for evaluating and modifying anti-social behaviour by students (Coverdale-Jones 1999).

Benefits in initial teacher training

- Students can observe teaching practice without being present in the classroom (Kinnear *et al.* 2002)
- Students may use video clips of their classroom experiences to share ideas and teaching resources (Sharpe 2000)
- Students on teaching practice feel 'a safety in distance' when using video conferencing to communicate with their supervisors, resulting in a more frank interaction (Sharpe 2000).

Benefits for students with special educational needs

- Support can be provided to children with complex physical and communication difficulties without professionals or families spending lots of time travelling (Donegan 2002).
- Students may overcome feelings of isolation and develop social skills by associating with peers who have similar needs (Thorpe 1998).
- The video conferencing context acts as a focus for some students, helping them to organise the way they think and act (Thorpe 1998).
- Students discover that if they shout out or talk over one another they cannot be understood, and alter their behaviour to take turns to talk (Thorpe 1998).

Factors for effective use

- Reliable equipment needs to be available, which provides good sound quality and is supported by a fast connection.
- Rules governing interaction should be established before a session starts.
- An appropriate teaching style is needed to suit the medium; teachers may need to adjust their teaching style, providing explicit opportunities for discussion, and addressing all audiences.

About Becta's 'What the Research Says…' series

This series of briefing papers is designed in particular for teachers, ICT co-ordinators and school managers, to provide an initial idea of the available research evidence for the use of information and communications technology (ICT) in schools and colleges. We welcome feedback and suggestions for further titles in the series (contact details can be found at the end of this briefing).

Video conferencing in practice

Sidmouth Community College and Baylis Court Secondary School collaborated on Key Stage 3 geography, to develop an understanding of two very different environments. Students exchanged annotated pictures and maps of their local area. The first session was a question and answer session, leading into more spontaneous and informal discussion in the second. Before the third session students devised and completed a questionnaire on local leisure facilities, taking turns in the subsequent sessions to present findings and ask questions.

Focusing on the local environment proved to be a good way of stimulating interest in geography, and allowed for the development of basic skills centred on the use of maps and photographs. Video conferencing aroused the curiosity of students, who then learned a good deal about each other's home area (Arnold *et al.* 2002).

Explanation of findings

As with ICT more generally, direct causal effects are not always easily identifiable. Drawing clear conclusions on the effects of ICT from the range of research evidence and reports available can be problematic. There are a number of factors that limit effective comparisons, such as differences in sample sizes, methodologies and effects, and the extent and purpose of ICT use.

Attitudes of students

Many studies have found that students react positively to video conferencing, finding it enjoyable and showing considerable interest in the medium (Wright & Whitehead 1998; Eales *et al.* 1999). There is, however, a significant difference between students showing an active interest in wanting to communicate and those who are attracted by the novelty, but are essentially only passively interested in the process.

Students who are normally hampered in school activities by poor literacy skills have been reported to be the most active and competent participants in video conferencing, eager to communicate by talking instead of writing. The motivation developed during video conferencing seems to transfer to areas where literacy skills are more central (Eales *et al.* 1999).

However, some students have been found to react badly to the technology (Tyler 1999; Coverdale-Jones 1999). It should not be assumed that all students will react well to a proposed video conference, especially if it contains the added strain of being conducted across language barriers, and teachers need to evaluate in advance how their students might respond.

Interactivity

Interactivity during a video conference can be problematic, and facilitating measures are required. Clearly, technical mishaps such as a connection failing will work against the success of a session. Other such hitches include a time delay between picture and sound, a shortage of microphones for would-be contributors, and sound which is dominated by background noises. There are also non-technical considerations which arise from the peculiarity of the scenario – all participants may not be able to see each other, and may, therefore, miss visual clues indicating that somebody wishes to speak.

Sessions which depend on student contributions will prove challenging if the teacher does not enable participation by all; in fact it has been suggested that video conferencing affects styles of teaching more than learning (Tyler 1999). Rules for participation are needed, and teachers should build in to their lesson clear opportunities for interaction. They should receive training in overcoming the challenges of the medium.

Teaching by video conference

Video conferencing is sometimes used to extend access to existing courses. Two classes may be taught simultaneously, of which one is present with the teacher, the other connected by video conference. In this situation the question of equity arises: for the remote students to get a good deal their experience should be of the same quality as the other. Given limitations on interaction, whether it be discussion, game playing or simulations, there are concerns that all students may not benefit equally.

One way to find out whether video conferencing is successful is by asking the students concerned. A US study suggested that students completing a course by video conference were satisfied with the mode of study; it also highlighted the importance of the teacher in this success. A key factor was that the teacher used presentation skills to create opportunities for interaction. The physical separation between the teacher and students was compensated for by developing appropriate resources to use the medium effectively (Furst-Bowe 1997).

Experience at De Montfort University raised questions about the quality of interaction that may take place. It suggested that video conferencing is only adequate for activities where little interaction is required, such as a lecture. Among the negative aspects reported were the domination of proceedings by less inhibited participants, points scoring between groups and a lack of interaction (Tyler 1999).

Key questions for schools

- What educational benefits are you looking for?
- How do you want to make use of video conferencing?
- Does the school have sufficient bandwidth?
- Are there other schools which would be capable of joining sessions?

About the research literature

This is an area where a substantial number of studies exist, the bulk of the literature found having been published between 1997 and 2000. The potential of video conferencing to support language teaching and distance learning is immediately apparent, and this is reflected in a number of published studies. The higher education sector has seen the opportunity to reach more students without increasing the number of lecturers, and several studies investigate how appropriate this is. There are concerns about anxiety levels engendered among students, but there are also reports of positive behavioural changes, and an interesting angle is presented by the use of recordings to evaluate sessions. Many schools and local education authorities are implementing video conferencing and producing small studies to illustrate its use, but there is a shortage of larger-scale studies into the educational impact.

Current research

A two-year Department for Education and Skills (DfES)-funded evaluation of the use of video conferencing in schools began in 2003. Some 27 schools are involved, which have different levels of experience with the technology, ranging from a lot of experience to very little.

The research aims to explore the impact of video conferencing on students' attainment in specific subject areas, giving a picture of teachers' and students' real experiences. Managed by Becta, this project will use both qualitative data from teachers and students, and quantitative data relating to attainment from national tests.

Key areas for further research

- Feelings of anxiety and episodes of antagonistic group behaviour towards others could undermine the benefits that may be gained. A valuable area of further research, therefore, would be to investigate how these may be reduced. One possible method might be to make initial contact with a remote school group by email, encouraging students to form some personal links before undertaking a video conference.
- Interactivity can be problematic, and it would be helpful to know the effect of desktop-based, as opposed to room-based, video conferencing. It may be that individuals or small groups based around computers are better equipped and more prepared to participate in interactive sessions.
- Many accounts exist of how schools are adopting video conferencing; larger-scale research into the impacts on teaching and learning would add to the understanding of this technology's potential.

Bibliography and further reading

The research referred to in this briefing represents a selection from the rapidly growing field of ICT research related to ICT, and should not be regarded as a definitive list of the 'most important' research in this area.

ARNOLD, T., CAYLEY, S. & GRIFFITH, M. (2002), 'Video conferencing in the classroom. Communications technology across the curriculum', Becta, http://www.becta.org.uk/technology/vc/vc_classroom/index.html.

CARVILLE, S. & MITCHELL, D.R. (2001), '"It's a Bit Like Star Trek": the effectiveness of video conferencing', *Innovations in Education and Training International,* **37** (1), pp. 42–49.

CIFUENTES, L. & MURPHY, K.L. (2000), 'Promoting multicultural understanding and positive self-concept through a distance learning community: cultural connections', *Educational Technology Research & Development,* **48** (1), pp. 69–83.

COVERDALE-JONES, T. (1999), 'The communicative effects of videoconferencing as a language learning environment: a reduced social and linguistic medium', paper given at the conference of the British Association of Lecturers in English for Academic Purposes, Leeds.

DONEGAN, M. (2002), 'TELENET project, summary report', ACE Centre, http://www.ace-centre.org.uk/html/research/telenet/teleport/int.html.

EALES, R.T.J., NEALE, D.C. & CARROLL, J.M. (1999), 'Desktop videoconferencing as a basis for computer supported collaborative learning in K-12 classrooms', paper given at the Educational Multimedia, Hypermedia and Telecommunications Conference, Seattle, WA.

FURST-BOWE, J.A. (1997), 'Comparison of student reactions in traditional and videoconferencing courses in training and development', *International Journal of Instructional Media,* **24** (3), pp. 197–206.

GAGE, J., NICKSON, M. & BEARDON, T. (2002), 'Can videoconferencing contribute to teaching and learning? The experience of the Motivate project', paper given at the Annual Conference of the British Educational Research Association, http://www.leeds.ac.uk/educol/documents/00002264.htm.

GILBERT, J. (1999), 'But where is the teacher? Cost-effective distance learning made possible', *Learning and Leading with Technology,* **27** (2) pp. 42–44.

HEARNSHAW, D. (1997), 'Capitalising on the strengths and availability of desktop videoconferencing', Active Learning, pp. 52–58, http://www.ilt.ac.uk/public/cti/ActiveLearning/al7pdf/hearnshaw.pdf.

KINGINGER, C. (1998), 'Videoconferencing as access to spoken French', *Modern Language Journal,* **82** (4), pp. 502–513.

KINNEAR, H., MCWILLIAMS, S. & CAUL, L. (2002), 'The use of interactive video in teaching teachers: an evaluation of a link with a primary school', *British Journal of Educational Technology* **33** (1), pp. 17–26.

SHARPE, L. (2000), 'Multipoint desktop videoconferencing as a collaborative learning tool for teacher preparation', *Educational Technology,* **40** (5), pp. 61–63.

THORPE, R. (1998), 'The use of personal video conferencing with special needs pupils from three schools serving rural areas: a case of successful adoption of new technology', *Journal of Information Technology for Teacher Education,* **7** (3), pp. 395–412.

TYLER, C. (1999), 'Beyond the content — video-conferencing', *Speaking English,* **32** (2), pp. 15–27.

WRIGHT, N. & WHITEHEAD, M. (1998), 'Video-conferencing and GCSE oral practice', *Language Learning Journal,* **18** (Dec), pp. 47–49.

Technical information on video conferencing is available on the ICT Advice site: http://www.ictadvice.org.uk

This briefing and others in the 'What the Research Says' series can be found on the Becta Research website at: http://www.becta.org.uk/research/

Becta's ICT Research Network

If you're interested in research on the use of ICT in education, you can join Becta's ICT Research Network.

The ICT Research Network seeks to encourage the exchange of information in order to inform the national agenda and professional practice.

Membership is free and is open to:

- teachers
- ICT co-ordinators
- ICT advisers
- school managers
- researchers
- policy makers
- research sponsors
- industry.

The Network provides them with an opportunity to:

- exchange information on current research
- develop partnerships
- discuss priorities for further investigation
- focus research on issues of importance to practitioners and policy-makers.

They can do this via:

- an email discussion list
- publications
- conferences and events.

More information on Becta's ICT Research Network can be found at:

http://www.becta.org.uk/research/ictrn/

Alternatively, send an email to: ictrn@becta.org.uk or write to: Michael Harris, ICT Research Network, Becta, Millburn Hill Road, Science Park, Coventry CV4 7JJ.

www.becta.org.uk/research

About Becta

Becta is the Government's lead agency for information and communications technology (ICT) in education and supports UK Government, national organisations, schools and colleges in the use and development of ICT in education to raise standards, widen access, improve skills and encourage effective management.

About the ICT in Schools Programme

The ICT in Schools Programme is the Government's key initiative to stimulate and support the use of information and communications technology (ICT) to improve standards and to encourage new ways of teaching and learning. The enormous potential of ICT means that for the first time it is becoming possible for each child to be educated in a way and at a pace which suits them, recognising that each is different, with different abilities, interests and needs. The challenge over the next four years will be to successfully embed ICT in every facet of teaching and learning where it can directly impact on raising standards of attainment. A vision for the future of ICT in schools is provided in the paper *Transforming the way we learn*, available at: **http://www.dfes.gov.uk/ictfutures**

Becta
ICT Research

British Educational Communications and Technology Agency (Becta)

Millburn Hill Road, Science Park, Coventry CV4 7JJ
Tel: 024 7641 6994
Fax: 024 7641 1418

Research email: research@becta.org.uk
Becta main email: becta@becta.org.uk
URL: http://www.becta.org.uk

06/2003-04/001/a/WK/1K