

Issues in the Use of Video Conferencing for Teaching

- Summary -

by
Seamus Fox
Oscail - National Distance Education Centre
Dublin City University

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SUMMARY

This is a summary of the issues that have emerged in the research literature on the use of video conferencing for teaching purposes. The issues are reviewed under the following headings:

- ◆ Technical
- ◆ Preparation
- ◆ Pedagogical
- ◆ Outcomes
- ◆ Cost effectiveness
- ◆ Conclusions

Technical

- ◆ There is a wide variety in the technical configurations of video conferencing suites used for teaching¹.
- ◆ Atypical configuration would be as follows: (1) Two monitors - one for the incoming picture and the other (sometimes smaller) to review the outgoing image; (2) Two pan-tilt-zoom video cameras and a document camera; (3) A CODEC for Compressing and Decompressing the image; (4) An adapter which interfaces with the telecommunications channel (the latter is increasingly ISDN); (5) A sound system comprising loudspeakers, tabletop microphones and (sometimes) wireless microphones and (6) A control panel which allows for control of camera, making video conferencing calls, etc².
- ◆ The main technical problem reported is the quality of sound³. However, the more recent studies do not emphasise this problem to the same degree.
- ◆ The other technical problem reported is the tutor concentrating on the equipment (particularly the control panel) to the detriment of the teaching⁴.

Preparation

- ◆ There would seem to be minimal requirements for tutor and student training in the use of video conferencing⁵ with tutors reporting that the equipment was less difficult to use than originally feared⁶. However, one study reported that tutors received considerable training⁷.
- ◆ A recommendation from a number of studies is that tutors and students should meet face-to-face at least once before lectures/tutorials via video conferencing begin⁸.

- ◆ A general finding is that extra time is required preparing audio-visual material for a video conferencing lecture compared to the conventional face-to-face lecture⁹.
- ◆ In addition, extra administrative backup is required for activities such as organising the sessions and sending out material in advance¹⁰.

Pedagogical

- ◆ There would seem to be a number of ways of using video conferencing for teaching purposes. These include:
 - One local and one remote and tutor with local group¹¹
 - Remote group only and tutor at originating site usually in home institution¹²
 - Local group and remote group with tutor in different room than local group¹³
 - More than two groups (which requires use of multipoint bridge)¹⁴. However, it should be noted that most studies which report applications of video conferencing in teaching encompass only one or two groups.

- ◆ The wide variety in the subject areas being taught via videoconferencing. These include:
 - Business and applied science¹⁵
 - Language teaching (with foreign tutors)¹⁶
 - Bookkeeping and safety¹⁷
 - Pharmacy, speech therapy and nursing¹⁸

Video conferencing is particularly suited for teaching subjects which exploit its visual facility. For example, demonstrations (medical operations, scientific experiments, etc.) and the training of skills.

- ◆ Video conferencing has been used for teaching at different levels including undergraduate¹⁹, postgraduate²⁰, professional development²¹ and training²². One researcher has concluded that most applications of video conferencing in teaching are in training and postgraduate programmes²³.
- ◆ A number of studies have reported that the contributions of students who are in the remote site (i.e. the site not having the tutor) are less than in conventional face-to-face teaching²⁴. It is therefore recommended that instructors using video conferencing should "learn to encourage student interaction from remote sites with deliberate techniques"²⁵.
- ◆ One researcher puts forward the following possible reasons for the lack of inactivity from students at the remote sites:
 - Students unaccustomed to taking an active approach to learning
 - Students inhibited by remoteness of tutor
 - Students intimidated by equipment²⁶
- ◆ Reinforcing the last point, another researcher says that "The current technology makes it an uncomfortable way to negotiate a shared conception"²⁷.
- ◆ Another factor affecting the level of interactivity is group size. After reviewing the extensive use of video conferencing for teaching in Australia, Latchem and his fellow researchers concluded that videoconferencing was a useful tool for linking small to medium groups consisting of 10 to 30 students²⁸. In a similar vein, another researcher concluded that "small group tutorials should be the model for two-way video-conferencing"²⁹.
- ◆ The appropriate pedagogical techniques for use with video conferencing are a matter of some debate. There is general agreement that video conferencing lends itself to the delivery of lectures and there is less variety in teaching strategies than there is in face-to-face teaching³⁰.
- ◆ The relative lack of interactivity, the appropriateness of video conferencing for small group teaching and the restriction on the pedagogical techniques has led one research to conclude that "As a way of transmitting a didactic lecture, a video would be cheaper and easier. As a way of allowing communication with the tutor, a series of small group audio-conferences or audio-graphic links may be more effective"³¹. As against this, other researchers have noted

that the visual presence of the tutor and other classmates (unlike audio-conferences or audio-graphic links) may create a comfortable environment for learning³².

- ◆ Some reviewers of the use of video conferencing for teaching have commented on the lack of research on the pedagogical issues³³.

Teaching Outcomes

- ◆ Tutors have reported that while there is a productivity gain in not having to spend time and energy in travelling, a lot of this gain was swallowed up by the extra preparation time administration required for video conferencing³⁴.
- ◆ Tutors also report that video conferencing requires much greater levels concentration than face-to-face teaching³⁵.
- ◆ Student report that while tutors seem to be better prepared for the video conferencing tutorials, they miss the informal contact with the tutor, that spontaneity decreases, that video conferencing requires a greater level of concentration and that not as much material is covered in the lecture/tutorial than would be in a similar face-to-face session of equal duration³⁶.
- ◆ Student attitudes would seem to be greatly influenced by the alternative opportunities on offer³⁷. In other words, if students would otherwise have to travel long distances or have less choice of subject, then their attitude towards video conferencing is more positive.
- ◆ The studies reviewed do not report any significant difference in the final assessments between students at remote and local sites³⁸. In one study, students taught via videoconferencing (both local and remote) were compared to classmates taught in a conventional face-to-face class and again no significant differences were found³⁹.

Cost Effectiveness

- ◆ One empirical study compared the cost of delivering training via video conferencing and delivering the same training by conventional means. The conclusion was (unsurprisingly!) that training via video conferencing was less costly than having a group of trainees travel to a trainer but more costly than having a trainer travel to a group of students⁴⁰.
- ◆ As the cost of using any media for teaching is highly dependent on the context, two studies adopted a scenario-based approach when trying to evaluate the cost-effectiveness of using video conferencing for teaching as compared to conventional face-to-face teaching. The adoption of a scenario-based approach allowed the researchers to vary key variables to test which ones had the greatest effect on cost effectiveness.
- ◆ One of these studies looked at the cost of delivering tutorials from the main site to one remote site via video conferencing and compared this with the sending the tutor to the remote site. The study concluded that the key variables were the distance between sites and the number of tutorial per year delivered via videoconferencing. In other words, as the distance between the sites and the number of hours per year increases then the videoconferencing option becomes more cost-effective relative to the conventional option⁴¹.
- ◆ The second study derived the cost of using videoconferencing systems integrated into a system for the telematic delivery of a range of courses to a number of outcentres and compared this with the cost of provided the same courses in a conventional way. In this scenario, the video conferencing systems were seen as linking the main site with a number of outcentres and used both for the delivery of lectures via multipoint bridges and the delivery of tutorials by point-to-point link-ups. The study concluded that the key variable was the number of student courses delivered⁴². In other words, as the number of courses increases (given reasonable levels of enrolments per course) then the video conferencing option becomes more cost-effective relative to the conventional option.

Conclusions

- ◆ There is a requirement for more research on the appropriate pedagogical uses of video conferencing.
- ◆ Small group point-to-point tutorials would seem to be the most appropriate use of videoconferencing for teaching.
- ◆ Given the cost implications of the previous conclusion, video conferencing would seem currently to have a highly constrained role in the media mix available to educators.

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Endnotes

¹ Mason gives a good overview of the type of video conferencing equipment needed for teaching (Mason 1994, pg 74).

² See, for example, Carpio and Ramos (1994). It should be noted that while the configuration given is now quite standard, for the older system the range of configuration was quite wide. For example, see the detailed description of the technical configuration given by Simpson and his colleagues (Simpson et al 1991, pgs 214-216).

³ For example, Simpson et al 1991, pg 221; Dallat et al 1992, pgs 18-19; Pugh et al 1992, pg 60.

⁴ For example, Treagust et al 1993, pg 324.

⁵ For example, Simpson et al 1991.

⁶ For example, Dallat et al 1992.

⁷ Mason 1994, pg 110.

⁸ Klingsheim and Kristiansen 1993, pg 33 and Abbott et al 1993, pg 35.

⁹ Maloy and Perry 1991, pg 44; Latchem et al 1993, pg 554 and Mason 1994, pg 81.

¹⁰ For example, Enkvist 1992, pg 273.

¹¹ For example, Treagust et al 1993.

¹² For example, Abbot et al 1993.

¹³ For example, Citcom 1994.

¹⁴ For example, Latchem et al 1993.

¹⁵ Treagust et al 1993, pg 318.

¹⁶ Enkvist 1992, pg 270.

¹⁷ Simpson et al 1991.

¹⁸ Burge and Roberts 1993, pg 63

¹⁹ Treagust et al 1993, pg 318.

²⁰ Dallat et al 1992, pg 16.

²¹ Maloy and Perry 1991, pg 44.

²² Simpson et al 1991, pg 44.

²³ Mason 1994, pg 78.

²⁴ For example, Dallat et al 1992, pg 19 and Laurillard 1993, pg 167.

²⁵ Maloy and Perry 1991, pg 43.

²⁶ Mason 1994, pg 82.

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- ²⁷ Laurillard 1993, pg 167.
- ²⁸ Latchem et al 1993, pg 554.
- ²⁹ Mason 1994, pg 81.
- ³⁰ Dallat et al 1992, pg 18.
- ³¹ Laurillard 1993, pg 167.
- ³² Mason 1994, pg 80 and Burge and Roberts 1993, pg 60. However, the latter do add that "Visual presence does not add much in strict cognitive terms."
- ³³ For example, Latchem et al 1994, pg 554 and Bates 1995, pg 101.
- ³⁴ Latchem et al 1993, pg 554.
- ³⁵ Mason 1994, pg 82.
- ³⁶ Treasgust et al 1993, pgs 332-324; Simpson et al 1991, pg 220 and Pugh et al 1992, pg 60.
- ³⁷ Treasgust et al 1993, pg 326 and Dallat et al 1992, pg 17.
- ³⁸ Maloy and Perry 1991, pg 43 and Treasgust et al 1993, pg 328.
- ³⁹ Treasgust et al 1991, pg 328
- ⁴⁰ Simpson et al 1991, pg 229.
- ⁴¹ Bacsich et al 1993, pg 25.
- ⁴² Curran et al 1995, pgs 31-36.