

Interacting at a distance: Staff and student perceptions of teaching and learning via video conferencing

John Schiller
The University of Newcastle
John Mitchell
J. G. Mitchell and Associates

Video conferencing is a new form of communications technology which allows students and lecturers to interact at a distance. Its use is currently being expanded within the university sector, particularly Distance Education Centres, and in Technical and Further Education Colleges. Using nine Colleges of TAFE in South Australia as case studies, this paper explores the nature of video conferencing, its major uses, and evolving, unique characteristics of teaching/learning methodologies for video conferencing. Staff and student perceptions of the appropriateness of video conferencing as an interactive medium are also presented.

The purpose of this paper is to explore staff and student perceptions of interacting at a distance via video conferencing as it is currently used by the South Australian Department of Technical and Further Education (SA DETAFE). Advantages and disadvantages of using video conferencing will be presented and an argument proposed for developing a teaching methodology which utilises the uniqueness of the medium.

What is video conferencing?

Video conferencing involves communicating using the television medium. The conference can be one-way video, two-way audio or two-way video and audio. In the form of one-way video, two-way audio, receive sites are equipped for audio transmission only, typically by telephone. In this case, the lecturer is seen and heard by those at the remote site, but cannot see those at the other sites. For two-way video and audio, all sites can send and receive both audio and video.

The conference can be point-to-point or multipoint, involving more than two sites. Transmission options include cable (both copper wire and optical fibre), satellite and microwave. The most popular form of video conferencing in Australia at the moment involves the transmission of compressed digital information. This compression is carried out by a computer called a codec. The compressed signal uses less space than the traditional analog signals, so there are cost savings which are offset by a reduction in quality of the picture. The standard amongst higher education institutions is 128 kilobits per second, the equivalent of two STD telephone lines.

The most common variation of video conferencing in the higher education sector involves live, two-way video and audio, transmitted as compressed digital signals, along fibre optic cables, utilising Australian and Overseas Telecommunication Commission's (formerly TELECOM) Integrated Services Digital Network (ISDN). In the last two years there has been rapid development of video conferencing, particularly at universities with Distance Education Centres (Atkinson, Latchem & Davy, 1991; Hansford & Baker, 1990; Youngblood, Mahoney & Tonkins, 1991) and in the Department of Technical and Further Education in South Australia (Mitchell, 1991a, 1991b).

Video conferencing, using compressed digital transmission, began in South Australia in February 1990 when the Clare and Barossa Valley campuses of Light College and the Adelaide College were linked by live, interactive television. Gawler campus was added to the other three sites in July 1990. In July 1991, the new DETAFE Channel Network was launched, linking Adelaide and Regency in the metropolitan area and Whyalla, Port August and Port Pirie. The Light College campuses of Clare, Barossa Valley and Gawler and the Port Lincoln campus of Eyre Peninsula College, were added to the Network to make up the nine-site Network in February 1992.

Why use video conferencing?

The main uses of video conferencing at the nine sites of SA DETAFE were to:

- combine smaller groups of students across several sites to make one viable class,
- provide lecturer expertise from another college when unavailable at the site where students wish to undertake the subject,
- reduce the need for travel between sites for teaching and administrative purposes.

Initially, the first four sites operated at a transmission speed of 2 megabits per second which was reduced to 384 kilobits in 1991. Compression of signals results in some deterioration of picture image and sound compared to regular television broadcasting but the higher transmission speeds used in the first two years of operation meant that the visual and aural effects of the digital compression were less obvious. The lowering of the transmission speed to 128 kilobits per second so that each site could utilise the much cheaper system, using an AOTC Microlink, took place in early 1992. This lower transmission speed resulted in more noticeable deterioration in picture and sound quality in that a pronounced lag in the transmission of image and voice occurred. Although the site at Pt Lincoln began operation at this slower speed in 1992, it has been a significant reduction in transmission speed, particularly for the sites at Light College. This posed the question, "Did the change in transmission speed necessitate changes in lecturer and student involvement in video conferencing?"

Features of video conferencing

From the outset of the pilot project, the philosophy of the advocates of video conferencing in SA DETAFE has remained constant. They saw video conferencing as a virtually 'invisible' technology which was 'user friendly' (Mitchell, 1991b, 1991b). This view was shared by those establishing the video conferencing network at the University of New England (Youngblood, Mahoney & Tonkins, 1991). They wanted the technology to be transparent to participants, both teacher and learner, so that the equivalent of face-to-face interaction was possible at a distance. Their vision was of an interactive system which did not require technicians to operate it and needed only minimal button pushing by the user. Through ingenious and innovative use of electronics during the pilot phase and through clever use of computer controlled touch screens for the lecturer under the current system, these visions have been achieved. The system is very 'user friendly', the sophisticated electronics are transparent to the user, and the entire system responds to the users at each site through a voice-activated switching system. By routing transmission through

Multiple Control Units at the two hubs of the Network, namely Adelaide and Whyalla, each site can be connected to every other site in the network. This results in the lecturer at one site, with or without a group of students in front of them, being able to see and hear the students at the other sites while those students can see and hear the lecturer.

Research questions

The research questions posed for this exploratory study were:

- what do SA DETAFE teachers perceive as the strengths and weaknesses of video conferencing?
- does video conferencing require changes in teaching methodology?

Methodology for gathering data

This exploratory study used a simplified, multisite, case study approach (Sowden & Keeves, 1990) in which the same data gathering techniques were used at each site. Due to constraints of time and resources, this study was not a comprehensive evaluation of TAFE CHANNEL but rather a 'snapshot' of its operation, as seen through the eyes of selected participants and from the perspective of an outsider who spent five days visiting the nine sites at which video conferencing was in operation in South Australia (Schiller, 1992).

Information was gathered through brief, semistructured interviews with key people at each site (see Table 1), brief observation of video conferencing in action, and through reading selected documents generated in South Australia regarding video conferencing.

Key individuals at each site were notified of the study purpose, terms of reference and action required, by the Manager of TAFE Channel. Selection and scheduling of people to be interviewed at each site was made, in most cases, by the Open Learning (OL) Manager at that site. Although staff members, including administrators and lecturers were the main interviewees, interviews with individual/pairs of students were also arranged at some sites. In addition, brief class discussions with students (mainly students undertaking traineeships) took place at Whyalla, Pt Pirie and Pt Lincoln.

104 staff and students of SA DETAFE were interviewed during the week May 1st - 7th 1992. Although there were several group sessions, with either staff or students, the majority of the interviews were with individuals. Several interviews were conducted over the phone and one interview used video conferencing. Handwritten notes were taken during interview sessions and audiotape recordings were made of about 20% of interviews.

Table 1: Sites and Personnel Interviewed

	College/Campus								
	AD	RE	BV	CL	GL	PP	PA	W	PL
Director	1	-	1	-	-	1	1	1	1
Executive	3	2	1	1	1	1	2	-	1
OL Manager	1	1	1	-	1	1	1	1	1
Lecturers	3	6	4	3	4	3	6	4	4
Students	-	-	-	4	4	6	-	12	12
TAFE Channel	2	1	-	-	-	-	-	-	-
TOTAL	10	10	7	8	10	12	10	18	19

Results

Issues and perceptions which were common to all nine sites at the time of this study (first week in May 1992) were as follows:

Use of video conferencing

- Use of video conferencing was increasing in terms of hours of usage overall and more demands were being placed on the system.
- Most students felt the video conferencing was fun, exciting, challenging and necessary in order for them to be able to be part of a class made possible through grouping sites via video conferencing, or to have access to a specialist lecturer not available in their college.
- Staff appreciated the reduction in travel time made possible through video conferencing.

Technical issues

- Technical difficulties during the early part of 1992 have caused concern and, at times, considerable frustration when part, or, occasionally, all of a lesson was lost.
- The slower transmission speed with the resultant blurring of motion and variation in synchronisation between voice and image was noticeable although most lecturers and students interviewed stated that they found it tolerable and they felt that it was considerably better than other distance education strategies such as teleconferencing or use of print material on its own. Predictably, lecturers and students who had used the higher speed in 1990 or 1991, commented on the poorer quality image although they were not always able to describe what the difference was with the current system, only that it was not as good as in 1991.

- Despite the technical imperfections of the new system, users were appreciative of the technical support systems built into video conferencing. Centrally available specialised technical and methodological support as well as the more general college/branch level technical support is crucial to staff's positive attitude towards teleconferencing (in spite of considerable difficulties in the earlier part of this year). Staff were reassured by the availability of help being only a phone call away. Lecturers were particularly appreciative of the simplicity of the touch screen control system of operation.

Teaching methodology

- The most common form of video conferencing involved a 'talking head' in which the lecturer presented material mainly through talking with the students at the same site and to other groups of students at one or more other sites, or to other sites but with an empty room at the lecturer's site.
- Although they understood the rationale for a voice activated switching system, all lecturers wanted to also have the ability to override this facility and switch to the camera at the other site/e when they felt it necessary.
- Although there was variation between subject areas and from lecturer to lecturer' most students stressed that lecturers need to learn more about teaching via video conferencing as current teaching strategies were sometimes less than adequate. For example, some felt that some sessions were too long with very little variety, others felt there was too much lecturer talk without input from students, sometimes graphic material used inappropriately or not at all when it should have been, while others felt that unnecessary teacher movement was distracting.

Concerns about video conferencing

- Lecturing staff, whether they had used video conferencing for some time or are newcomers, all stressed that preparation for use on the current system necessitates significant reorganising and restructuring of their material and presentation approaches to accommodate the delay in picture and sound imposed by the slower speed. In some cases, this has created significant levels of stress.
- The suggestion that there should be centralisation of these resources for development of video conferencing resources and subjects which would emphasise video conferencing was vigorously opposed as it was felt that development was best done at the local level.

- Numerous other issues affecting SA DETAFE at the moment which, although not directly impacting on the use of video conferencing, add to the complexity of lecturers being able to cope with change. Issues which were causing lecturer stress included; the new computerised student administration system, alternatives to use of 'student hours' for determining teaching load, potential use of performance indicators, emphasis on Open Learning approaches generally, and possible restructuring and/or amalgamation of colleges.
- There was considerable use of video conferencing by the Trainee Program, but this program was also a major source of concern. On the one hand, there was a desire for more branches to be connected to make viable classes of trainees. Because the students were younger, more immature, and less able to work independently than other TAFE students, lecturers expressed concern about 'lecturer control' of classes. Some classes are already too big (in one case, 35 students across three sites) and video conferencing may be inappropriate as a delivery mechanism but it was used because it was available.

Student responses to video conferencing

Comments from the students reflected major differences in orientation to teaching and learning. The younger, more recent school leavers in the Traineeship Program compared video conferencing with face-to-face teaching whereas the other students interviewed often made comparisons with other distance education strategies they had experienced. In the case of the latter group, video conferencing was regarded as superior to other open learning techniques such as use of distance education print material or use of teleconferencing via DUCT or loudspeaker telephones. As a generalisation, students who had experienced some other form of distance education were more understanding and more tolerant of the limitations of video conferencing and of its malfunctions. These differences in understanding of learning styles need to be accommodated by lecturers.

Students at sites other than the regular teaching site, stressed the need to feel part of the multi-site classroom and highlighted their appreciation of the occasions that the lecturer visited their site and taught from an alternative location. This technique was commented on frequently and given as an example of a strategy which students appreciated as it increased their feeling of being part of the total class and made sessions more personal. It had the added benefit of increasing understanding of video conferencing for the 'home class' who normally experienced video conferencing sessions in a face-to-face mode.

Learning to use video conferencing for teaching

Although the policy of TAFE Channel is that every lecturer who uses the Network should participate in an induction program, not all lecturers interviewed had taken part in an induction workshop. Those who had not received instruction prior to their first use of the system, agreed that they felt somewhat overwhelmed at first but felt that they could cope because of its simplicity of use. They conceded, however, that it would have been better had they participated in a 'hands on' session prior to their first use of the system in a class situation.

For those lecturers who did participate in workshops prior to first use, the general feeling was that these workshops could have been shorter and that they should focus on actual use of video conferencing. The consensus was that workshops which dealt with other issues of open reaming were not appropriate at that time as the concerns about using video conferencing were so great as to restrict interest in the wider implications of its use. They felt they need to learn the basics of operation in the induction session and that other issues could be dealt with in later workshops.

Generally, staff felt that learning to use video conferencing is best done via video conferencing thereby necessitating someone at another site with whom the user can interact. This techniques was also use at UNE (Youngblood, Mahoney & Tonkin, 1991). Considerable help is required in helping lecturers cope with a change in teaching methodology. Dealing with change challenges previously held convictions and beliefs. It was suggested by several interviewees that video conferencing is confronting as it requires staff to question and adapt what they have previously been presenting or doing in face-to-face classroom, meeting and workshop situations. Classroom techniques do not work in the same way. Many lecturers felt that the voice activated system reduced their 'control' over students at other sites. A dominant message from interviews was that, initially, coping with the changed methodology was stressful.

Privacy is maintained during a video conferencing session in that only the participants in the session are present in the rooms and that any visitor is there only after permission has been sought from the lecturer and the participants (Mitchell, 1992). The right to privacy has been an important element of the operation of the system from the outset. The cameras at the other sites are the lecturers 'eyes' enabling them to see the other members of the class. However, the camera's field of vision is much more restricted than a human's eyes and other people could be in the room but out of the cameras field of view. This can be very disconcerting to the person at the other site who may not realise someone is there. Lecturers and students need to know that they can talk openly as they would within the four walls of a traditional classroom and that any person, who is not in the

class but present at one of the sites, is there with the full knowledge and agreement of the lecturer and students. For staff and students to have full confidence that video conferencing can be an effective substitute for face-to-face interaction, they need reassurance that the same courtesies apply as in a conventional classroom.

All lecturers stated that they had to work harder to use video conferencing effectively. Rather than being a mere substitute for face-to-face interaction, all agreed that a readjustment of teaching style and methodology was necessary. Some felt that only minor modifications were necessary while others felt that a major restructuring of their whole approach to teaching was required. Some of the difficult teaching and planning decisions required of lecturers who use video conferencing are illustrated by the following comments from a lecturer at Light College who has been using video conferencing for over a year.

The video conferencing classroom is a very tight and difficult social dynamic. It's quite different from being in a face-to-face situation as it's very tightly structured. The students in the classroom with the lecturer feel very constrained because they have to be quiet all the time, they can't talk because you've got to be concentrating all the time on the screen and what's happening with the students at the other sites. What I've had to do in each of the subjects we've done is to look at the whole curriculum and work out what are the critical things that need to be covered that are not covered adequately in the materials they have and which are not covered in the textbooks but which are required by the curriculum. To deliver those in concentrated bursts, we mostly have 1 to 2 hour sessions, so we don't take breaks and we make them sit there for 1 to 2 hours with their eyes glued to a fuzzy, flickering screen with imperfect sound and demand total concentration. So every now and then I actually make them go and do an activity - you have to find ways in which you can involve the students and break up the session as they have difficulty with the concentration that watching the screen demands. So there are activities that they can do and so that you not just a talking head for that length of time. But because their time is so precious they really resent being made to do things that they regard as soft options. They want a really solid information slab but if you give it to them they can't cope. So it's a very fine balance that you have to work out. If you're giving them exercises and materials, you need to have them worked out a good 2 weeks in advance of the session in which you want to give them because you've got to arrange distribution to each site.

I also spend a lot of time on the telephone with my students, I encourage them all to write to me, and I encourage them to ring me if they've got a problem, if they're not sure about how they're going with their assignments, I say send me what you've got, let's talk about what you've got, let's go right through it, we'll go through it in draft form, so that you're not doing a huge amount of work that's going off the track. I send out newsletters to them so that they have the feeling of knowing what's going on because I think that that's very important too. Some of my students travel 200 km a round trip to come into a class, so, it's very important to keep them feeling that they are part of a group and wanted, so I spend a lot of time doing that.

Although this lecturer is aware of the importance of mixed mode techniques and obviously puts a great deal of effort into teaching, the impression gained from some interviewees was that video conferencing is used as a substitute for face-to-face teaching and that the same strategies and techniques apply. There appeared to be an emphasis on trying to accomplish all that was done in a face-to-face program but by doing it faster as the time available on the network was considerably less than in traditional classes.

Teaching via video conferencing is different

A major conclusion from this exploratory study is that video conferencing, using compressed digital video, requires a different teaching methodology from any that lecturers have used previously. The technology itself necessitates different ways of interacting, different ways of moving, different ways of presenting information and different ways of judging the meaning of the messages going in both directions.

At first impression, video conferencing appears to be a substitute for regular classroom interaction and is, therefore, appealing as a teaching medium as it promises face-to-face experiences for teaching at a distance. The aim is for the technology to be transparent so that interaction takes place as it would if the individuals were in the same room. When video conferencing is used effectively, comments from both lecturers and students indicated that this was achievable and high level interaction occurred between people who may be separated by many kilometres. However, comments from staff and students during the study also indicated that this level of transparency, when the technology virtually disappears from the interaction process, does not occur as often as might be possible due to technical problems.

Equipment malfunctions and concerns about the lack of synchronisation between movement and voice, due to the slower transmission speed, cause sufficient concern as to inhibit effective face-to-face interaction. In addition, teaching techniques used during video conferencing sessions were limiting the potential of the system.

An example of a teaching technique which can be inhibiting is the use of lectures. There was clear evidence from interviewees, both staff and students, that video conferencing was being used mainly for lecturing, ie. one way transmission of content. A 'talking head' image, with little or no chance for interaction, leads to boring, dull presentations using an expensive technology. Use of a videotape of a lecture or an audiotape would be preferable and much cheaper. At the current level of technology, video conferencing is markedly different from broadcast quality television. On a continuum, compressed digital video is closer to audio than broadcast television in that it lacks the clarity and clear reproduction of

movement and sound which is possible on broadcast television. Therefore, considerable effort has to be put into teaching and learning via video conferencing.

Video conferencing it is not merely another version of face-to-face teaching. Major modification of teaching strategies is essential so that focus is on interaction. Although many of the following points apply equally to face-to-face teaching/learning situations, the technology currently in use with video conferencing necessitates special modifications to teaching practice.

First, video conferencing involves simultaneous teaching of multiple classes at different sites through the use of technology. Considerable effort is required to maximise interaction between sites.

Second, as with all types of teaching, there is need for variety of presentation techniques within video conferencing sessions. If a lecture strategy is necessary, the 'talking head' component of the lecture should be kept short, it should be broken up with use of graphics and other visual material to emphasise and illustrate, and questions should be asked frequently to challenge the students and to check whether understanding is taking place.

Third, the capability of transmitting close up images of small, two and three dimensional objects via the graphics camera at each site, enables video conferencing to contribute a unique element to teaching and learning. For example, progressive disclosure of the points being made during a lecture add variety to a presentation as well as giving a conceptual overview. Postcards, photos, diagrams and illustrations in books can be transmitted by the graphics camera to a class on site as well as to classes at remote sites more effectively than if they were used in a face-to-face situation. A lecturer who taught an LPG Gas Conversion course, explained in interview that close up views showing how to connect hoses, pipes and other fittings could be shown better on video conferencing than in a face-to-face situation.

Fourth, another major difference with using video conferencing techniques is that the nature of interaction itself is influenced by the current state of compressed digital technology. Although the intention of creating an interactive system in which the dominant voice at any site determines which image is transmitted to all sites emphasises genuine open interaction, the response time required of the slower transmission speed, reduces the effectiveness of the voice activated system. The time taken for the image to be switched to the person who has interjected or is responding to a question is several seconds by which time another person has spoken, resulting in the image of the first speaker only staying on the screen momentarily. This is frustrating for all sites as the image flashes

from one site to another. Continuing to speak would lessen the problem but often responses are only of short duration. More attention needs to be placed on encouraging a longer response to allow the system time to adjust to a new speaker. A lecturer at Barossa summarised a view which came from many lecturers.

For the student, each classroom feels cut off because you can't see each site. What you need to do is actually sit as a student in a remote classroom, not one where there is somebody lecturing because you will find that when you talk as a student you can't see yourself talking. You don't know that anybody else can hear you. It's like talking blind. Unless someone else talks back to you and gives you immediate feedback you don't know that anyone has heard. Students in remote classes can't see that they've been heard because their screen doesn't change.

Although a voice controlled switching system is desirable in that it is a reflection of a true, open interaction system in which all participants can have input, and the lecturer is not in 'control' of the interaction, the current limitations of the technology and of lecturer's skills in facilitating open exchange of ideas and comments, some form of lecturer control over which image is transmitted appears to be necessary. The majority of lecturers interviewed expressed the need for some form of control over the switching of images from site to site as they felt they needed to orchestrate responses from students, particularly the younger, less mature students and from students who have not studied for some time, and as a result, lack confidence. Getting responses from such a group using a voice-activated system was seen as particularly difficult.

Our student group are mainly women and because it's an entry program we largely have women who have low self esteem and low confidence and so it's a barrier that we have to get over in getting them to have the confidence to use the microphone. The feedback that I receive most often is that they're reluctant to speak and by the time they get the courage to speak it's too late and the issue has gone (lecturer at Barossa)

Fifth, for lecturers who used the system in its first year or so of operation the option of a 'quad split' in which the screen could show four sites simultaneously, each site taking a quarter of the screen, was provided. This option was not provided at the time of this study and was missed by lecturers who had experienced it.

With a voice-activated camera, unless a student speaks I'm stuck on that picture but with a 'quad split' you get much more of a feel of a whole group ... it's obviously just a perceptual thing but it makes a big difference -and plus you can see them, all the other sites. Even while I'm presenting material I can at least see what's going on at other sites, whether somebody's walked in, or whether someone looks like they're looking for something and that makes a big difference, to be able to make contact with the student. The 'quad split' is really something I miss (lecturer at Barossa).

Sixth, from lecturers' comments, it appears that interaction with four sites, that is, with a home room class, and with students at three other sites, is the maximum number for effective interaction.

Seventh, as stated earlier, lecturers should be encouraged to visit and teach from each of the other sites so that all participants feel part of the same group or class.

Finally, while teaching in a face-to-face mode requires particular teaching competencies and presentation skills, teaching in a distance education mode requires equally demanding but different skills in which interaction is via the printed page which has to be prepared a long time in advance of the student working on it. In video conferencing, both modes of interaction are used. As well as being an effective presenter, a video conferencing lecturer has to be highly organised ahead of time as he or she can't send teaching materials to the other members of the class at other sites during the session itself. Prior planning is essential so that materials are prepared and distributed well in advance of the session.

Preparation of teaching strategies and resources

Lecturing staff pointed out repeatedly that considerable time and effort was required to modify their materials and teaching strategies for video conferencing delivery and highlighted the significant stress levels generated in teaching courses via video conferencing for the first time. For example, they pointed out that overhead transparencies had to be redesigned as the proportions required of the image were different for use on the graphics camera, appropriately sized pictures, photos, illustrations had to be collected and prepared for use on the graphics camera, lecture material had to be restructured so that different modes of student interaction could be built into the presentation. They also pointed out that student activity material and resources had to be prepared in advance and distributed to other sites and modified to make it appropriate for video conferencing. These procedures involved additional work. In most cases, lecturers spoke of the significant changes they had to make to their presentations which had been prepared for the traditional 3 hour presentations of lectures and seminars in a face-to-face situation. Some lecturers use distance education packages prepared specifically for external students but modification of approaches and resources was still necessary as an additional delivery strategy had been injected into the system.

In all cases, lecturers stressed that a significant amount of additional work was required to present their course via video conferencing, regardless of whether they used existing packages or modified their own material. Although the actual time involved in the video conferencing session was less than the regular face-to-face commitment, their total involvement time

exceeded what they had previously spent on traditional face-to-face teaching.

There was resistance, however, to centralise preparation of video conferencing sessions as is the case with the development of distance learning packages. In interview, several senior executives within SA TAFE advocated that video conferencing resources could be pooled centrally and materials and approaches developed on a central basis for statewide use but staff reacted negatively to this suggestion. They argued that video conferencing has many of the idiosyncratic elements of face-to-face teaching and depends on the personal skills and teaching competencies of individual lecturers. Although it could be argued that time and resources could be used in developing strategies and approaches on a centralised basis, users of video conferencing argued that the personalised, interactive nature of video conferencing mitigates against this.

Additional demands for staff development

I've been trialing (the new subject) in the classroom for the last two semesters and I am in the process of converting it for use as an external subject. I think it's important to recognise that the standard external learning materials don't work on video conferencing because you're working with students in a completely different way. The materials that are produced for the classroom, ie. the classroom sets for lecturers don't work for video conferencing and neither do the materials that are produced for external students. So we've really got to develop all our own materials. In this subject it's been immensely time consuming but it's also been easier because it's my own subject and I know it really well (experienced lecturer at Barossa)

Because of the need to restructure existing material, to learn new techniques and to change one's approach to teaching when using compressed digital video conferencing, an emphasis on staff development is critical. Video conferencing confronts staff and challenges teaching/learning methodologies. It demands a reassessment of the way in which a lecturer interacts with students and poses different limitations on students interacting with students at other sites. Because video conferencing requires a closer examination of teaching strategies, it can play an important staff development role in leading lecturers to experiment with new and different approaches and to question existing practices. Of the different delivery and organisation systems available for teaching at a distance, video conferencing is most like traditional face-to-face teaching and yet it also has the appeal and glamour of a high technology approach which is 'user friendly' in its operation.

Video conferencing has impacted on my personal teaching methodology. With video conferencing you can't leave things to the last moment, you've got to be fully prepared. It requires more precise teaching. My mates didn't

think I could do it but now they are envious They call me the 'video conference king' (new technical studies lecturer at Pt Pirie)

Discussions with staff of TAFE Channel, Open Learning Managers at each site, and with lecturers, indicated that there was a clear understanding of the need for extensive staff development about video conferencing. It appears, however, that the emphasis has been placed on providing inservice programs at the initial use stage rather than in developing an ongoing staff development strategy and program. Excellent resources, such as the 'Lecturer's Guide to Video conferencing (Rixon, 1991)', and associated programs, have been implemented to prepare lecturers for first use of video conferencing. If participation is not possible in 'hands on' workshops at video conferencing sites, the Procedures manual (Mitchell, 1992) and printed material prepared for staff inservice provide excellent overviews of basic operation of the system. However, what is needed is further staff development programs in which users of the system can exchange ideas, challenge each other, discuss concerns and explore the challenges of video conferencing.

The literature on implementation of change highlights the nature of change as a process rather than an event, that change takes time and persistence, that individuals go through stages in the change process and have different needs at different stages, and that change strategies are most effective when they are chosen to meet people's needs (Hall & Hord, 1987).

Implications of this study

A major implication from this exploratory study is that the use of video conferencing needs to be carefully planned and the rationale for its use clearly identified. It is not merely an electronic means of transmitting lectures to other sites. When used as one of a range of 'mixed mode' strategies and techniques, including use of intensive face-to-face workshops, distance education print packages, e-mail, teletutorials, and other means of teaching and learning at a distance, video conferencing becomes a powerful medium for interacting at a distance.

Through new technologies, video conferencing enables use of familiar face-to-face teaching/learning strategies with students at other locations. However, it also necessitates variations in teaching style and methodology to accommodate the characteristics of the technology. Therefore, initial use needs careful planning and considerable support. Induction workshops are essential as lecturers will have initial anxieties about its use. These workshops should focus on the actual operation of the video conferencing system with an emphasis on 'hands on' operation and should highlight the major, essential teaching strategies for effective initial use. 'Information overload' at this initial stage sometimes occurs when experienced users of

video conferencing try to alert the new user of all the variations and even the pitfalls of video conferencing they have experienced, sometimes forgetting that the neophyte user's needs are quite basic as they focus on 'survival' strategies in initial use.

Considerable preparation time is required for a video conferencing session. All lecturers interviewed in this study said that preparation for video conferencing sessions required additional effort for them to be effective. Staff development programs are required for lecturers to acquire and develop skills in the preparation of teaching/learning materials. Many of these skills relate to the preparation of distance education material such as print and nonprint resources to support a video conferencing session.

Staff development programs are also necessary to assist lecturers in using a variety of teaching approaches in video conferencing sessions to enhance its capabilities and provide variety of presentation. Techniques such as the use of a graphics camera to show summaries of notes, close-ups of pictures, diagrams etc, the need to vary the length and pace of a video conferencing session, and the desirability of lecturers visiting and teaching from all sites during a course so that all students meet the lecturer face-to-face and so that the 'home class' also experiences video conferencing, should be dealt with in staff development programs.

Support is necessary for lecturers to experiment with variations in use of video conferencing. There is a need to share strategies and techniques with other users, to observe colleagues in action through video conferencing and to practice techniques in workshops conducted via video conferencing. The grouping of more experienced users with less experienced users in these video conferencing workshops will facilitate greater sharing of experiences and techniques. As users progress through different levels of use of video conferencing, the type of help and support needed will change. Staff development programs need to take account of these various needs.

Another implication of this study is that there appears to be a limit to the number of sites which can be effectively handled simultaneously by a lecturer. As interaction is an integral component of video conferencing teaching/ learning methodology, linkage of no more than four sites is recommended. Linkage of less sites is desirable for initial users.

Potentially, video conferencing sessions exposes a lecturer to more public scrutiny than a 'normal' face-to-face session in which the presence of all participants in the room are known and in which 'outsiders' are easily identified. When using video conferencing, however, additional people can enter the room at other sites and, if they stay out of camera range, their presence will not be realised by the lecturer or participants at other sites.

'privacy' needs to be ensured and common courtesies should prevail so that all participants in a video conference should be present with the permission of each other.

Evaluation processes for subjects which involve video conferencing sessions should include the use of qualitative tools, such as interviews, open ended survey questions and observation strategies to capture the many varied human dynamics which are part of video conferencing.

Finally, development of any new subject in which video conferencing could be a component, should be developed as a 'mixed mode' subject in that a variety of distance education techniques should be planned and implemented. Video conferencing should be used in those elements of the subject in which interaction is important. Different distance education strategies should be used for other components of a subject.

Issues for further investigation

Because SA DETAFE has pioneered video conferencing in ways that differ from other users around Australia, it is important that more research into the impact of TAFE Channel be undertaken. To date, little research has been conducted in Australia on the impact of teaching/learning using video conferencing.

Questions for research include:

- will the newer users of video conferencing go through the same stages and be faced with similar problems as those experienced by the early adopters?
- is there a video conferencing methodology?
- in what way has video conferencing impacted on other aspects of institutional operation such as timetabling, allocation of resources, staffing, provision of courses, student numbers, performance measures and issues of equity?
- what are the most effective strategies for helping staff and students in using video conferencing effectively?

Much needs to be done to critically examine the impact and effectiveness of this exciting means of interacting at a distance.

Note

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Authors: Dr John Schiller is Head of Instructional Design and Development, Centre for the Advancement of Learning and Teaching, Hunter Building, University of Newcastle, Callaghan, NSW 2308.

John Mitchell is Managing Director, J G Mitchell and Associates Pty Ltd, Open Learning Management Consultants, 261 Stanley Street, North Adelaide, SA 5006.

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