

VIDEOCONFERENCING IN LEARNING AND TEACHING

A LITERATURE REVIEW

Videoconferencing Project funded by a Monash Faculty of Medicine, Nursing and Health Sciences Learning and Teaching Performance Grant 2007

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Literature Review Criteria	
Search Period	2000-2007 (Researchers have been particularly active in this subject from 1997 onwards)
Key Words	Interactive videoconferencing (IVC); Online learning Teaching Active learning; peer learning; collaboration Medical/health professional education
Databases	ERIC EBM Reviews A+ Education (Informit) CINAHL (Harley) MEDLINE PsycINFO (Ovid) UltiBASE Embase Australian Digital Theses Program
Other criteria	Selective focus on educational models and IVC innovations Not a systematic review

Introduction

This literature review seeks to explore and describe best practice in interactive videoconferencing (IVC) for educational purposes. The review also aims to inform the development of innovative models for the application of IVC technologies in the context of undergraduate medical/ health professional education within Monash University. A significant proportion of the literature reviewed for this project originates from Australia and the USA with several articles describing trans-continental experiences.

Technology and Learning

Many of the 'How to' guides to videoconferencing begin by advocating for a needs analysis, asking the key question: Does use of the videoconferencing environment suit the curriculum and learners being taught? This is particularly relevant to those Faculty programs where learning and teaching occurs across multiple and geographically disparate sites.

Luck (2003a) poses the question '[d]oes geography shape the nature of an educational innovation?' She describes a situation where Central Queensland University's 1997 strategic vision prioritised the acquisition of a videoconferencing network. This was followed by a period of 'grappling to come to terms' with how best to deploy the technologies recruited to address the equity and access issues experienced by students attending satellite campuses. Luck reports that the rationale for implementing videoconferencing environments for 'efficiency and economic reasons' (p.156), was not supported by detailed investigation of the hidden costs and educational demands of 'setting up, running and maintaining the extra facilities'(p.153). Costs associated with learning and teaching via videoconference were also underestimated.

Luck observed that 'best practice' teaching via videoconference at that time was assumed to be the 'replication of face-to-face teaching'(p.154). Little consideration was given to anything more inventive. This supports the findings of Webb and Murphy (2000) who highlight 'the temptation to invest in the tangible things that can be seen (i.e. technology)

rather than the people'(p.25). In an earlier article, Luck (1999) argues that due to the general lack of guidance for staff in how to use videoconferencing tools for educational purposes, 'it is assumed that when people have problems using VC tools that the technology is the problem and not the teaching strategy'(p.6 of 7).

Tele-teaching at Monash University

Monash University established suites for tele-teaching across 14 sites approximately 10 years ago. Take-up was not high, as staff were unfamiliar with the use of the technology. Attempts to embrace it revealed shortcomings in the design of the environments which were mainly geared towards one-way delivery of material. Transfer of traditional models of teaching did not prove to be engaging for students (Patrick Lee, IT Support, personal communication, July 2007). These factors point to the need for careful consideration when choosing Information Communication Technology (ICT) equipment and designing teaching spaces for their use. The particular curriculum, learning needs of students being taught, teaching methods, educational support structures and technologies used all require equal consideration in the needs analysis and decision making process (MacIntosh, 2001).

The Monash School of Rural Health and Faculty of Medicine, Nursing and Health Sciences is attempting to address distance education issues by implementing a video conferencing platform that can link all of the educational sites within the Monash system across metropolitan, rural and regional Victoria. The award of a Department of Health grant has meant that the technical and infrastructural issues have been accounted for. However, in keeping with the findings of Luck (1999; 2003a) and Webb and Murphy (2000), the pedagogical and professional education complexities remain largely unexplored. For various reasons, staff training within Monash School of Rural Health has been directed towards a very limited number of mainly IT-Support staff, with relatively little dissemination through to the academic users.

Adapting to a new learning environment: Pedagogical Strategies

In 2000, Monash educationalists were advocating the need to embrace new approaches to teaching in the move towards flexible Learning. In their work with the former Centre for Higher Education Development (CHED), Edwards et al (2000), stated that ‘flexible learning is not about technology, but concerns the creation of a teaching and learning environment that makes best use of a variety of approaches, including...face-to-face sessions, print materials and online resources’ (p.151). As outlined above, there is always the risk that if attention is not given to both pedagogical change and technological innovation, there is a tendency for the technology itself to become the driver of change.

Luck (2003a) found very limited literature that explored pedagogical approaches to the use of ICT. Drawing on Jamieson and Martin’s (1997) work, she concludes that:

research into the use of new technologies should focus on the critical relationship between a teacher’s experience of, and approach to teaching and learning, rather than on the teacher-technology relationship which has dominated previous research. (p. 155)

The strongest pedagogical case for videoconferencing occurs where the course requires interaction: student-to-teacher; student-to-student; and/or, learner-to-expert panel etc. This requires a pedagogical shift beyond a traditional ‘talking head’ approach to a more student-centred view of learning (Laurillard, 2002). MacIntosh (2001) concurs with this view and suggests that ‘[e]ducators should choose videoconferencing when it fits the nature of the course’ (p. 265). An appropriate course for videoconferencing is one where there is a desire to have participants interact with one another in real time. An interactive environment, especially where peer-to-peer interaction is involved can engage students and help them to ‘improve their critical thinking, develop writing skills and reflect on their learning’ (ibid, p.264).

Webb and Murphy (2000) discuss the effects of technological change on the educational practices adopted by institutions of learning. The prevailing attitude, they observe, has

been one of preserving a traditional body of knowledge and the approach to teaching it, and simply ‘adapting’ to new technology. They highlight the need to rethink how educational programs are designed. Students seeking access to educational opportunities via increasingly diverse flexible learning environments should not simply be ‘presented’ with a body of knowledge but encouraged to become active learners, capable of constructing and reconstructing their understandings in increasingly complex and dynamic fields of study and professional practice. For Webb and Murray:

...the movement towards lifelong learning, student centeredness, flexible learning and the growing importance of media, holds opportunities for a particular conception of university teaching. That conception sees teaching as being more than the transfer of information, as information needs to be constructed and inhabited by each human being before it becomes knowledge. The process whereby people develop their knowledge is an essentially human and social activity, which requires the development of relationship between teachers and students, students and students, teachers and teachers and teachers and students with themselves (this latter point referring to the necessity for reflection in order to turn experience into learning, as found in Boud et al, 1985). It suggests that learning is a deeply human activity based on talking, communicating, and the empathetic and careful development of understanding. (Ibid, p. 21)

One significant opportunity afforded by the use of interactive video-conferencing is for groups with similar educational interests to build a ‘Learning Community’ around common areas of professional practice. These groups may include teachers, learners and expert practitioners on a local, national or international scale. For Luck (2000), a community of practice:

may be large, the task general and the form of communication distant: for example a group of surgeons around the world sharing knowledge on new medical procedures, and publishing their work in a journal. Alternatively, they can be small, the task specific, and communication close; for example a team of lecturers developing a new curriculum. (p.2)

Encouraging active engagement and participation in learning communities across distributed learning settings via a videoconferencing network will however, require thoughtful integration of contemporary learning and teaching methods with emerging ICT technologies. As Greenberg (2004) points out, ‘instructional strategies must be matched to the technology’ (p.6).

Learners Alike

Teachers and students are co-learners in any new technologically mediated environment. Both will have training needs. Luck (2000) reports that the establishment of new technologies in teaching means that both groups are learners in a process of adjustment. By focusing training for academic staff on comparisons between their previous approaches to teaching and the kinds educational strategies required to engage students in the videoconferencing environment, the emphasis remains on effective learning and teaching rather than on the technology (p.3 of 7). Central Queensland University recognised that stakeholders would need to re-think how educational programs might be designed and implemented in ways not previously entertained (Luck, 2003a). The team adopted Laurillard’s (2002) ‘conversational’ framework to generate a learning and teaching strategy which emphasised social interaction, discussion, collaboration and shared reflection among the teacher, students and content.

This view of learning acknowledges the socially negotiated aspects of meaning (Lave & Wenger, 1991) and the role that mediating artefacts (such as other people, VC technologies, languages, mnemonic techniques, domain specific tools) have in contributing to the construction of knowledge at both the ‘individual’ and ‘group’ levels of learning (Griffiths & Guile, 2003).

For the University of Queensland team, the shift to a socio-cultural approach to learning resulted in the development of a framework for video-conferencing designed to:

- integrate theoretical and experiential aspects of the educational program;
- increase ‘interactivity’ in videoconference sessions, by promoting discussion of key concepts rather than didactic core curriculum delivery;

- incorporate games and other active learning strategies;
- include input from experts (from another city for instance);
- include specific preparatory workshops for staff and students.

This fits well with current thinking in undergraduate medical and health professional education that increasingly calls for the integration of theory and practice and greater emphasis on collaborative, inter-professional education.

Teaching for active learning in the videoconferencing environment

Andrews (2002) lists a range of educational strategies for use in the VC environment including:

- guest presentations (for interaction rather than content delivery);
- interviews;
- panel and group discussions;
- mini-lectures;
- student/learning group presentations;
- brain storming;
- modeling;
- role plays or simulations;
- demonstrations; and
- small group activities

The longer the scheduled video-conference session, the greater the need to include a variety of learning and teaching activities. Active learning strategies such as those above can help to ensure that learning does not simply become a passive and therefore potentially disengaging experience.

The videoconferencing literature states that between 15 and 25 minutes of any one person talking is optimal (McKinney, 2000). Switching to an interactive period using the strategies listed above can assist in keeping participants at far-end sites engaged.

A number of articles highlighted potentially useful examples of interactive videoconferencing. Many of these innovations can be seen as variations on the learning and teaching strategies suggested by Andrews. A summary of these can be found in Table 1 below.

Table 1: Summary of Active Learning Strategies for use in the Videoconferencing Environment

Author	Summary of Learning Teaching strategy	Outcomes/Findings
(Robertson et al, 2005)	<p>Problem-based Learning via Videoconference:</p> <p>A study involving student Occupational Therapists in the USA and Scotland was designed to assess whether videoconferencing would enhance a Problem-based Learning environment.</p> <p>Participants compared clinical practice between the two countries with respect to Occupational Therapy management of a patient experiencing an exacerbation of a chronic disease (Multiple Sclerosis).</p>	<ul style="list-style-type: none"> ▪ Overall there was a positive regard for the value of the PBL and for the use of videoconferencing as a medium for its delivery. ▪ The loss of spontaneity in communication brought about by the videoconferencing environment was compensated for by the opportunity to gain an international perspective on the learning and practice of OT. ▪ Student confidence in the use of the technology appeared to grow as a result of the project
(de Godoy, Costa Mendes, Hayashida, Nogueira, & Marchi Alves, 2004)	<p>Teaching of a clinical skill:</p> <p>Intra-muscular injection was demonstrated by via videoconference lecture, as part of training for an extended role by nursing-assistants in a South American health service.</p>	<ul style="list-style-type: none"> ▪ Findings indicated that students found this a successful means of acquiring the skill when supported by local mentoring at home sites.

	Time allocated: 5 minute introduction; 15 minute instruction; and 10 minute question and answer session.	NB: How the success of their acquisition of the skill was measured was not included in the report
(Thoesen-Coleman, O'Brien, & Wright, 2004)	<p>Expert Panel (Example One)</p> <p>A one hour rural GP/Patient consultation via videoconference with a specialist, multi-disciplinary (Aged Care) team at a regional facility was conducted. Participant observers (students) were located at three different educational sites.</p> <p>Following the ‘live’ consultation a second session was organised in which the expert panel answered questions from students based on the case just witnessed.</p>	<ul style="list-style-type: none"> ▪ The series comprised six such cases over a period of months and permitted a holistic discussion in aged care medicine.
(Tiwari, 2003)	<p>Expert Panel (Example Two)</p> <p>Another reported use of videoconferencing facilitated communication between a group of postgraduate nursing students preparing for the role of advanced practice nursing in Hong Kong and an expert panel in the USA.</p> <p>The objectives of the session were to: (1) learn from the experiences of the expert panel (costs, benefits, challenges and risks); (2) compare</p>	<ul style="list-style-type: none"> ▪ The required preparation exceeded expectation. The expert panel needed briefing as well as the students, but the objectives were achieved. ▪ Perceived cultural barriers to communication were overcome with the inference being that the learning climate created by the teacher was responsible for this.

	development of advanced nursing in the respective countries; and, (3) develop a plan for implementation in the local (Hong Kong) environment.	
(Rowan, 2000)	<p>Interactive Lectures: One academic prepared and delivered the same interactive session to four sites in successive videoconferences on the same day.. Sessions involved responding to questions posed by the teacher; ‘think-pair-share’; exploration of a topic - with students given some freedom in how this might proceed. The course material was supported by print, video and on-line sources.</p>	<ul style="list-style-type: none"> ▪ Allowed an individualised approach to each campus and minimised difficulties imposed by multipoint videoconferencing (where only the site that is speaking can actually be seen). ▪ Was considered more cost effective than having four academics preparing and delivering the same material at the four educational sites
(Luck, 1999)	<p>Small Group Work The lesson content for one term was captured as ‘key themes’ and assigned to students within small groups at separate Queensland sites. Groups took turns to present their subject theme to the virtual classroom. Group presentations were enhanced by contributions from the teacher and followed by interactive discussion from all participants.</p>	<ul style="list-style-type: none"> ▪ Sessions were backed up by tutorials given at local sites which consolidated topics discussed in the videoconference.

<p>(Aveling, Frylinck, & Walsh, 1993)</p>	<p>Active Learning Strategies</p> <p>Four active learning methods were trialed:</p> <ol style="list-style-type: none"> 1. ‘Firing-line’ questioning were included within a framework of asking a student to introduce and sum up the topic (one hour duration). Student-led activity; Commenced with 10 minute presentation by student, followed by a further 10 minute tutor-directed segment. The student facilitator formulated questions for discussion and fired them at their peers. The student facilitator was also required to respond to questions from peers. 2. Discussion statements: Students were divided into two groups and instructed to tackle statements prepared by the tutor, in turn. Those statements which elicited either unanimous agreement or unanimous disagreement were 'discarded'. Those statements on which the subgroup could not agree were to be brought back to the whole group for further discussion. The statements were carefully worded to avoid simple 'yes' or 'no' responses and were 	<ul style="list-style-type: none"> ▪ The strict timeline involved did not permit the required depth of discussion to take place ▪ Identified as one of the most successful strategies used by the teaching team.
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	<p>based a weekly topics.</p> <p>3. Video of a guest lecture, with discussion statements and debate: This was a serendipitous ‘extra’ based on a one-off opportunity to hear a guest, speaker rather than a scheduled part of the course. Students watched video footage of a guest lecture. This video had been posted out to the external students along with written notes by the presenter which helped students to make connections between the video content and the coursework.</p> <p>4. Role play in conjunction with prepared discussion statements or debate to explore the content material. Two types used. A short sketch using ‘shock value’ to generate discussion on the subject (issue of gender & ethnicity)</p>	<ul style="list-style-type: none"> ▪ Didn’t work as well as anticipated. Students and tutor felt obliged to ‘stick with’ the pre-planned structure. As a result, discussion and debate were seen to be less spontaneous. Strategu was still regarded as valuable. ▪ External students perceived they were on a par with students at central campus as all received the same materials ▪ Identified as one of the most successful formats used by the teachers researchers along with no 2 above
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When planning student learning experiences within the video-conferencing environment, Gill et al. (2005) suggest that there needs to be a good balance between varying the stimulus required to keep people interested whilst also avoiding excessive changes in the media or activities used within one session’. Building on this theme, the authors suggest that the atmosphere created by the teacher is one of the biggest influencing factors on the learning environment. Birden and Page (2005) also support this view and argue that:

strategies that maximize the educational value of videoconferencing are those which focus on the educational content and downplay focus on the tools themselves. **To the greatest extent possible, it is desirable for the students to forget that the high tech gear is there**' (authors bolding, p. 4)

Effects on Students: *'How will the educator know me?'*

In a study of rural nursing student concerns over interactive videoconferencing (MacIntosh, 2001), a combination of; (a) mastering the technology; and, (b) use of teaching strategies appropriate to the environment was seen to assist learners in developing the capacity for higher order thinking, critical reflection and deep learning. The teacher's familiarity with the technology was seen to generate a sense of confidence amongst the students and supported the transition to the VC learning environment. This contrasted with student experiences of another lecturer who was less proficient and where the difference in quality of the flow of the lesson was apparent. 'Educators who were comfortable with the technology and the course material and who used appropriate teaching strategies for technology in classes influenced learning positively' (ibid, p.263).

Learners reported greater difficulty adjusting to the technology in classes where educators were not completely familiar with the technology. Whilst finding the technology 'intimidating at first', the learning experiences of the student participants improved as time went on. The interactive nature of the sessions, peer support and the small sizes of the distant sites were also factors reported to positively influence the learning environment.

Another valuable finding from MacIntosh's (2001) research highlighted the importance of allowing sufficient time for reflection during the videoconference session. 'Educators must ensure that time to think and reflect is not limited by a perceived need to fill all the paid-for-on-line minutes' (p. 265). In this way, the learners were found to be better able to take responsibility for their own learning and reflect on their experiences from time to time - an expectation of their distance education course.

Maximising the Potential of Videoconferencing Technologies

To this point, consideration has been given to the types of pedagogical activity which may be used to exploit the interactive opportunities available through videoconferencing. However, to achieve the ideal situation where the technology becomes ‘seamless’ and ‘invisible’, technical skills will also be required. Gill (2005) and Andrews (2002) advocate the necessity for a team approach and suggest such a team might comprise a lead teacher, a facilitator at each far-end site and technical support - either available, or at least on call for each occasion in which videoconferencing is used. To some extent the recommendations given by these two authors imply that this level of support is mandatory and that without it, barriers will be encountered. On the other hand, MacIntosh (2001) reported that ‘having no educator present in off-campus sites may provide learning opportunities of a different nature than anticipated because learners reported increased leadership skills of some group members’ (p. 265). To what extent teaching staff (or students) need to become experts in Information and Communications Technology is debatable and probably depends upon the extent to which technical support is available at each educational site.

McKinney (2000) suggests that the teacher must be prepared to take on the educational facilitation roles of ‘Commentator’, ‘Presenter’, ‘Moderator’ and ‘Director’. Clearly, additional competencies come into play during the videoconferencing session, as do presentation skills and etiquette, which are either not required, or less heavily relied upon, in face-to-face teaching. Presumably this is largely accounted for by the complex subtleties of non-verbal human interaction which can be lost or very much harder to detect in the videoconferencing environment. A minimum requirement for teachers will be a comfortable familiarity with the capabilities and limitations of the VC technology. Staff development could usefully be directed towards placing these skills and this degree of functional command of the equipment within the repertoire of the teacher. The key teaching tools essential for facilitation of effective video-conferencing sessions are summarised in Table 2 below.

Table 2: Principal and Peripheral Teaching Tools

Principal Tools	Room cameras at host and far end sites Associated microphones Video screen
Peripheral Tools	Document Camera/Presenter Roving camera and Microphone Lap-top Computer (for Power-Point™ or CD Rom presentations)

Assuming that in the real world, Information Technology support may not be instantly available at all educational sites, training in the use of core VC equipment should extend to:

- Dialling up site(s) or accessing videoconference facilitator if using a bridge (as in multi-point conferencing)
- Familiarity with use of Power-Point™
- Connecting laptop to videoconference system
- Switching between Room Camera and peripherals (document cam, laptop,)
- Focusing/zooming/panning room camera at home site and distal sites (if this option is available)
- Familiarity with functions on remote controls or touch pad

This will in turn help academic staff to gain confidence in their ability to facilitate student learning in the videoconferencing environment.

Considering the complexities and potential contingencies encountered in facilitation of video-conferencing sessions (such as possible time delays in compression and transmission of data; the need to switch between peripheral equipment; and the need for effective etiquette), conservative estimates are that only two thirds of the material normally taught in a face-to-face setting may be feasible in a videoconference session (Luck, 2000). This puts pressure on traditional lecture style presentations which aim to ‘deliver’ content in an allocated time frame. Relying on simple translation of

transmission style lectures to the video-conferencing environment may therefore limit opportunities for student-to-student and teacher-student interaction. Students may find themselves positioned as passive ‘TV watchers’, rather than as active learners.

Preparing for VC learning and teaching

Several articles offered practical advice for more effective video-conferencing. Key themes identified included:

1. planning ahead;
2. establishing a videoconferencing team;
3. developing a teaching matrix or plan,
4. presentation using the equipment
5. giving your teaching a personalised and inclusive approach

These themes are discussed in further detail below.

1. Planning Ahead

Sound forward planning is the most reported pre-requisite to successful learning and teaching in the videoconferencing environment (Andrews, 2002; Birden & Page, 2005; McKinney, 2000; MacIntosh, 2001). Authors of many of the articles provide in-depth descriptions of the preparation involved in launching successful video-conferencing pilots. According to Gill (2005), teachers will need to be much more structured and organized and give ‘special attention to time and interaction’.

Suggestions for effective VC session planning include the following:

- **Arrange VC site bookings** - either organised centrally through bridge (for multi-point) or by direct contact with distal site (point to point)
- **Send materials out ahead of the session** (could use on line (MUSO)/ email group/ CD Rom);

- **Prepare relevant information regarding VC session objectives and lesson plans** for staff at distal sites who may be involved as facilitators;
- **Consider preparing a week by week study guide** to be released at beginning of semester. Guides could include supplementary reading and an outline of content for discussion at videoconferences;
- **Arrange any follow up face to face tutorials required at specific local sites**
- **Have a back-up plan** for your teaching session - for example audio-link in case of equipment failure. Audio loss is the commonest failure followed by digital image break-up;
- **Try to ensure equity for all learners.** For example: If refreshments are provided at the home site try to ensure these are also available at distant sites;
- **Consider arranging access to a fax machine at all sites.** Can be handy for last minute documents;
- **Request that signs be placed outside the videoconference room whilst in progress.** Noise from adjacent sources can cut across audio system;

As part of the planning phase, Luck (2003a) found that consideration needed to extend beyond those immediately involved especially when videoconferencing to multiple sites.

One thing that was not predicted was that this teaching model would dictate that the class timetables for all Central Queensland University campuses would have to be linked to allow staff to book rooms at up to five sites simultaneously, and that bookings would have to be completed before the remainder of the timetable could be finalized at each of those campuses.

The implications of multi-site timetabling will still apply, even where Universities are equipped with a Scheduling Management Tool, such as that which has been installed at Monash's Clayton Campus.

2. Establishing a videoconferencing team

The team will ideally include:

- **The lead teacher/lecturer**
- **Educationalist** - to advise and assist with developing teaching strategies lesson planning and program evaluation;
- **Site Facilitator /s** - tutor or possibly a student. The role of this person is to help keep students on track, answer questions at the local site, hand out materials at the appropriate time and monitor progress of group work/interactive learning activities;
- **Technical Support staff** - to ensure connections are sound, advise on room layout/set-up and technical troubleshooting.

3. Develop a Planning Matrix or VC Lesson Template

Andrews (2002) suggests the development of a VC planning matrix or lesson plan that addresses all of the items listed in point one above. Initially this matrix can serve as a step- by- step guide, although as the teacher/teaching team and students become more familiar with the technologically mediated learning environment, reliance on the template may lessen. At a minimum the VC lesson template can serve as a handy checklist.

Andrews suggests the following headings for such a template:

- Learning Objectives
- Teaching/Learning Activities – how the objectives will be reached
- Materials Required at Sites
- Time allocated to each activity
- Administrative Organisation
- Personnel to be involved

See Appendix 1 for an example of a Planning Matrix.

4. Presentation in the Videoconferencing environment

It is essential to establish VC protocol/etiquette guidelines with students at earliest stage. This should include expectations regarding:

- **Punctuality:** Late arrivals are more distracting than in traditional classroom;
- **Use of the microphone:** mute when not talking;
- **When student breaks will occur within the session:** Participants are less likely to leave or interrupt the session;
- **Appropriate presentation on camera** (applies to self and students)
 - a) avoid 'loud' clothing, noisy jewellery
 - b) avoidance of sudden or rapid movement (image distortion)
- **Seating arrangements:** While not always possible or enforceable, aim for seating arrangements which allow *all participants* to appear on camera

5. Adopt a personalised approach to teaching

MacIntosh's (2001) study highlighted the need to build meaningful learning relationships with students in the VC environment. Feedback from students indicated that 'their experiences were enhanced when the educator was organized, accessible, encouraged interaction, and related to learners as persons' (p.262). Practical strategies that can be used to 'connect' with learners and encourage active participation in the VC environment include:

- **Circulating photo ID of participants** at the respective sites and calling individuals by name where possible;
- **Conducting sessions from each of the participating sites** at least once per term or semester (if possible). The value of even one face-to-face meeting with the students at each site is highly regarded and heightens students sense of equity, inclusion, rapport building and even the degree of participation (MacIntosh, 2001; Birden & Page, 2005; Zundans & Wright, 2002; Andrews, 2002);

- **Encouraging an inclusive atmosphere** by making it known that the input of all participants is important and valued, and will be sought either individually or through a spokesperson (Luck, 1999);

Interestingly in one study, for the purpose of equality for all students, the lecturer placed themselves in an isolated room so that all students, even those at the home site, were required to utilise the same communication methods; none had face-to-face interaction with the lecturer, though there was a facilitator with each student group.

6. Presentation tips (teaching materials and environment)

Practical presentation guidelines to help ensure clear communication and sharing of resources include:

- Where possible use document presenters rather than whiteboards which are not easily visible at the remote sites;
- For impromptu, hand-written, ‘spur of the moment’ documents, try clear acetate sheets such as those used with an overhead projector. Write using blunt-point texta and place under document presenter;
- Avoid white paper on document cams – pastel shades appear better on screen
- For presentation clarity, use Font size 24 pt, max. 4 to 6 words per line, 6 lines per page
- Paper orientation. Landscape works best (horizontal layout)
- Use document cam only for ‘headlines’ – expanded text is better distributed as adjunctive documents ahead of the session, such as handouts or power-point print-outs for students to write on
- Where possible, mute sunlight if intrusive. Lenses are geared towards artificial lighting.
- Have a sign with the name of the campus visible at each site makes for ease of identification in multi-point conferencing.

Facilitating Educational Change - Approaches to Staff Development

Wilson and Stacey (2004) examine staff development requirements for on-line teaching. Whilst not the same as videoconferencing, this is none the less another technologically mediated environment and staff development approaches can be considered similar—especially given that videoconferencing may be well supported by use of on-line materials. The authors address the question of how to teach teachers to embrace the concept of an on-line learning community. Staff are categorised by their patterns of adoption of technology into early adopters, the ‘mainstream majority’ and these staff who may fall into sub-categories of ‘medium, late and laggard’ adopters of technology.

The article describes the desirable competencies of a proficient on-line educator (courtesy of Goodyear et al 2001) and suggests the use of these competencies as a starting point for building a staff-development program. Adapting these competencies to the videoconferencing environment would result in something similar to those suggested in *Appendix 2* of this paper.

Such a staff development program, they suggest, could be form part of formal approach such as an Accredited Course, possibly being made available on-line. Wilson and Stacey (2004) cite an example of this approach in the work of Monash University’s (former) Centre for Higher Education Development (CHED) in the late 1990’s. The ‘raison d’être’ of CHED was to assist university staff to improve the quality and effectiveness of teaching and other professional academic activities. Edwards, Webb, & Murphy, (2000) wrote of their experiences in an article which describes the evolution of The Graduate Certificate in Higher Education, in response to the need to assist professional development of academic staff by equipping them with the teaching and technological skills required for student-centred, flexible learning.

The authors do not specifically refer to the use of videoconferencing but they do advocate that ‘a goal of any change or innovation is to become embedded in the fabric of the institution’ (ibid, p.153). The first module of the Graduate Certificate of Higher Education doubled as the ‘Introduction to University Teaching’ which all new staff were

required to complete. Subsequently the Graduate Certificate was adopted as a probationary requirement for new academic staff. The importance of this article is that it demonstrates the possibility of linking new educational innovations with strategic planning at the Faculty and institutional levels. The article also demonstrates how educational change can be achieved by the creation of an articulation pathway for staff development.

Webb and Murphy (2000) advocate the need for the ‘professionalisation’ of university teaching. ‘Professionalisation of university teaching is the single most important step that can be taken to effect staff development.’ (p.22). Their suggestion is that all staff become accredited through a staff development program ‘which introduces them to the theoretical discourse of university teaching and learning and supports them as they develop their teaching practice’ (ibid). The need for accreditation, they espouse, stems from the fact that ‘the discourse on university-level teaching has evolved over more than 30 years, yet remains largely unknown to the majority of workers in the industry’ (p.21). The means to achieve this, they assert, are to be found in:

1. **Reformation of reward systems** – recognition that gaining of teaching qualifications, of educationally sound course development and at a higher level, the presentation of teaching and learning development papers should be seen as criteria for promotion.
2. **Reforming central staff development** – In line with flexible access to courses offered to students, staff development should be available via similar pathways.
3. **Supporting distributed staff development** – Linking central staff development with faculty based development.

Wilson and Stacey (2004) suggest staff development may be more appropriately offered ‘in-situ’ via a Mentor System whereby a network of ‘experts’ (usually the early adopters) provide localised peer support by acting as mentors to their colleagues. An important feature of more informal and localised approaches is the opportunity to customise staff development approaches to the professional learning needs, educational interests and situation of the staff involved.

Luck et al (2003c) had a different experience:

Performativity was useful as a way of analysing the role of gatekeepers in the study. For example, the defeat of staff development officer's motion to accept the policy (training of staff to use the IVC facilities prior to teaching using the IVC facilities) by the Academic Board (a gatekeeper for teaching and learning policies). The staff development officer performed the proposed policy as a threat to members of the Academic Board. It was made clear to the members of Academic Board that unless academic staff possessed a certificate they could not teach using the IVC facilities. Had the staff development officer performed the policy differently (as an opportunity to improve teaching and learning for all stakeholders) the outcome may have been different. (p.7 of 9)

However continuing education opportunities are achieved, the design brief for a University staff Videoconferencing Professional Development Program should be that it:

- a. builds on previous experiences of teaching and is relevant to participants educational practice/teaching situation;
- b. encourages reflection on aspects of the learning and teaching process;
- c. models use of active and collaborative learning pedagogies (such as small group work; role place; questioning etc)
- d. engenders confidence in how to use IVC technologies effectively for different purposes;
- e. equips participants' with the educational competencies (knowledge, skills and attitudes) required to building a learning community around disparate groups, using Information and Communication Technology.

Wilson and Stacey (2004) advise that 'for the adoption of new technologies in learning and teaching across an institution, staff development strategies need to focus on achieving a critical mass of staff that are competent online teachers to enhance the institution's capability to sustain the integration of new technologies into learning and teaching practices'. (p.4)

Wilson and Stacey also suggest that **incremental change** may be a realistic approach, tailoring staff development programs to an identified level of need, based on an assessment of existing competency levels. These are classified in 4 Levels from beginner to expert with the content increasing in complexity accordingly.

A list of questions which might usefully be asked by staff faced with the challenge of adopting new technology is given by Wilson and Stacey (2004) as follows:

- Does the innovation indicate an advantage over current ways of doing things?
- Is the innovation compatible with existing needs and expectations?
- Does the innovation make life simpler or at least not contribute to complexity?
- Can the innovation be tried without commitment to completely change the current practices?
- Is the innovation observable and visible to potential adopters? (p.4)

On one hand a videoconferencing network provides the obvious solution to the logistical difficulties brought about by the tyranny of distance and the human and financial costs of staff travel to remote sites. On the other hand, the added layers of complexity in preparation and planning for effective learning and teaching in the videoconferencing environment as illustrated in this literature review should not be underestimated.

Strategic Planning for ICT at Monash University

Monash University is beginning to adopt a much more coordinated, collaborative (cross-faculty) approach to examining the uses of ICT within education as is evidenced by the formation of the Educational Technology Committee (ETC) in 2006.

In 2006 the university had little process to guide innovation, development and implementation of ET. Such processes are needed to guide the strategic initiatives of the university. The Educational Technology Committee (ETC) was established to provide an interactive forum for staff from faculties and departments across the university. In 2007 a part-time administrative coordinator was employed to support the work of the ETC. The facilitation of

the development of an Educational Technology Framework (hereafter “the Framework”) became a role of the ETC.

The purpose of the Framework is to ensure development of technology, for the purpose of advancing learning and teaching, is of a high quality and aligned with the needs of Monash's unique character as a research-led, international and multi-campus university. Such developments should encompass, but not be limited to, emerging educational technologies, innovations in teaching practice, pedagogy, collaboration, communication and mobility. (Education Technology Committee, 2007)

Work undertaken by this project will seek to align with the strategic goals not only of the School of Rural Health and Faculty of Medicine, Nursing and Health Science but will also where possible, seek to build collaborative partnerships and share resources with other faculties and the Education Technology Committee.

Summary

Learning and teaching via videoconference differs from face-to-face teaching principally by the additional layers of planning and coordination required. To actively engage students across distributed learning sites, high priority must also be given to the use of varied interactive learning and teaching strategies.

At its best, videoconferencing can be viewed as an innovative educational tool and collaborative learning environment rather than an annoying intrusion of technology. Encouraging active engagement and participation in learning communities via a videoconferencing network requires thoughtful integration of contemporary, student centred learning and teaching methods with emerging ICT technologies. As Luck (1999) argues, we need to maximize the distinctive contributions of interactive videoconferencing ‘that are not present in other communication media available to teaching staff’ (p.1 of 7). Effective facilitation of ‘interactive videoconferencing’ calls on teachers to reconsider and possibly re-evaluate their previous learning and teaching

experiences. Well structured and identifiable educational technology support structures, educational policies and staff development strategies are also needed to: (a) facilitate educational change; (b) create and sustain supportive, student-centred learning environments and practices; and (c) maximise the use of multi-media instructional tools.

Relatively few of the articles reviewed directly addressed *approaches* to staff development in the use of education technology. Reports of educational change strategies which influenced the rate of its adoption and successful, wide-scale uptake were also limited. It appears that the pedagogical and professional education complexities remain largely unexplored. Indeed according to Greenberg (2004), there is an urgent need for systematic research into the effective use of video-conferencing in distance education and for investigation into the barriers and facilitators that impact on high quality learning and teaching in these environments. This project goes some way towards identifying and addressing these issues.

Appendix

Key Roles and Competencies for Effective Teaching in the Videoconferencing Environment

Key educational roles/competencies for effective use of the VC environment include:

- 1. Content facilitator.** Concerned with directly facilitating the learners growing understanding of course content and approaches to learning;
- 2. Technologist or ‘Director’.** Capable of using IVC technologies (camera and peripheral devices) appropriately to enhance the learning environment and learning process. Requires a balance between diversity of use (for active learning) and intrusion due to over-use. Strive for ‘invisible’ technology.
- 3. Designer:** Capable of designing relevant interactive learning experiences, assignments and assessment tasks. Must develop and gain ownership of a VC ‘Planning Matrix’ which can serve as a guideline and future checklist for lesson planning using IVC – covering all aspects (logistics, technology, etiquette, teaching strategy, evaluation)
- 4. Process Facilitator:** Capable of creating a safe and supportive environment which is conducive to interactive learning: An ‘interactive Learning Community’. Personalise the learning environment by welcoming, establishing ground-rules, maintaining a sense of the presence, inclusion and value of the contribution of all participants, and modeling social behaviour.
- 5. Team builder.** Able to use a team approach to planning and achieving effective learning; Team comprises teaching staff at each site plus network of technical and educational support staff. If not already existing, this network should be built

- 6. Reflective Practitioner.** Able to evaluate own performance, pedagogy and technology and seek feedback from peers and students with the aim of identifying opportunities for further improvement or new innovations.

Adapted from the work of Goodyear et al 2001, cited in (Wilson & Stacey, 2004 p5)

BIBLIOGRAPHY

- Andrews, T. (2002). Using Videoconferencing for Teaching and Learning. *Teaching and Learning in Higher Education Series*
- Aveling, N., Frylinck, D., & Walsh, B. (1993). *New Technologies, new structures: videoconferencing as a teaching tool*. Paper presented at the AARE Conference 1993. from <http://www.aare.edu.au/93pap/aveln93009.txt>.
- Birden, H., & Page, S. (2005). Teaching by videoconference: a commentary on best practice for rural education in health professions. *The International Electronic Journal of Rural and Remote Health Research, Education, Practice and Policy*, 5(356).
- de Godoy, S., Costa Mendes, I. A., Hayashida, M., Nogueira, M. S., & Marchi Alves, L. M. (2004). In-service nursing education delivered by videoconference. *Journal of Telemedicine and Telecare*, 10(5), 303 - 305.
- Education Technology Committee. (2007). *Draft Monash Education Technology Framework*.
- Edwards, H., Webb, G., & Murphy, D. (2000). Modelling practice: Academic development for flexible learning [Electronic Version]. *International Journal for Academic Development*, 5, 149 - 155. Retrieved 17 July 2007 from <http://dx.doi.org/10.1080/13601440050200752>.
- Gill, D., Parker, C., & Richardson, J. (2005). Twelve tips for teaching using videoconferencing. *Medical Teacher*, 27(7), 573 - 577.
- Greenberg, A. (2004). *Navigating the Sea of Research on Video Conferencing-Based Distance Education. A Platform for Understanding Research into the Technology's Effectiveness and Value (White Paper)*: Wainhouse Research, Polycom Incorporated (sponsor).
- Griffiths, T., & Guile, D. (2003). A connective model of learning: the implications for work process knowledge. *European Educational Research Journal* 2(1), 56-73.
- Laurillard, D. (2002). *Rethinking University Teaching* (2nd ed.): Routledge.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge U.K.: Cambridge Press.
- Luck, J. (1999). *Teaching and Learning using Interactive Videoconferencing: Screen-based Classrooms Require the Development of New Ways of Working*. Rockhampton: Australian Association for Research in Education.
- Luck, J. (2000). *Building a Learning community Using Interactive Videoconferencing*. Rockhampton: Central Queensland University.
- Luck, J. (2003a). Does geography shape the nature of an educational innovation, *Journal of Research in Rural Education*, 18(7), pp.152-158.
- Luck, J. (2003b). Performing Teaching and Learning Using Interactive Videoconferencing. In B. A. Knight & A. Harrison (Eds.), *Research Perspectives on Education for the Future* (pp. 83-97).
- Luck, J. (2003c). *You think you have problems with your research participants? My research subjects don't have a pulse!*, Central Queensland University, Rockhampton
- MacIntosh, J. (2001). Learner concerns and teaching strategies for videoconferencing. *The Journal of Continuing Education in Nursing*, 32(6), 260 -265.

- McKinney, S. H. (2000). *Interactive Videoteaching: a guide for educators*: Charles Sturt University.
- Robertson, D., McCannon, R., Caldwell, J., Juwah, C., & Elfessi, A. (2005). Transatlantic Collaborative Teaching and Learning via Information and Communications Technology. *British Journal of Occupational Therapy*, 68(10), 438 - 446.
- Rowan, L. (2000). Surfing Electronic Waves: The Application of Videoconference Technology in Tertiary Teaching (Publication. Retrieved 10/07/2007, from multiBASE: <http://ultibase.rmit.edu.au/Articles/online/rowan1.htm>)
- Thoesen-Coleman, M., O'Brien, J., & Wright, B. (2004). Teaching geriatric medicine through videoconferencing. *Medical Education* 38, 545 - 576.
- Tiwari, A. (2003). The use of videoconferencing to enhance student learning. *Journal of Telemedicine and Telecare*, 9(1), 59 - 61.
- Webb, G., & Murphy, D. (2000). Organisational approaches to staff development to support teaching and learning. *Teacher Development*, 4(1), 15 - 29.
- Wilson, G., & Stacey, E. (2004). Online interaction impacts on learning: Teaching the teachers to teach online. *Australasian Journal of Educational Technology*, 20(1), 33 - 48.
- Zundans, L., & Wright, N. (2002). *Can Big Brother Watch? The Challenge of Interactive Video Teaching*. Paper presented at the Australian Association for Research in Education annual conference.