Connecting teachers in remote Australia: Challenges in realising the potential of videoconferencing

Chris Reading
SiMERR National Centre, University of New England

Andrew Fluck
SiMERR-Tasmania, University of Tasmania

Sue Trinidad
SiMERR-WA, Curtin University

Neil Anderson
SiMERR-Queensland, James Cook University

Bruce White
SiMERR-SA, University of South Australia

Most teachers recognise the benefits of meeting face-to-face for professional learning activities. However, for teachers in remote locations in Australia the vast distances that need to be travelled for such meetings are prohibitive. The potential of videoconferencing was utilised in a national project to provide teachers in remote schools with quality professional learning experiences. This paper aims to highlight the challenges that inhibit the use of videoconferencing for professional learning experiences for those most likely to benefit, the teachers in remote schools. Firstly, is a description of the potential for the use of videoconferencing to enable and enhance professional learning experiences for teachers, especially in remote locations. Secondly, is a synopsis of the videoconferencing facilities available for teachers in schools in five Australian states. Especially important is the difference between what is possible for remote schools compared to their urban counterparts. Thirdly, is the anticipated professional connection of teachers in a national project on the use of social computing to enhance learning in remote Australia. Finally, the actual experiences of teachers from the schools in each state involved in the project shows how the challenges of remote location connection to videoconference links hampered teacher participation in the professional learning experiences.

INTRODUCTION

Videoconferencing offers an as yet untapped potential to enhance professional learning experiences for teachers in remote Australia. However, the current state of videoconferencing facilities for teachers in Australian schools does not necessarily facilitate communication across states/territories or between education systems. A national project, designed to promote the use of social computing for student learning, also included a component to use videoconferencing to facilitate the professional connection of teachers. The actual experience in the five states involved was less than optimal with various challenges hampering teacher participation. This paper profiles availability of videoconferencing in each of these states and presents case studies of attempts to connect for professional learning activities during the project.

VIDEOCONFERENCING TO ENHANCE PROFESSIONAL LEARNING FOR TEACHERS IN REMOTE SCHOOLS

Connecting teachers in isolated areas with other teachers for professional learning activities comes at a large cost (time and money) when travelling is involved. Videoconferencing is one option for connecting teachers at a reduced cost. Three critical factors for optimal teacher professional learning
are: working with peers towards a common goal (Dale, Robertson & Shortis, 2004, p. 466; Moyle, 2006, p. 26), building a sense of community (McPherson, Wizer & Pierrel, 2006), and providing sufficient time to reflect and share in a professional community (McPherson, Wizer & Pierrel, 2006, p. 29). Although online communication tools, such as forums, can provide an environment that contributes to addressing these critical factors, researchers are finding that teachers need opportunities to communicate face-to-face to strengthen their involvement in professional learning activities (see, e.g., Henderson, 2006). Ideally, the face-to-face communication would involve the teachers meeting in one place geographically but this is costly for teachers in remote schools. Videoconferencing is a viable alternative. Despite the obvious benefits of videoconferencing for teacher professional learning there is still little evidence of implementation in remote schools. For example, teachers in four remote Western Australian schools reported no use of videoconferencing despite lack of professional learning opportunities and geographic isolation being key factors in poor teacher retention (Lock & Forlin, 2006). A critical factor in utilising videoconferencing for teacher professional learning is the quality of the facilities.

VIDEOCONFERENCE FACILITIES AVAILABLE TO SCHOOLS

The current status of videoconferencing facilities for schools varies considerably across states/territories and between education systems. Following is an overview of the situation in New South Wales, Tasmania, Western Australia, Queensland and South Australia. The information in these overviews was prepared by key university personnel in each state from their experiences working with schools and from direct contact with relevant education personnel in the government, Catholic and independent sectors.

New South Wales
In NSW some government schools are making regular use of dedicated videoconferencing equipment while non-government schools have focused on experimenting with low-cost, internet-based, alternatives. Of the 462 NSW Department of Education and Training (DET) videoconference sites, 52% are in schools. Most are located in non-metropolitan areas and many schools have more than one videoconference connection. This means that only a minority of the approximately 2200 schools has access to videoconferencing facilities. The NSW DET has a well-structured state-wide standards-based videoconference network that facilitates learning and work commitments for both students and teachers. In particular, teachers are able to connect within and outside the DET network for professional learning. The state government’s Connected Classrooms has committed to providing videoconferencing facilities for all public schools (by 2011) to broaden and extend the provision of education options. Funding has also been allocated to increase bandwidth, security and reliability of the DET Wide Area Network (WAN) to better support initiatives.

Although only a small number of independent schools have dedicated videoconferencing equipment, the Association of Independent Schools (AIS) is encouraging schools to explore videoconferencing, via Internet Protocol (IP), using the Industrial Supplies Office WAN (ISONet). Connections have been established between schools and internationally but strong technical support is required to ensure protocol between systems. Teachers currently engage in professional learning as they work towards introducing videoconferencing for student use and formal AIS professional development programs are ready to be delivered via videoconferencing. At this stage there has only been minimal use of videoconferencing in Catholic Schools in NSW. The NSW Catholic Education Commission (CEC) focus now is to experiment with the use of web-based connections between schools for videoconferencing to minimize infrastructure costs. The National Education Commission Technology Network is being used to support this experimental work but lack of suitable broadband capabilities is still an issue for remote schools.

Tasmania
Internet connectivity for Tasmania’s 215 government schools and colleges is generally excellent. They can use low-quality videoconferencing based on Microsoft Communicator to make calls between personnel with accounts on the central Exchange server. Only six schools have dedicated
videoconferencing equipment. Most are connected to ISDN lines at 128k or faster, with one school equipped with new IP-based equipment. Generally, these six schools can connect to other Tasmanian government schools and call costs are paid centrally. Some additional remote schools have permission to use videoconferencing equipment in associated Health Department premises. This access is difficult (locked rooms and cabinets) or involves travel (three kilometres in one case). Despite this range of videoconferencing provision, the Manager Schools and Client Information Technology Support, Information Technology Services for the Department of Education reported that schools make little use of the systems available.

Distance Education Tasmania makes extensive use of a Centra videoconferencing server. Most of the 200 or so students have regularly scheduled group and/or individual lessons in Centra, monthly school assembly, and scheduled times for an online student common room with a teacher in attendance. All teachers are expected to make use of Centra. Video is not always used due to the impact on bandwidth. The four Learning Services regional administration offices have ISDN videoconferencing equipment, but this is not used extensively.

Western Australia

Currently the Department of Education and Training (DETWA); the Association of Independent Schools of Western Australia (AISWA) and the Catholic Education Office (CEO) have set up telecommunications networks to improve learning opportunities for students and administrative services for staff. The aim is to provide a virtual private network (VPN) with access from anywhere, anytime and ultimately to reduce the feeling of professional and social dislocation experienced in isolated communities. The full potential of videoconferencing and Voice over Internet Protocol (VoIP) has yet to be explored by many schools. The CEO VPN has successfully implemented videoconferencing opportunities through Centra to its 158 schools and provided professional learning via videoconferencing. The School of Distance Education (SIDE) makes extensive use of Centra to offer the largest coordinated network of Telecentres in the world with over 100 regionally operated centres, 60 with dedicated Polycom equipment. The Telecentres provide core services and can videoconference point-to-point at no charge or use the government-provided bridge service to link more than two Telecentres incurring charges for all parties.

The issue of providing reliable, low-cost connectivity remains but connectivity should improve with two government initiatives, the state-wide broadband networking strategy and Connect Australia funding. The State Government committed “to provide reliable, high-speed and affordable broadband access, no matter where they live” (Carpenter, 2006) by installing a network similar to Alberta’s SuperNet. In August 2007 the Federal Government announced the funding for broadband infrastructure in 88 Catholic and Independent schools in rural, regional and remote WA (Coonan, 2007). Managed by the CEO of WA, in partnership with the AIS of WA and the WA Department of Industry and Resources, The Bush Schools Network project will allow schools, whose students are predominantly Indigenous, to receive new or upgraded satellite services to remote areas not served by landlines. This project will allow students to participate at an affordable cost in the online learning services offered by the CEO to help further close the digital divide currently experienced in a geographically vast state (Trinidad, 2007).

Queensland

Queensland’s use of videoconferencing for teacher professional learning dates back to Gibson’s trial (1995, cited in Anderson, 2000) using temporary microwave links to enable interaction between groups of pre-service educators at the University of Southern Queensland and clusters of rural schools. By simulating a window into rural classrooms, the project facilitated viewing of teaching in rural schools and enabled two-way discussions. Since 1995, videoconferencing for professional learning became secondary to the videoconferencing for the delivery of secondary school subjects. This use grew in popularity as it meant that curriculum specialists in larger schools could deliver subjects to smaller schools, e.g., teachers in Brisbane delivering physics classes to students at Thursday Island. These video links commonly utilized three dedicated ISDN lines and consequently incurred a substantial monthly rent from the telecommunications provider.
In 2000, a project entitled ‘virtual schooling’ trialed a model of subject delivery that utilized audioconferencing in combination with web resources (Lundin, 2000). Smith (2002) reported on the success of the ‘virtual schooling’ project. Virtual schooling meant that schools (mainly in the state system) no longer used their videoconferencing units for subject delivery and consequently cancelled their service contracts as costs could not be justified. In the Catholic and Independent systems the high cost of ISDN links means limited use of videoconferencing, although some sites remain active, e.g., eight rural sites link to Toowoomba city for teacher professional learning. In recent times the potential of video over IP at low cost has encouraged educators from the different sectors to reconsider the potential of videoconferencing and has led to planning and the purchase of equipment for trials in Cairns, Townsville and Brisbane. Lack of bandwidth is an issue, so the trials take place after school hours when network demand is lower.

South Australia

The South Australian Department of Education and Children’s Services (DECS) schools have access to two systems with videoconferencing capabilities, Centra and Polycom. Centra is currently used more for online learning and online events using audioconferencing, while Polycom has become the preferred videoconferencing tool. Schools have installed two different Polycom units. One is software-based and used in conjunction with a computer and webcam. The other is a hardware/software system suitable for a classroom. The schools connect through the internet via DECS eduCONNECT to the DECS bridge and are able to book sessions online. The units are mainly in country schools and some country districts use videoconferencing to deliver subjects across schools and for meetings. The use of videoconferencing is being strongly promoted by DECS and the Learning Technologies unit is offering training in the use of the equipment and how to facilitate meetings and classes. ‘Monday Night Mathematics’ trialled professional learning by videoconference for mathematics teachers. The main issue has been bandwidth as 384kbs is needed for good quality but the schools only have 512kbs and so significant problems occurred during school hours. Catholic Education SA (CESA) country schools have access to teleconferencing facilities using Polycom. Teleconferences are facilitated for professional learning opportunities, conferencing and collaboration. Presently, the technical infrastructure for schools within the CESA network does not allow for web conferencing. Future planning is to use Oracle ‘Collaboration Suite’ for desktop sharing and also to develop facilities for face-to-face web conferencing for schools within the CESA network.

ANTICIPATED PROFESSIONAL CONNECTION OF TEACHERS

The Social Computing Enhancing Learning in Remote Australia Project, funded by the National Centre of Science, Information and Communication Technology, and Mathematics Education for Rural and Regional Australia (SiMERR), provided professional learning support for teachers in remote Australian schools to incorporate social computing into their students’ learning. The project (scs.une.edu.au/web2.0/) was implemented in five different states. The various activities in the project aligned with seven specific ‘events’ designed to support the teachers’ professional learning by fostering connection between the teachers and with university-based critical friends. Three events were videoconference-based: awareness raising, sharing of progress in planning student learning experiences, and sharing case studies from each school. Two separate groups of four to five teachers progressed through the events but then combined for the final videoconference event. The challenge with this project was to connect the teachers, across different states and education systems, in videoconference sessions hosted by the University of New England’s (UNE) Tandberg-based professional full-screen videoconference facilities. Actual experiences in the schools involved and the benefits and recommendations for addressing the challenges of using videoconferencing are described. This report is based on data collected from observations made by critical friend as they assisted schools to connect to the videoconference events and from teacher evaluations (collected in a Wiki) of the events.
ACTUAL EXPERIENCE

Following are case studies, for each state, of the experiences for the teachers as the project attempted to connect their schools to UNE for the professional learning events.

New South Wales (one school)
While the Catholic Primary School involved did not have dedicated videoconference equipment the plan was to use internet-based tools to connect. The school downloaded and installed a browser-based solution, XMeeting, and purchased a webcam. This provided effective Internet Protocol (IP) videoconference connection to dedicated videoconference equipment or to individual computers with XMeeting/NetMeeting installed. Establishing settings that allowed these connections to take place was challenging for the teachers, who were assisted by a local educator with some technical expertise but limited videoconference experience. However, as the school was in a remote area, the internet connection had reduced effectiveness during the day while other activity was also making demands, or when the connection tried to cope with IP input that included detail from multiple sites. The excitement of the teachers was obvious when they first connected but disappointment followed when the video signal failed and only audio was available. An alternative considered was the use of dedicated videoconference equipment at the local DET Distance Education School. However, while the system could connect to individual videoconference units at UNE it could not connect to the bridge to support multiple participants in a videoconference. The teachers had to accept a dial-up audio connection but are keen to try videoconferencing in the future. The school hopes to secure dedicated videoconference equipment in the future but in the meantime will have to hope for improved quality IP-based solutions.

Tasmania (two schools)
The problems encountered in the two schools related to connectivity difficulties and social factors. One school was situated in the north-west corner of Tasmania and used ISDN videoconferencing through high-capacity telephone lines. This school was able to dial into the UNE bridge and link with IP-based participants. However, the data-rate was only 64kbits/s, which led to slow responses and grainy video pictures. Participating teachers were not familiar with the equipment, and were not socially comfortable with near-shots. Their faces appeared pixelated for most other participants in the videoconference discussions, and even disappeared when they spoke, since the technology preserved audio at the expense of video. The effect was to reduce their ‘social presence’ in the conversations. The other school proved more challenging to connect. It had a good quality internet connection (10Mbits/s) and new IP-V345 videoconferencing equipment, but as with many schools, the internet connection passed through both a firewall and a content filter which prevented videoconference connections outside the government network. A NetMeeting connection could not be made with UNE in either direction, but Skype was successful. However, due to ‘security concerns’ the school-based technician was not allowed to authorise this software. Skype is incompatible with IP-V345 and the UNE bridge. Therefore permission was sought to open a selective hole in the firewall to connect the school to an external point. This took three months, and was limited to the UNE bridge. Videoconferencing in government schools is highly restricted, needing a booking months in advance for any external call to be made. Access to Web 2.0 real-time communication applications appears to be inhibited for the vast majority of Tasmanian schools.

Western Australia (two schools)
Two major issues experienced by participating teachers were cost of the broadband and connectivity. Broadband is expensive for videoconferencing as it consumes the download allowance, especially for a remote Independent school connected via a satellite connection. This caused one teacher to withdraw from the project due to the predicted videoconference cost. Connectivity compatibility between the different videoconferencing systems prevented another teacher from connecting to the UNE bridge from CEO Centra due to firewall and connection issues. Teachers from two schools used the Telecentres to successfully access the UNE bridge via the dedicated Polycom videoconferencing system. A cost was incurred if the Telecentre connected to the UNE bridge but no cost to the school was involved if UNE connected to the Telecentre. The teacher who was unable to connect through the
Centra videoconferencing system successfully connected via the Telecentre but had to travel 30 minutes to the neighbouring community to use their Telecentre. This project illustrated that connecting between different systems was difficult unless using a Telecentre and costly connectivity issues remain as a major barrier for teachers to easily videoconference in Western Australia.

Queensland (one school)
Perhaps the most challenging aspect was the lack of available schools with functioning videoconferencing units. A mapping exercise was undertaken to determine schools using videoconferencing and various schools were contacted to determine the level of interest in participating. Although schools reported great interest in the use of social computing tools, they consistently reported that their videoconferencing links had been disconnected due to prohibitive costs and their redundancy in the ‘virtual schooling’ model. One cluster of schools west of Longreach (centred on Jundah State School) indicated they were particularly keen to participate if they could gain assistance in reactivating the three ISDN lines that connected the Sony videoconferencing unit. Approval was gained but the school faced a long wait before the telecommunications company could place a technician in the remote area to undertake the work. Unfortunately the reconnection was not successful due to a technical problem with the installation, necessitating another lengthy delay. After a number of visits the technical problems were only partly overcome as not all three ISDN lines were functional. This resulted in lower picture quality. Dealing with the technical problems illustrated the difficulties that exist in connecting and maintaining systems in the ‘bush’ and resulted in frustrations and delays in joining the project. Despite the initial problems, teachers responded with much enthusiasm once they could link with the other participants across Australia and have decided that the cost of maintaining the link is worthwhile.

South Australia (two schools)
The project tried to involve two DECS schools, both had Polycom videoconferencing units that had been successfully used between DECS schools. While the use of videoconferencing between schools has become much easier, accessing the system externally proved to be more difficult with a number of technical issues resulting in no successful connections. When the project started the DECS system did not allow internet access from external videoconferencing units. There was however the ability to use an ISDN connection which was trialled successfully by the very helpful teams at DECS and UNE. Unfortunately when the time came for the videoconference event, there were technical issues that did not enable a connection to be made. Since then DECS have installed an upgrade to the system which now allows for external units to easily connect to their system via the internet. This has been successfully tested and while too late for the project does mean that it can be used in the future. While the video link was not successful one of the schools was able to connect via telephone and participate. This feature proved to be very useful as a backup and was also used by others during the project. The issue of bandwidth still remains and so needs to be addressed if videoconferencing is to become a useful one in overcoming the disadvantages of distance.

BENEFITS
Teachers were asked to evaluate their videoconference experience by posting to a Wiki. Benefits to teachers of using videoconferencing to compensate for lack of face-to-face meetings included practice in connecting using videoconference equipment and professional connection with like-minded people across Australia. In fact, the best aspect was identified as being able to connect in ‘real-time’ with other teachers and experts for professional affirmation. Teachers were assisted in their use by their previous videoconferencing experiences and having ready access to technical experts.

RECOMMENDATIONS FOR ADDRESSING CHALLENGES
Various challenges were identified during the project and those that were more commonly recurring across states are considered. These are outlined along with recommendations for addressing them:
• **Increase bandwidth** – connections available to schools appear to be reasonable for one-to-one communication but falter and/or reduce in quality for many-to-one;

• **Improve visual quality** – while sound quality was generally very good, the visuals were disappointingly pixelated and no visual was considered preferable to poor quality;

• **Reduce connectivity costs** – although connectivity is improving, the cost of connection for remote locations is prohibitive;

• **Improve technical service** – people in remote locations deserve, but currently do not receive, the same telecommunications technical services as urban counterparts;

• **Open up system security** – while many videoconference systems are being designed so that there is effective connection within the system, there is often limited ability to connect with other systems which effectively restricts the possible audience;

• **Develop clear protocols** – time delays and unscheduled disconnections mean that there needs to be clearer directions for dealing with the unexpected; and

• **Develop expertise with own equipment** – regular practice with equipment is needed for teachers to become more comfortable with dealing with technical issues as they arise.

**CONCLUSION**

Although only a small number of schools were involved in this national project, they were all geographically remote and located in five of the eight Australian states/territories. The variety of experiences and accompanying challenges, even within this small group of schools, indicates that state/territory-level education authorities need to rethink technical facilities and policies to optimise the use of videoconferencing to connect teachers across Australia for professional learning. The fact that the identified challenges focused on technical aspects indicates that the participants were early adopters of videoconferencing. Addressing these challenges would assist participants in future projects to use videoconferencing for learning purposes.

More projects are needed that support teachers in using videoconferencing for professional learning and schools in using videoconferencing to connect across systemic (state/government/independent) and geographic (state/territory) boundaries. However, this will not be enough. To allow the flexibility required for teachers to have fast, reliable and national-level connections, changes are needed to the quality of communication technologies in remote locations and to technology-related policies that restrict inter-system and inter-state connections.

**REFERENCES**


