

Windows into classrooms: using ICT to facilitate regional, rural and remote practicum and teacher professional learning

Abstract

The purpose of this study was to field-test several conferencing technologies in regional schools in Victoria to determine whether the technologies are appropriate for the needs of the university supervisor, trainee teachers and supervising teachers with regard to practicum placements. The study also explored the potential of technology for other related purposes.

Three technologies (m-View, Skype, Adobe Connect) were trialed. Pre-service teachers reflected on the conferencing experience and university supervisors compared the remote supervision using the technologies with traditional on-site supervision. This paper describes the findings of the project and suggests implications for professional experience and pedagogy.

INTRODUCTION

Field experience or teaching practicum is an important component of pre-service teacher (PST) education in preparing future teachers for the complexity and rigors of teaching. However it remains a challenge to locate and place PSTs in appropriate field settings. It is impossible to guarantee that they will have the opportunity of being supervised by talented teachers and faculty members. Other challenges include: finding appropriate supervising teachers to mentor PSTs, issues concerning scheduling problems and disrupting the classroom environment (Kent, 2007; Knight, et al., 2004). Faculty demands for research output, teaching workload, the need to keep costs down and the need to supervise a large number of PSTs also mean that the university supervisor is not always available to undertake supervision. The challenge is compounded when supervisors need to travel long distances for on-site supervision in rural and remote regions. Technology such as video conferencing may have the potential to address some of these challenges.

Video conferencing has been widely used in educational settings since the mid-1980s. Much of the literature on the use of video conferencing for practicum supervision is US-based and involved proprietary and expensive equipment such as the Polycom Viewstation system (for e.g., Lehman & Richardson, 2007). The purpose of this study was to field-test several asynchronous and synchronous video conferencing technologies in schools to determine whether the technologies are appropriate for the needs of the university supervisor, the PST and the supervising teacher in the school. This study was guided by three research questions:

1. What are the strengths and limitations of these technologies?
2. What training and support is required in order to use these technologies effectively?
3. What is the potential of these technologies for professional experience pedagogy and beyond?

This paper briefly reviews the literature on the benefits and limitations of video conferencing in practicum supervision. It then describes the participants and the schools participating in the study. A discussion of the methodology follows. Finally the findings on the use of the three technologies, m-View, Skype and Adobe Connect are reported and conclusions are drawn.

LITERATURE REVIEW

The literature provides a number of insights. Of particular interest are the benefits and limitations of the use of video conferencing for practicum supervision, Falconer and Lignugaris/Kraft (2002) categorized the benefits as observation benefits, communication benefits, and nature of system benefits. Nature of system benefits has been re-categorised into 'technology' benefits and 'system' benefits and the list of benefits is supplemented with the inclusion of other cited benefits.

Observation Benefits

- *Observation of teaching from a remote site.* Instead of spending time

and money travelling to a distant school, supervisors can now observe teaching in a diversity of school sites from the comfort of the supervisor's office (Barron, 2009).

- *Watch other experienced teachers teach.* Instead of on-site observation of teachers in a school, PSTs can now observe exemplary teachers from different schools.
- *Watch other PSTs teach.* Observing and reflecting on their peers' teaching can help PSTs improve their own teaching and classroom management skills (Danielson & McGreal, 2000; Weiss & Weiss, 2001).

Communication Benefits

Communication can be enhanced in terms of frequency, immediacy and type of communication. It can be:

- *Less intrusive to class teaching.* Without the supervisor's physical presence in class, the Hawthorne Effect is minimized as teacher-student interactions can be more natural (Bolton, 2010; Lesley, Hamman, Olivarez, Button, & Griffith, 2009).
- *Facilitating of communication between supervising teacher and supervisor.* The supervising teacher can use the conferencing system to discuss strengths and weaknesses of the trainee teacher with the university supervisor.
- *Used for multiple supervisors to conference with PSTs.* When the need arises, two or more academics can mentor the PST in different areas. Without the technology, this would be cost prohibitive, not to mention upsetting the classroom dynamics with their presence.
- *Used to enable immediate feedback during teaching.* This benefit applies to some video conferencing systems ('bug-in-ear technology') which allows immediate feedback to be provided to pre-service teachers during teaching (Dymond, Renzaglia, Halle, Chadsey, & Bentz, 2008).

Technology Benefits

Falconer and Lignugaris/Kraft (2002) named those benefits arising from using conferencing technology as 'nature of system' benefits. This term is somewhat vague and in this paper the term technology benefits is used in its place to emphasise the usefulness of acquiring the technological know-how per se.



Geoff Romeo
Australian Catholic
University,
Melbourne



Donna Gronn
Australian Catholic
University,
Melbourne



Sue McNamara
Australian Catholic
University,
Melbourne



Yiong Hwee Teo
Australian Catholic
University,
Melbourne

- *PSTs learn an alternative delivery method.* This increased ability to use another technology for teaching and learning provided “PSTs with a balance between pedagogical knowledge and technological knowledge” (So & Kim, 2009).

- *Supervisor can use a chat function with their supervising teacher to discuss performance while practicum student was teaching.* This will avoid disturbing the teaching of the PST.

- *The web conference can be recorded.* PSTs and supervisors can review their lessons after the session thus making possible reflective practice.

System Benefits

From the context of the current research, a fourth category of benefits might be added to the range above: System benefits denotes affordances arising or benefits at the system level or the organizational level of practicum experiences.

- *Enables distant sites to become potential practicum settings.* Using web conferencing forges a connection between universities and schools that may be separated by distance, but not in thinking (Bolton, 2010).

- *Reduced cost of supervisors’ travel.* The number of in-person visits to schools can be reduced or even eliminated for remote sites (Bolton, 2010).

- *Build trusting relationship between school, university supervisor and PST.* The ease of setting up web conferencing can enable the frequent interaction between the university supervisor, supervising teacher and PST which will then result in a more collaborative effort and help to build an open trusting relationship (Clawson & Weiner, 1993).

Limitations of web conferencing

Limitations of web conferencing can be seen in terms of technical, human (Falconer & Lignugaris/Kraft, 2002) and performance factors.

- *Technical Limitations.* The limited angle of view of the web camera may result in the inability to capture the whole learning space (Ardley, 2009). Poor sound quality can also cause issues as most microphones need to be near the sound source for good pickup and inadequate internet bandwidth can also cause audio delay or pixilated video.

- *Human Factor Limitations.* Teachers/Pre-service teachers ideally require a ‘camera operator’ or second pair of hands to operate the technology.

- *Performance Limitations.* Whilst there is a growing literature on the use of web conferencing for practicum supervision, there is however little that compares the efficacy of observation/feedback via technology versus face-to-face.

CONTEXT OF THE STUDY

Four schools (three primary and one secondary) and six PSTs agreed to participate in the study. Of the six PSTs, five were enrolled in Bachelor of Education (Early Childhood/Primary) and one in the Graduate

Diploma Education (Secondary). All PSTs were in their final year of their teaching degrees. Two PSTs trialed m-View; two trialed m-View and Skype; and two trialed Skype and Adobe Connect. Each PST attempted at least two observations for each technology and each was supported by a university lecturer and a supervising teacher. Volunteer schools were from Victorian rural and regional areas. The different locations enabled the study to gauge variation in Internet access.

The initial university supervisors for the PSTs were two members of the research team. Once the technologies were operational, six other university staff were asked to participate in viewing the lessons either live or in recorded format. The particular supervisors selected were chosen because of their experience either with practicum supervision or in specific curriculum areas.

DATA COLLECTION AND ANALYSIS

The data collection instruments included predominantly observations of lessons, accompanied by a PST survey, supervisor survey, audio recording of focus group interview with principals, technicians and teachers, individual PST interviews, video of classroom observations, field notes from participants.

The PST survey sought participants’ feedback on the strengths and limitations of using the technology, and the level of training and support required to use the technology effectively. The survey was emailed to PSTs immediately after the observed teaching episodes and contained 10 quantitative items and 2 open-ended type items. As this study was mainly a qualitative inquiry, the intent of administering the quantitative items was to get a feel of the extent of agreement or disagreement on certain issues and not to generalize beyond the small sample size. The PST interview sought views on the use of microphone, webcam positioning, whether the use of this method influenced PST teaching in any way and the training and support that was required.

The second source of data was the survey completed by the supervisor after they had watched and reviewed the event. As well as seeking strengths and limitations as in the PST survey, the supervisor survey also asked questions about audio and visual elements and the supervisor’s preference for using the technology compared to on-site observation. The supervisor survey also included a section asking about the PST’s planning, preparation and in-class skills that a traditional on-site supervisor would need to do.

A further source of data was a focus group interview with the principal, technician and a cooperating teacher from two of the primary schools which allowed the researcher to seek understanding by exploring and probing participants’ viewpoints in an open but structured environment. The interviews focused on issues such as pedagogy, ethical requirements getting the children’s parents’ permission for their children to participate in an internet video based activity, and the potential and limitations of using a different method of practicum supervision.

FINDINGS FROM THE m-VIEW TRIALS

m-View (<http://www.m-view.com.au/>), runs on 3G mobile networks and allows one-to-many video broadcast. The system broadcasts events in real time over the phone network and allows the user to download the recording from the m-View server for later viewing. This enables it to be used synchronously or asynchronously. The m-View mobile phone system was trialed in both secondary and primary schools. Through an agreement with Telstra, the study had the use of four Nokia E52 phones. At the time of the project, the technology worked with mobile phones which could record video. Before the start of conferencing, the user dialled into the m-View site. Upon successful log-in, video capture and streaming was initiated by activating the relevant app (application) button within the E52 menu. The phone was attached to a small tripod (gorilla-pod) and positioned at the back of the room for a wider capture. The m-View site streamed the footage live and retained the recording for later viewing and download. Supervisors viewed the m-View footage from their desktops.

What are the strengths and limitations of m-View?

It was easy to operate the phone. The small size and portability of the mobile phone for field work is the key strength of m-View. The affordance of play, stop, rewind and sharing functions allowed the recorded clips to be used for reflective teaching, post-conferencing discussion and mentoring, engaging peer review and inclusion in e-portfolios. PST Kathy highlighted the usefulness of using the recorded m-View footage for reflection: "The footage can provide useful feedback/reflection on teaching. I think if I used it consistently, it would help me to develop reflective practice in my teaching". However, there are many limitations of the m-View mobile phone technology platform.

- The signal was sometimes unstable.
- The angle of view was not wide enough to capture classroom dynamics and the peripheral vision of the camera was not sharp. This was exacerbated by any movement of the camera.
- The video resolution was not of a sufficient quality to identify some of the classroom happenings, for example, what was being written on the board.
- The omni-directional microphone in the mobile phone did not allow for discrimination between background noise and the teacher's voice.
- There was a lag time between vision and sound whenever the mobile phone was moved to track classroom activities.

To use m-View, PSTs need to possess some computer knowledge such as how to install an app on the phone before use; how to use the m-View Viewer using a browser to view and download video files; and possess knowledge of video file formats, size and sharing files over the internet. One PST mentioned that "it took about 5 – 10 minutes to find an appropriate position for the mobile camera" and another mentioned that "it would be helpful to have an assistant to control the camera while I teach".

FINDINGS FROM THE SKYPE AND ADOBE CONNECT TRIALS

Due to the similarity of these two web conferencing applications, the strengths and limitations will be discussed together and any differences highlighted. More trials were carried out for these two applications due to their perceived potential compared with other technologies.

The Skype conferencing interface

Skype (<http://www.skype.com>) is a web conferencing program using voice over Internet protocol (VOIP) technology. It is multi-lingual, cross platform and the basic version is free to download. Upon setup, users register for a free Skype account and search for and add their friends' Skype usernames. An instant message is consequently sent to the friends and once they grant permission to be added, the user can connect with them online. For slow connections, the video can be intermittent but audio calls are generally good quality. Skype lacks webinar features like white boards and polls. Text chat and screen sharing are however present in Skype's free version. While Skype lacks advanced features, its simplicity of use and low cost makes it a popular and accessible tool to less technologically experienced users.

The Adobe Connect conferencing interface

Adobe Connect (<http://www.adobe.com/products/adobeconnect.html?promoid=DJDVR>) is a flash-based webinar conferencing software. Adobe Connect requires paid subscription. Several features were found to be useful for practicum supervision. First the moderator can enlarge or shift positions of any of the multiple screens (video, chat, computer screen) to have a larger picture of specific sections of the lesson. Supervisors could enlarge the computer screen image whilst the children were focusing on it and then move back to a larger classroom image when required. Secondly, the use of the chat screen for supervisors to discuss the lesson with each other without disturbing the lesson. In one lesson, there were five supervisors logged in to view the PST in action. They were all able to view

and hear the lesson and the chat area enabled them to exchange ideas and thoughts of the teaching episode.

The video and audio quality of web conferencing applications depend on the webcam and microphone used. Internet bandwidth is also a determining factor. In the trials, both Skype and Adobe Connect delivered good to very good resolution, with Adobe Connect being better. Depending on the quality of connection in schools and the Internet traffic at the time of conferencing, Skype video ranged from good to patchy.

One PST found that a disadvantage of using the built-in laptop webcam was that the screen needed to be open to capture a scene. This resulted in children initially being distracted by seeing their video image on-screen. When using Skype the PST minimized the Skype screen so that the distraction was not an issue, but with Adobe Connect the 'Chat' needed to be visible so the images could not be minimized. Although children were initially distracted, once they were shown the video (after the lesson) they realized they would be seen if they were looking at the camera and so virtually ignored it. The researchers and supervisors were disappointed with the limited angle of view of the built-in camera on the laptop and the difficulty in capturing student voices.

To enable a wider and clearer video capture, an external webcam (Logitech C905) was procured. Both were however not sufficiently wide angled to capture the entire classroom. On the optimum placement of the webcam, the higher the camera could be placed, the wider the vision. To the front and side of the classroom was generally the best compromise.

Audio quality was dependent on the microphone used and the distance between the microphone and the speaker. The PSTs did not use the lower quality built-in microphone of their laptops and the Logitech webcam. Instead a Sony (ECMAW3) Bluetooth wireless external microphone was chosen. The PST clipped the microphone on their clothing and the receiver, which received the signal via Bluetooth, was connected to the laptop via the computer audio jack. The microphone picked up the teacher's voice clearly and the wireless transmission was unimpeded by physical obstruction. The sound pickup of students' responses in the background ranged from 'acceptable' to 'inadequate' depending on the distance of the clip-on microphone to the students.

Fast broadband connection in the school was an important factor to ensure the transmission of the video capture was smooth and not pixilated. The technicians at each primary school reported that they have fibre optic connections of 10MB/s maximum bandwidth allocation to the school. Within the schools, both wireless and LAN connections were available.

What are the strengths and limitations of Skype and Adobe Connect?

Compared with m-View, PSTs needed more computer skills to work with web conferencing technologies. These included: going into the Options menu to pre-test the webcam and microphone settings; adjusting the playback and recording level setting of the soundcard driver; and working the Skype or Adobe Connect software. The PSTs found it easy to use the conferencing software although the Adobe Connect interface is slightly more complicated than Skype. The

PSTs were in their early twenties and it may have taken more time for less experienced technology users. University supervisors need similar technology skills to those described above for PSTs except that they need not have to deal with webcam and microphone placements in the classroom. They would however need to know how to activate the recording function on Adobe Connect or use a third party recording plug-in for Skype (e.g. Pamela for Windows or Call Recorder for Mac).

Skype		Adobe Connect	
Subscription	S Free for basic version	S Most universities have a paid subscription to this or a similar program L Only paid subscription available	
Audio, Video	S Good quality audio and video possible L Audio and video quality dependent on microphone and webcam used and their placement	S Very good quality audio and video possible L Audio and video quality dependent on microphone and webcam used and their placement	
Synchronous	S Real-time viewing of teaching event by supervisor S Feedback can be given immediately after lesson L Only one supervisor can view event unless paid subscription	S Real-time viewing of teaching event by supervisor S Feedback can be given immediately after lesson S Allows multiple supervisors (up to 99) to view event	
Asynchronous	S Recording via third party application allows similar strengths as Adobe Connect L Recording possible only via paid third party application	S Recording within interface for later retrieval S Replay and pausing allows for reflection by PST S Helps in post-conferencing by supervisor	
Connectivity	S Audio and video are good with strong broadband connectivity L Busy Internet or poor broadband will degrade webcast quality	S Audio and video are very good with strong broadband connectivity L Busy Internet or poor broadband will degrade webcast quality	
Other	S Easier to use than Adobe Connect L Did not have as many functionalities as Adobe Connect	S Flexibility of screen options; allowing customization, enlarging or shifting positions of multiple screens S Integration of white boards and polls L Harder to use than Skype	

Table 1: Comparison of Skype and Adobe Connect (S = Strengths and L = Limitations)

CONCLUSION AND DISCUSSION

What s the potential of these technologies for professional experience pedagogy and beyond

For the m-View system, limitations far out-weigh the strength (portability) in the classroom environment. Both Skype and Adobe Connect shared many similar traits and were found to have more strengths compared with m-View. As versatile web conferencing

applications, they are both cross platform, capable of synchronous and asynchronous broadcast of classroom teaching, and offer good audio and video resolution. The caveat is that they require good broadband Internet connectivity. Resolution of audio and video is dependent on the choice of microphone and external webcam, and their placement in the classroom. Skype would be the second option if subscription cost is a concern and/or ease of use is the most important consideration. Overall, feedback from university supervisors, trainee teachers and supervising teachers has shown that Skype and Adobe Connect are the favoured options with regard to practicum supervision. Noting the inherent limitations however, it is not recommended that web conferencing to be used as a complete replacement for on-site supervision.

The project has supported findings of other projects cited in the literature on the benefits of conferencing such as not having to commute, engaging external consultants, non-obtrusive observation, PST improving computer literacy and using recordings to help teach other PSTs. It established that technologies can be used to effectively deliver data from the field (the classroom) to base (the university) synchronously and asynchronously and that PSTs can, under some circumstances be effectively supervised from a distance using technologies. The question of whether remote supervision of practicum can compare to face-to-face visitation remains a complex issue. The project has allowed the researchers to 'unpack' the various dimensions of the interaction, from exploration of the physical capabilities of vision and sound to the cognitive and affective considerations of elements such as classroom organization and the dynamics of a learning conversation between teachers and students in the classroom setting. Perhaps even more importantly the study has provided some very powerful insights into possible required mindsets and learning which will need to become fundamental considerations in pre-service teacher education in the near future.

The study has raised a number of other investigations for the future that can add to our understanding of the potential and requirements of using technology in professional experience. The trials indicated that both students and staff may benefit from prior awareness of the expectations of the technology and operational training so as to maximize its usage, whilst minimizing its influence on the nuances and dynamics of the classroom learning. Approaches might be explored which will pedagogically make the equipment a seamless part of the learning environment so that children, PSTs and supervisors are not distracted by the technology from the true focus of the episode – teaching and learning.

A further consideration that the study raises is that of the design of future classrooms, and appropriate desktop access in universities, to multiple camera classrooms in which the various positions of a class might be accessed via remotely controlled cameras. Audio capability might be a further design feature in these environments. In tandem with such developments, facilities in universities might well be used to train pre-service teachers prior to practicum, in order to neutralize distraction. In essence the 'wired' classroom' of the future could make the experience of practicum seamless in the education of teachers at all levels of their careers.

From an academic perspective, the application of the technology has the capability of becoming a central focus of pre-service teacher education courses, rather than a separate, and often silo designed experience seen predominantly as 'practice' time rather than pivotal to the whole of pre-service teacher education. In maximizing the practicum experience, similar education technology premises and processes may be applied to the academic involved in supervising practicum, and to the supervising teacher in the school. Whilst the use of technology 'opens the doors' for the PST, for both the academic and supervising teacher it provides a wealth of opportunities for reflection and the generation of new awareness and possibilities in their own dimension of the pre-service teaching practicum.

This project was funded by the Department for Education and Early Childhood Development (DEECD), Victoria.

References

- Ardley, J. (2009). Unanticipated Findings: Gains by Cooperating Teachers via Video-Mediated Conferencing. *Journal of computing in teacher education*, 25(3), 81-86.
- Barron, A. (2009). A teacher's guide to distance learning. Retrieved Jul 7, 2011, from <http://fcit.usf.edu/distance/default.htm>
- Bolton, M. (2010). Fly on the Wall: Using Teleconferencing to Supervise Student Teacher Performance. *Journal of Open, Flexible, and Distance Learning*, 14(1), 62-76.
- Clawson, B. N., & Weiner, A. M. (1993). Two-way, interactive A/V applied to the supervision of student teachers. *Technological Horizons in Education Journal*, 20(11).
- Danielson, C., & McGreal. (2000). *Teacher Evaluation: To Enhance Professional Practice*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Dymond, S. K., Renzaglia, A., Halle, J. W., Chadsey, J., & Bentz, J. L. (2008). An Evaluation of Videoconferencing as a Supportive Technology for Practicum Supervision. *Teacher Education and Special Education*, 31(4), 243-256.
- Falconer, K. B., & Lignugaris/Kraft, B. (2002). A Qualitative Analysis of the Benefits and Limitations of Using Two-way Conferencing Technology to Supervise Preservice Teachers in Remote Locations. *Teacher Education and Special Education*, 25(4), 368-384.
- Kent, A. M. (2007). Powerful Preparation of Preservice Teachers using Interactive Video Conferencing. *Journal of Literacy and Technology*, 8(2), 41-58.
- Knight, S. L., Pedersen, S., & Peters, W. (2004). Connecting the university with a professional development school: Pre-service teachers' attitudes toward the use of compressed video. *Journal of Technology and Teacher Education*, 12(1), 139-154.
- Lehman, J. D., & Richardson, J. (2007). *Assessing the Use of Video Conferencing for Linking Teacher Preparation Programs with K-12 Schools*. Paper presented at the AECT Conference.
- Lesley, M. K., Hamman, D., Olivarez, A., Button, K., & Griffith, R. (2009). I'm prepared for anything now: Student teacher and cooperating teacher interaction as a critical factor in determining the preparation of "quality" elementary reading teachers. *Teacher Educator*, 4(1), 40-55.
- So, H., & Kim, B. (2009). Learning about problem based learning: Student teachers integrating technology, pedagogy, and content knowledge. *Journal of Educational Technology*, 25(1), 101-116.
- Weiss, E. M., & Weiss, S. (2001). Doing Reflective Supervision with Student Teachers in a Professional Development School Culture. *Reflective Practice*, 2(2), 125-154.

Authors Note**Geoff Romeo**

Professor Romeo has a PhD from Monash University. He is the editor of Australian Educational Computing, a past board member of the Australia Council for Computers in Education, and a past President of ICT in Education Victoria (ICTEV). In 2004 Professor Romeo received state and national awards for outstanding leadership in ICT in education and was made a fellow of the Australian Council of Computers in Education in 2010. He joined the Faculty of Education at the Australian Catholic University as the Associate Dean, Teaching and Learning in 2010.

Donna Gronn

Dr Donna Gronn is Senior Lecturer in ICT Education at Australian Catholic University. Since 2008 Donna has held a 0.5 role either at university or faculty level as a mentor to staff in elearning. In 2013 Donna has the 0.5 faculty position of Academic Coordinator - Virtual Hub. Donna's research focuses on professional development within ICT and currently the role of a broker in mentoring relationships.

Sue McNamara

Associate Professor Sue McNamara works in the Faculty of Education ACU specialising in research in instructional design, evaluation, narrative and story, complexity and learning design and technology.

Yiong Hwee Teo

Dr Yiong Hwee Teo held various portfolios at the Ministry of Education (Singapore) including Assistant Director (IT Training) and Lead Educational Technology Specialist. He has taught at universities in Singapore and Australia. His research interest is in computer-supported collaborative learning and educational video production.