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ENHANCING MULTIPOINT DESKTOP VIDEO CONFERENCING (MDVC) WITH LESSON VIDEO CLIPS

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Introduction

Being able to watch yourself and others teach and being able to discuss real life examples of teaching with peers and mentors has long been recognised as an ideal in teacher training. Given the logistics of teaching practice placement, however, where trainee teachers are posted in ones and twos to different schools, this ideal has been impossible to achieve. Micro teaching and the discussion of teaching videos have been reasonably good substitutes. Micro teaching, on the university campus, either before or after teaching practice, provides trainees with opportunities to role play and discuss selected teaching skills with their peers. Video clips concretise what can otherwise become abstract discussions (Galbreath, 1996; Miels, 1998). Both have obvious limitations, however, for example role play is artificial and neither it nor the discussion of videos occur at the time when trainees can benefit from them the most, which is during school-based practical teaching. Two recent developments in computer communications technology, however, offer a promising solution to this problem. The first is multipoint desktop video conferencing (MDVC) technology which, as we have argued in earlier papers, (Sharpe 1999, Sharpe 2000) can be used during Teaching Practice as an aid to reflectivity. The second is digital video recording, capturing and streaming technology, which promises to make video clips of teaching more readily available for discussion. Both of these technologies have an important independent contribution in initial teacher training. We believe, however, that additional benefits might accrue from their combination, and it is an attempt at making such a combination that is the focus of this paper.

This paper reports on the current phase of the "Teaching Practice Discourse and Computer Communications Technology Project" which is exploring the feasibility of combining MDVC and the streaming of digital video clips made by conference participants of aspects of their classroom teaching. Because our early experience with MDVC has been documented at length in previous papers, we concentrate in this paper particularly on the making, capturing, transfer and video streaming of digital video clips, drawing out key lessons that we have learnt from the experience.

Overview

Thirteen trainee teachers from the Post Graduate Certificate of Education programme at the National Institute of Education (NIE), Singapore were posted to eight primary schools in School Cluster N2 for their teaching practice from 3 July to 25 August 2000. During the course of the teaching practice they were asked to arrange with a fellow trainee or their school's Technical Assistant (TA) to make one three minute digital video clip each of themselves teaching a specified teaching competency. These clips were then transferred electronically by the school TAs to NIE using File Transfer Protocol (FTP).

At NIE they were edited and placed in a password-protected area of the project WebPage on the project's video server at NIE. Trainees then video streamed the clips and discussed them as part of their MDVC conferences.

Background to the Project

The Teaching Practice Discourse and Computer Communications Project is a two-year NIE research project, fully funded by the Ministry of Education's Education Research Fund. The origins of the project lie in the findings of a 1994 NIE study (Sharpe et al. 1994) which concluded that ways and means needed to be found to improve the quality and quantity of discourse between trainee teachers and their NIE and school-based supervisors during teaching practice. The project has two principal aims. The first is technical and developmental, involving the practical feasibility of putting into place a reliable MDVC system that fully exploits existing technologies. The second aim is pedagogic and is concerned to establish whether and, if so, how MDVC can add value to NIE's Practicum by enhancing the professional preparation of NIE trainee teachers.

The project is a partnership between NIE and School Clusters N1 and N2 and has two parts: the 'Mentor Study' and the 'Pre-Service Study'. The former uses MDVC to link together School Coordinating Mentors (SCMs) at eight secondary schools in Cluster N1. The SCMs are senior school staff who, under NIE's partnership model, have overall responsibility for the management of the Practicum at their schools. The latter, N2 Cluster, uses MDVC to link NIE trainee teachers on teaching practice at different schools to each other and to NIE supervisors/researchers at NIE. The NIE researchers and school staff work in a partnership which involves collaboration on a range of matters such as the purchase and sharing of hardware and software, the timetabling of trainee teachers and the provision of computer support services.

Preparations for the Video Clip Trial

Technical Requirements for MDVC

Being able to conduct multipoint desktop video conferences already presupposes the availability of certain hardware and software, in particular a broadband network and telephone lines, a network server, and end-user hardware and software. The project uses the White Pine CU-SeeMe MeetingPoint server and end-user software. Each school and NIE are linked to the project server over the SingaporeONE broadband network, by ADSL telephone lines provided by SingTel Magix.

Additional Technical Preparations for the Video Clip Trial

In order for the video clip trial to proceed it was necessary to purchase additional equipment and to brief TAs and trainees on its use. Eight of the nine N2 primary schools were involved in this phase of the project. They were each provided with a digital video camera, tripod and digital video capture card. Six of these cameras were able to record digital video to tape whilst simultaneously capturing digital still photographs to a memory card. The remaining two cameras captured directly to a memory card in MPEG1 format. Both allowed uploading of digital video to a PC and subsequent transfer to NIE by FTP in either MPEG1 or AVI digital video format. Briefings were held with the TAs and trainee teachers to demonstrate how to use the cameras and tripods and

where to position them in the classroom, as well as to demonstrate use of the capture cards and FTP. Issues of confidentiality were prominent on the agendas of these meetings. It was stressed that the decision to video stream had been deliberately chosen over conventional file downloading in the interest of security (1). Using video streaming meant that no permanent file would be left on the school computers and that only those with knowledge of the password would be able to watch the clips. Neither would it be possible to copy the video streams. It was stressed also that TAs should delete the clips from their own hard disks once they had been sent to NIE.

Administrative Preparations

A crucial lesson learnt in the early stages of the project was the need to structure both the timing and content of MDVC sessions. An early belief that trainees would conference whenever they needed to, appears very naïve in retrospect. Even for three people to arrange a mutually convenient time to conference has been found to be difficult enough. For six people, it is a virtual impossibility. To overcome this problem, students were placed in groups of four or five trainees from different schools, together with one supervisor/researcher, and a time was set aside each week for each group to meet. These times were blocked off on the trainees' teaching timetables before they were allocated their classes, thus guaranteeing that conferences could go ahead as planned. Similarly, another early lesson was acted on, namely that trainees should be provided beforehand with a conference agenda and asked to prepare in advance for conferences. A different topic was chosen for each of the four weeks of the trial: lesson introduction, questioning and explaining, small group teaching, and overall reflections on the Teaching Practice. Finally, the trainees and TAs were provided with a detailed schedule for the taking and transfer of video clips. Typically, a video clip would be taken on either the Monday or Tuesday of the week prior to it being streamed. On the Wednesday it would be sent to NIE by FTP. On the Thursday it would be edited by the researchers, where necessary. On Friday it would be put onto the video server, ready for streaming the following week.

Pedagogic Preparations

Trainees were each allocated one of the three teaching competencies: lesson introduction, questioning and explaining, or small group teaching. A check list covering a number of teaching behaviours associated with each competency was provided to help them in planning and this was discussed in detail by one of the researchers. Because of the short length of the video clips, the trainees were asked to choose carefully which examples of the competencies they were to incorporate into their lesson clips. Additionally, they were advised to re-shoot at clip if they were unhappy with it.

The Video Clip Trials

Eighteen video clips were made in total, all of the thirteen trainees making at least one each. The clips were between three and four minutes long and, in MPEG format, took approximately 30 minutes each to send to NIE by FTP. At NIE they were converted into Microsoft Advanced Streaming Format (ASF) and then placed onto the project WebPage. Technically and organisationally, this part of the trial went as well as, or even better than, hoped for.

The first attempt to stream a video clip as part of an MDVC session took place at NIE. Five researchers were able to stream a video clip simultaneously during an MDVC conference. The video clip was accessed from the project WebPage, played on Microsoft Media Player Version 7 and appeared superimposed on top of the CU-SeeMe screen on the researchers' computer monitors. Picture and sound reproduction were good, with smooth video and unbroken audio. Participants could watch the video clip and see other participants in the conference at the same time. Once again, from a technical point of view, this first trial of linking together the MDVC and video streaming technologies exceeded our expectations.

Unfortunately, the trials with the schools met with far less success. The first two weeks, which involved six MDVC conferences, presented a number of technical difficulties. Chief amongst these was that the multiple video streaming that had worked so successfully at NIE refused to work when the schools attempted it. At most, two trainees in any one conference were able to stream successfully at the same time. Other conference participants either could not see the picture, could not hear the audio, or even could not access the server at all. After two weeks without success, it was decided to abandon the attempt. Instead of trying to stream video clips simultaneously during the MDVC conferences, it was decided that each participant should video stream independently before the conference, and would come to the conference with notes on what they had seen. This arrangement not only proved to be technically satisfactory but also highlighted to us the value of watching and being able to reflect on video clips prior to the conferences. Technically, then, these results fell far short of our expectations, and the reasons for the failure are still being examined. On the positive side, however, valuable lessons were learnt from the experience and are discussed below.

Despite the achievements in the making, transfer and streaming of video clips, the project continued to be plagued with other technical problems concerning the basic operation of the conferencing system. Poor frame rates and broken audio were the most common. These seemed much worse than in early stages of the project. Narrowing down these problems is an ongoing concern, involving as it does a number of possibilities, such as incorrect software settings, faulty connections, overloaded computers, as well as possible network and telephone line problems. As a result of such problems, it was only possible to discuss video clips at length in four of the six remaining conferences that had been planned for this purpose.

Student Feedback

Immediately after their Teaching Practice, eleven of the thirteen trainee teachers attended a briefing session held at NIE and one who had been ill completed a questionnaire five days later. They were firstly invited to discuss their experiences with the researcher who had chaired their MDVC sessions, following which they were asked to complete an anonymous questionnaire individually(appendix). As a token of appreciation, those trainees who wanted one were given a CD of the video clip(s) they had made.

The Making and Viewing of the Video Clips

All of the trainees found the digital video cameras very ease to use and 'user friendly'. They commented that positioning the camera on a tripod at the back of the classroom with light from the windows behind produced the best video quality. The camera microphone, however, tended to pick up background noise resulting in less than satisfactory audio. TAs had provided excellent support in the majority of cases.

Tables 1-5 summarise the trainees' feedback on the viewing of the video clips that they streamed individually.

Table 1

How many video clips did you watch?

Number of video clips	Frequency
One	-
Two	3
Three	3
More than three	6

Table 2

How easy was it to access the video clips on the project WebPage?

Ease of access	Frequency
Very easy	6
Easy	6
Difficult	-
Very difficult	-

Table 3

Quality of the Video Stream

Quality	Frequency
Smooth	9
Jerky	3
Broken	-

Table 4

Quality of the Picture

Quality	Frequency
Good	2
Adequate	10
Poor	-

Table 5
Quality of the Sound

Quality	Frequency
Good	-
Adequate	6
Poor	6

All the trainees watched two or more video clips. They found the clips 'very easy' or 'easy' to access on the project WebPage. Overall, the video streams were smooth and the picture quality adequate. They were divided, however, over the quality of the sound, with half reporting 'poor' quality. In view of this it is interesting that eight of the trainees thought that it would be 'useful' or 'very useful' to have a transcript at hand while viewing a clip.

Choice and Length of Video Clips

Tables 6 - 8 summarise the trainees' feedback on the length, timing and number of video clips. All found three minutes too short a time, with most suggesting that five minutes would be more appropriate. They were divided on the best time to watch, with seven preferring to watch both before and during the conference, and five before. None thought that clips should only be viewed during the conferences. They were similarly divided on the number of clips that should ideally be viewed and discussed during an MDVC conference, with half suggesting one and the other half two.

Table 6
Was three minutes long enough for the video clip?

Quality	Frequency
Too long	-
Too short	6
About right	6

Table 7
When is the best time to view a video clip?

Time	Frequency
Before the conference	5
During the conference	-
Both before and during	7

Table 8
What is the ideal number of video clips to be discussed during a conference?

Number of Clips	Frequency
One	5
Two	7
Three or more	-

Regarding the choice of teaching competencies, trainees commented that the three chosen for the trial were important. They suggested that subsequent trials might also include: National Education; tuning-in activities; handling misbehaviours, pupil group feedback and lesson conclusion.

Feelings about Making and Discussing the Video Clips

A mixture of 'excitement' and 'worry' best sums up the trainees' feelings towards making the video clips. As one trainee put it, "I was *excited* but quite *worried* that I might do badly during the video shooting. I was *happy* that I can see myself on screen". Only one student reported feeling pressurised.

The nine trainees whose video clips had been discussed during MDVC conferences were asked to write down one or two words to sum up their personal feelings about the experience. 'Defensive' and 'apprehensive' were the most negative words used by two of the trainees. The remainder used the following words: 'constructive', 'enriching', 'positive', 'rewarding', 'comprehensive', 'open', 'good experience', 'very excited' and 'good to receive feedback', 'O.K. -comfortable with other peers'...

Pedagogic Value

The final open-ended item on the questionnaire asked students to comment on the 'advantages' and 'disadvantages' of using video clips as part of MDVC sessions during Teaching Practice.

Advantages

Trainees identified benefits both from watching and discussing their own teaching and from watching and discussing their peers' teaching. Typical comments about themselves were: 'know our strengths and weaknesses'; 'spot our own weaknesses and avoid them in future'; 'pinpoint bad habits'; and 'reflect on how I can improve myself'. Typical comments about watching their peers teach were: 'We've been able to learn from each other and can adopt the strategies our peers have used'; 'you learn from trainees in other schools who have varied teaching experiences'; 'receive feedback from peers'; 'important to see fellow trainees teach instead of well-trained teachers'; 'view things about teaching that are otherwise impossible to see (sic) over the phone'; 'peers share the experience and understand why you are doing certain things like Power Point'. Viewing the video clips provided a good opportunity for trainee teachers to self-reflect their teaching practice. One trainee teacher said "I realised how boring my lesson was. No wonder my kids were not paying attention." Another said, "I did not know until I watched the video I have so many gestures. They are very distracting. I will certainly work hard to try to get rid of the habit."

Disadvantages

Four comments pointed to the possibly contrived nature of the clips: for example, 'the video clips were a bit faked because the students were so well behaved.'. One trainee confessed to being 'too frightened to comment on what others have done'. Another pointed to high costs and another to concerns about whether teachers would have enough

time to make video clips if this became a standard feature in the schools. Still another thought three minutes was too short to reflect what was going on. He suggested that trainee teachers be allowed to take longer videos and edit them into three-minute episode for discussions.

Discussion and Conclusion

This paper has reported a mixture of successes and failures from the latest phase of the 'Teaching Practice Discourse and Computer Communications Technology Project'. The main technical aim was for students to take short video clips of their teaching, send these to NIE, and stream them during MDVC conferences. It is clear from the trainees' feedback that they found video clips easy to make and, given help from the TAs, the task was not time consuming. It was possible to send all of the clips successfully to NIE and the quality of the video streams was adequate. Most importantly, when the first attempt at multiple video streaming during an MDVC conference was tried at NIE with project staff, the experiment succeeded better than the team had expected. Unfortunately, a similar experiment tried shortly afterwards with the schools failed, obliging the team to fall back on the backup plan of individual streaming before conferences. This problem is currently being investigated and will hopefully be resolved quite quickly.

Despite the failure to multi-stream during the conferences, and despite a number of irritating technical problems experienced with the basic conferencing system, feedback from the trainees was generally positive. Though somewhat apprehensive to begin with, the trainees generally found the process of making and discussing the video clips valuable as a learning experience. None had seen themselves teach before and found that experience alone enlightening. Watching their peers teaching was a useful source of ideas and alternative ways of performing a teaching competency. Feedback had been given in a professional way and was not seen as threatening. These results are suggestive of the ways in which the sharing and discussion of digital video clips can not only promote cooperative learning in video conferences (Lawrence 1995) but can also facilitate what Squire and Johnson refer to as 'distributed communities of practice' (Squire and Johnson 2000;). These are communities or interest groups comprised of 'cognitive apprentices' who engage with peers and mentors in reflective practice, ideally across of a range of situations. Bringing together the two technologies of MDVC and 'interactive television'- perhaps more appropriately termed 'interactive digital video'- promises to make available to trainees both a rich source of digitised teaching competencies and discussion with peers and mentors. Furthermore, to do this at a time when trainees are likely to benefit most from the experience - while they are on teaching practice. The pedagogic promise, that we have still to research, is that this will aid reflectivity, improve teaching and ultimately benefit pupils (Bailey 1996; Wu & Greg 1999; Xiaodong 1999). Though based on a small sample with limited experience of using the technologies, these results are encouraging.

It is clear in retrospect that the original idea of streaming video clips during conferences was unrealistic. As supervisors, we perhaps take too much for granted the complex skills that are required to analyse and comment on classroom teaching. Somewhat fortuitously, this truism was only laid bear with the technical problems we encountered. Even when

video clips were watched beforehand, the researchers found it necessary to run them backwards and forwards on a number of occasions in order to make sense of them. One of the researchers made transcripts of the dialogue and found these useful not only for following the dialogues but also for making notes. Similarly, the researchers had not anticipated the extra preparation necessary to manage the conferences in a professional and non-threatening way, given that they usually conduct feedback on a one-to-one basis. These, and other lessons, have already been incorporated into the design of the next phase of the project.

These results are sufficiently encouraging to warrant further refinements of the procedures already put in place for managing MDVC conferences and combining them with video streaming. In fact, the next Teaching Practice is already under way. It will be vital in this next stage of the project not only to solve the problem of multiple video streaming between NIE and the schools, but more so to tackle basic technical problems, such as broken audio, in the MDVC conferences themselves. For example, to tackle the problem of background noise in audio recordings, we are experimenting with the use of radio microphone recording equipment at two schools. Once basic technical problems have been minimised, it will be possible to incorporate a range of application sharing devices into MDVC conferences, such as the sharing of digital photographs, documents and Internet pages. In anticipation of the problems being solved, provision has already been made for trainees currently on Teaching Practice to take one or two digital photographs each week of interesting features of their schools and pupils' work. One session has been set aside later in the Teaching Practice for sharing and discussion.

Technically, the bringing together of digital video and MDVC is challenging and interesting in its own right. However, what really counts is whether such developments as these in communications technology can result in improvements in teacher education and, in turn, in the quality of pupils' education. The research team will focus on these important research questions after the completion of the current practice.

Footnotes

1. Downloading of a video clip file had been tried just prior to the present phase of the research. Though this worked well technically, the researchers were concerned that copies of downloaded files might accidentally be left on hard disks.

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