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Effective Use of Desktop Videoconferencing in Teacher Education and Professional Development With Reference to Strategies for Adult Basic Education

NCAL Technical Report

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JANUARY 2004

Prepared under contract for TECH21 – National Technology Laboratory for Literacy and Adult Education (ED-01-CO-0139), sponsored by the Office of Vocational and Adult Education, U.S. Department of Education. This working report is being circulated for further comments and revisions prior to subsequent publication; all comments are welcomed. This report represents the work of the author, and not necessarily the views or opinions of any sponsoring organization or agency.



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Abstract

This paper is primarily a literature review that examines the following two issues: (1) Can lower cost desktop videoconferencing be used effectively in preservice teacher education and inservice professional development, and if so, what would be the most effective strategies for use in the adult education field? and (2) Is there research evidence to support desktop videoconferencing being particularly useful with the adult education population —both teachers and learners? If so, what does the research suggest? The studies discussed here support a strong affirmative to the first question, with small group collaboration being the most effective strategy. Regarding the second issue, there are no direct studies linking desktop videoconferencing with adult education programs, but K-12 studies suggest that it could be of great benefit for both teachers and learners in this older population.

Introduction

Videoconferencing is coming into greater use in education due to advances in the bandwidth, software, and hardware that make it possible to use the Internet for connections. Dedicated and costly microwave or satellite connections are no longer necessary because of the development of codec (compression/decompression) technology and advanced video compression. These advances permit the use of relatively low bandwidth transmission devices and the Internet through Integrated Service Digital Networks (ISDN) and T1 lines. Therefore, expensive and technologically complex room-sized videoconferencing is no longer the only option for establishing interactive voice and video connections to distant people and settings. Desktop videoconferencing (DVC; use of a single, Internet-connected computer with suitable software and minimal peripherals) is an inexpensive alternative that is being increasingly implemented in a variety of educational settings.

This paper will briefly discuss the differences between large group, room-sized videoconferencing (which is the model that most people have in mind when they mention videoconferencing) and DVC. Then the literature on the educational benefits of videoconferencing in distance education in general, the use of videoconferencing in K-16 preservice and inservice teacher education, and finally the use of DVC for professional

development and in the classroom will be reviewed. The goal of this exploration was to understand how best to deploy DVC in inservice professional development in the field of adult basic and literacy education and therefore some findings of importance to the adult education field will also be pointed out with suggestions for implementation.

Background

Room-sized videoconferencing is often not an option for many organizations because of its high cost both financially and in needed technology expertise. Additionally, this kind of videoconferencing usually (though not always) involves “talking heads” and lecture-style presentations, which are often not successful in maintaining the motivation and interest of their audiences and therefore not always recommended for optimal learning gains.

Desktop videoconferencing (DVC) allows people at different locations to see and hear each other using ordinary Internet-connected computers (desktop or laptop) equipped with microphones, small video cameras, speakers, and appropriate software. New easy-to-use integrated USB desktop units that combine the video camera, a microphone and a codec and connect to a computer simply via a USB port are also available (see www.polycom.com and www.vcon.com). There are even free options for the software such as Microsoft’s NetMeeting. Affordability, accessibility, and ease of use make DVC an excellent choice for interaction with distant locations for purposes of collaboration and information sharing and the education community has begun to explore this new tool.

As has been true with all technology innovations, just acquiring the equipment and software does not guarantee acceptance and effective use of it. In order to help make this inexpensive and easy-to-use technology more attractive to educational agencies and programs, this paper makes available recent research on how DVC is currently being used in educational programs. The emphasis is on teacher education, but since modeling classroom practices is an important element of both preservice teacher education and inservice professional development, some of the projects highlighted here include student-learners as well as teacher-learners. Acceptance and effective use can be encouraged by these explorations into the benefits and limitations of DVC implementation.

A recent report on the state of technology and teacher attitudes towards it in today's adult basic education classrooms (Carter & Titzel, 2003) presents the results of a survey of the states in the northeastern United States. Findings of special significance to DVC are that

- 52.3% of the ABE teachers surveyed said they had no skill in DVC,
- 8.1% used broadcast instruction, audio/videoconferencing, and/or distance learning, and
- 57.2% of the ABE teachers wanted to learn more about broadcast instruction, audio/videoconferencing, and/or distance learning. (pp. 3, 5, & 6)

Given the financial constraints that govern most adult education programs, DVC could be a very attractive technology to adopt for teacher professional development as well as for direct use with learners.

Two major issues or questions motivated this study and the research was examined with them in mind:

- Can lower cost DVC be used effectively in preservice teacher education and inservice professional development, and if so, what would be the most effective strategies in the adult education field?
- Is there research evidence to support DVC being particularly useful with the adult education population — both teachers and learners? If so, what does the research suggest?

Review of Related Literature

Books and articles of relevance to DVC and education were searched through the ERIC system, WilsonWeb, and the Internet (Google) using the following terms: *videoconferencing+teacher education*, *desktop+videoconferencing*, and *personal+conferencing*. After these initial searches, relevant books and articles were gathered and their bibliographies were “mined” for further

relevant articles. The emphasis was on the most recent resources, so most of the references are from 2000-2003. Several of the DVC projects also involved room-sized videoconferencing or set-top boxes and several room-size videoconferencing resources held useful and relevant information for DVC so they are also included here.

This literature review moves from the most general to the more specific and thus starts with resources for videoconferencing and instruction in general, and includes summary information sources as well as how-to guides. Videoconferencing and teacher education/professional development is the next category and this is followed by DVC and its use in professional development and in the classroom. This paper is not a general review of videoconferencing but seeks to target DVC and teacher professional development with a special interest in adult basic education applications of DVC.

Videoconferencing and Instruction

There is an abundance of resources on videoconferencing in general and they range from the highly technical to the very simple. One of the best and clearest discussions (available online) is by the British Educational Communications and Technology Agency (Becta) and is entitled “What the Research Says About Video Conferencing in Teaching and Learning” (Becta, 2003). The key benefits listed by Becta are the following:

- allows interactive access to experts,
- enables collaboration by teachers and learners with peers,
- enriches the experience of distance education by reducing feelings of isolation and encouraging interaction, and
- raises learner motivation.

The final two benefits relate directly to major and continuing issues in adult education — feelings of isolation and concerns with learner motivation.

Becta further summarizes how teachers can maximize the learning impact of videoconferencing with the following suggestions:

- Establish pedagogical outcomes.
- Exploit the motivational effects on the learner.
- Seek partnerships with other schools and educational agencies.

The Becta report (2003) mentions the particular benefits for learners with special needs by quoting extensively from the findings of Thorpe's (1998) case study:

- Support can be provided to children with complex physical and communication difficulties without professionals or families spending lots of time traveling.
- Learners may overcome feelings of isolation and develop social skills by associating with peers who have similar needs.
- The videoconferencing context acts as a focus for some learners by helping them to organize the way they think and act.
- Learners discover that if they shout or talk over one another, they cannot be understood and they alter their behavior to take turns talking.

Since many in the adult education target population have undiagnosed special needs, videoconferencing can be seen as directly beneficial for the area of education.

Another recommended resource (available online; brief and well focused) is by The Commonwealth of Learning and is entitled "Video/Videoconferencing in Support of Distance Education" (Stilborne & McGibbon, 2001). Several books on videoconferencing are available for those who require more technical detail. Schaphorst (1999) is a somewhat dated general review and Rhodes (2001) is a more useful lengthy overview. Wilcox (2000) includes a full chapter (#14) as an overview of personal computing/DVC.

More readily available (online) and immediately useful for instructional videoconferencing are a series of excellent videoconferencing websites. These all provide some technical detail, much

how-to advice, and excellent videoconferencing suggestions (such as museums, zoos, your congressman, etc.). Some were produced in collaboration with the regional technology in education consortia (*Digital Bridges: Videoconferencing for Teaching and Learning* and *K-12 Videoconferencing*). One was produced by a regional service provider and concerns large-group videoconferencing (*SBC Knowledge Network Explorer: Videoconferencing for Learning*). The Video Development Initiative (2002) produced the popular *Videoconference Cookbook* and an Indiana school district produced *Videoconferencing: A Digital Handbook for Teachers and Students*. These run the gamut of formats and information and the best suggestion would be to review the one that seems most in tune with your institutional goals and context.

An excellent resource for interactive videoconferencing in a K-12 context was produced for the 2002 K-12 National Symposium for Interactive Videoconferencing held in Dallas. The document contains two sections, a literature review and a policy review, both of which contain thought-provoking discussions of all aspects of interactive videoconferencing (IVC). The literature review (Heath & Holznagel, 2002) is particularly useful as a summary document, discussing, among other issues, instructor requirements for teaching at a distance. They reproduce the following sample of important teacher skills and activities from Cyr's list (2001), which while referring originally to instructional television, resonates equally well in reference to IVC and DVC.

- Using visualization techniques to take advantage of the visual opportunities that IVC [and DVC] provides.
- Planning and managing remote site activities.
- Creating and using questioning strategies with remote sites.
- Correlating handouts to what is seen on the screen.
- Planning and managing materials at the remote sites.
- Using good presentation skills such as appropriate style and color of dress, voice, movement, facial expressions, gestures, and eye contact.
- Using different types of camera shots and using props.
- Knowing and following copyright laws.
- Planning how evaluation will be carried out. (Heath & Holznagel, 2002, p. 13)

Cyrs (1998, #26) can leave us with another important general statement about technology and learning: “Students never learn from the technology. They learn from the way instructors communicate or show how to communicate through the technology.”

It is important that teachers select the best technology tools for their instructional purposes and that they match those tools with their individual styles of instruction and their students’ individual styles of learning. Cillay (2003) talks about this aspect of technology choice. His “multi-modal” delivery system calls for the development of multiple technical student access options (DVC, discussion boards, etc.) in order to address different student learning styles. (This redundancy of materials and delivery modes has the added benefit of back-up technology in case one mode “goes down” temporarily.) Foreman (2003) points out that for collaborative, problem-based learning that requires brainstorming, planning, negotiation, problem solving, and document production, synchronous communication optimizes performance because of its speed and immediacy. Videoconferencing comes closest to reproducing the multisensory experience of “presence” and enables teams to collaborate efficiently and effectively. Nayman (1999) makes clear that using videoconferencing for instruction requires a different pedagogical approach and one that has not been fully refined or even recognized by many teachers. “Talking heads” approaches do not fully utilize the potential of graphic, video, and document sharing that characterizes good videoconferencing. Naymen further insists that teachers must take part in the initial testing of their videoconferencing systems so that they have a more realistic attitude towards the technology and are less likely to become overly frustrated. He listed several pointers for agencies developing videoconference events:

- Involve teachers in the development of the program and its testing.
- Always have backup for the primary technology (maintain a phone bridge).
- Insure that there is enough time for interaction
- Distribute materials for videoconference instruction several days ahead of time.
- Establish a protocol for taking turns in order to avoid confusion and frustration.

Just as evaluation is an essential component of any educational activity, videoconferencing events need robust evaluation methods to identify and encourage effective use. Hearnshaw (2000b) proposes a scheme to evaluate videoconferencing learning using a modified discourse content analysis. While testing his evaluation instrument, he discovered that there was not a significant increase in learning enablers when the technical quality of his test videoconference was improved halfway through the trial study, suggesting that visual quality is not always an overriding factor in learning through videoconferencing. This was an important finding because DVC almost never has the high quality video and audio of large room-sized videoconferencing.

Videoconferencing and Teacher Education/Professional Development

The potential of videoconferencing in general to provide authentic classroom contexts to teacher education students has been explored in a variety of recent studies. The findings from three diverse studies involving a variety of videoconferencing modalities are discussed here:

- a relatively small study in South Carolina involving a first-grade and a fifth-grade classroom and two large undergraduate teacher education classes (Edens, 2001),
- a larger and longer (3 academic years) collaboration in Northern Ireland between an elementary school and a college providing teacher education (Kinnear, Williams, & Caul, 2002), and
- an extensive project in Australia that over 2 years conducted more than 45 videoconference sessions linking more than 9000 preservice teachers to 24 schoolteachers and principals in 8 widely varied schools (Millwater & Albert, 2002; Virtual Workplace Project, 2003; Yarrow, Millwater, & Albert, 2001).

Edens (2001) describes the South Carolina project that examined “the potential of videoconferencing as an instructional strategy that models an appropriate use of technology infusion, establishes an authentic context, and provides supplementary ‘experiences, interactions, and learnings that enable preservice novices to move into the roles of highly skilled, effective teachers’ “(Debolt, 1996, pp. 93-94 as quoted in Edens, 2001, p. 26). University students, elementary school students, and elementary school teachers interacted in real time after videoconference observation of classes, posing questions to each other about teaching and

learning. Teachers also demonstrated ways that they used technology in their classrooms and some professional development meetings of teachers and university-based professors occurred. The following positive outcomes were reported:

- Authentic elementary school classrooms were made available for real time observation and discussion in a university lecture hall through relatively inexpensive videoconferencing technology.
- Technology use in instruction was modeled by university faculty.
- Collaboration between a public school-based faculty and a university-based faculty promoted a sense of renewal and increased professionalism.
- Focus groups reported that both students and teachers said that videoconferencing was a very promising new technology for teacher education.
- Videoconferencing was a way that teachers could demonstrate strategies and serve as guest speakers for large university teacher education classes.

Videoconferencing was definitely seen as a viable tool in the teacher education arena and the following recommendations were suggested when using this tool for teacher education and for professional training in other fields:

- Establish a stable technology infrastructure.
- Insist on extensive planning and sufficient human resources so that the instruction and delivery is effective.
- Use TCP/IP-based videoconferencing if at all possible because of its dramatically lower cost compared to earlier videoconferencing connection techniques.
- Use USB-based videoconferencing systems because of their portability and ease of use.
- Use inexpensive echo-canceling speakerphones to alleviate some of the audio difficulties.

Observation of an authentic classroom in action was also one of the primary objectives of the study from Northern Ireland where a videoconferencing link was established between a teacher education institution and a small rural primary school (Kinnear et al., 2002). The teacher education students were able to observe naturalistic teaching practices without being too

intrusive and they could engage in immediate discussion and analysis about the teaching and learning processes observed in the classroom. The experience was felt to be both collaborative and communicative. Furthermore, the students were also able to observe their fellow teacher education students actually teaching and have discussions about teaching skills, decisions, and techniques as well as strategies and classroom management issues. The elementary school discovered the added value of having a videoconferencing facility and organized links with a variety of other schools both near and far. This proved to be a significant motivating force. The project personnel found that the usefulness of videoconferencing was directly related to the tutor's understanding of its benefits, limitations, and utilization strategies (Willis, 1996 as quoted in Kinnear et al., 2002, p. 23) and that the technical requirements of the setup sometimes interfered with the curriculum and scheduling demands of the primary school. Suggestions for optimizing the videoconferencing experience included

- face-to-face contact prior to the video link,
- making students responsible for part of the planning of the sessions, and
- videotaping the videoconference session for later use and analysis.

The Virtual Workplace Project from the Queensland University of Technology, Australia, was a model two-year project (2001-2002) that reveals the potential of videoconferencing on a large scale as a medium for engaging preservice teachers in the professional thinking required of teachers in actual classrooms (Millwater & Albert, 2002; VWP, 2003; Yarrow et al., 2001).

The following somewhat lengthy description from Millwater and Albert (2002) explains the model in some detail and is included here as an example of a promising practice. It is important to note the use of a variety of technologies in concert and the extensive preparation that is required.

... Using videoconferencing technology over ISDN (Integrated Services Digital Network) phone lines and QUT's IP (Internet Protocol) network, two-way audio and video communication links have been established between the participating schools and

QUT. These allowed for live lessons to be transmitted from the school classrooms to large lecture theatres at the Kelvin Grove campus.

The model for the VW sessions evolved in consultation with the teachers. Furthermore, the model was developed to best facilitate the types of learning outcomes that were planned for the preservice teachers within their subjects. The model includes three components. Firstly, the teacher partner delivers a 10-15 minute pre-lesson presentation by the teacher partner covering matters such as the general context of the school, class students, classroom processes (as aligned with the subject itself) and the curriculum. Secondly, this is followed by a 30-45 minute live lesson from the classroom. There is no direct discussion with the teacher or students during the lesson. Finally, after the lesson, there is a 15-20 minute post-lesson question and answer session between the teacher partner, the preservice teachers and the QUT facilitator. Throughout the session, the preservice teachers use a worksheet to take notes on their observations, their comments and possible questions for the teachers. These are also the basis for discussions in the tutorials after the session. The tutorials investigate the VW experience in terms of developing teacher thinking through facilitation by the subject tutors.

The videoconferencing session is preceded by preparation between the QUT facilitator, the teacher partner, and the project's organisational and technical staff. Similarly, the lecturers, tutors and preservice teachers discuss the program in the previous week's lecture and after the initial videoconference often prepare questions for the teacher. These sessions are also videotaped, under strict contract conditions, for subsequent use in tutorials and for evaluation of the project.

This makes covert teacher thinking, overt. The teacher also evaluates the planned learning that occurred. The Principal of the school or Head of Department also joins in this VW session and relates the activity and planning of the teacher to the school planning and expectations. So the preservice teachers see *and believe* in the professionalism and "intentionality" of teachers' practice. It is intended that they observe the spontaneity of the living classroom. It is important to note that the teachers who are

actively involved in the VW experience were volunteers and also were trusted and experienced members of the school.

A project website has been developed and it links with the web resources of the online teaching websites of the participating QUT subjects. Use of web resources and email allow for a continuing conversation among all participants. (pp. 2-3)

“The feedback from inservice teachers and school leaders affirms that the participation on the project and in related professional development activities have indeed facilitated their professional development in relation to their own teaching practice and their participation in preservice teacher education” (VWP, 2003, p. 1). Utilizing methods of guided observation, student/teacher interactions, the embeddedness of theory in practice, and professional conversations (through focus groups and Learning Circles) about the demonstrated pedagogy, the project fostered deep learning about practice for both preservice and inservice teachers (Millwater & Albert, 2002, p. 1).

A questionnaire was sent out at the end of the Virtual Workplace Project to the key stakeholders in order to evaluate the use of videoconferencing and their responses are summarized here (VWP. 2003, pp. 24ff):

- *Benefits to preservice:* (1) bringing authentic classroom teaching from a variety of contexts into university lecture halls, (2) post-observation discussions with the classroom teacher about what strategies they used and why, (3) taping the videoconferencing events for further/later teaching and learning, (4) observation guides and worksheets helped structure observation and question development, and (5) observing the enthusiasm of the classroom teacher.
- *Benefits to inservice:* (1) greater self-awareness and improved critical and self-evaluative skills, (2) improved teaching strategies, (3) increased sense of professional esteem, and (4) inter-school professional development and curriculum innovation.
- *Benefits to the curriculum:* virtual excursions to educationally valuable sites and collaboration with other schools to develop projects.

All of these three projects involved observation of distant classrooms by preservice teachers through the medium of videoconferencing as well as post-observation discussions between classroom teachers, preservice teachers, school leaders, and university faculty to explore instructional strategies and decision making. Furthermore, the VWP took the additional step of facilitating Learning Circles for professional development of inservice teachers, which contributed to even greater professional enrichment from the videoconferencing events. Although these events do not specifically involve adult education teachers, the lessons learned can inform DVC use in ABE, GED, and ESL contexts.

It should also be pointed out that small group videoconferencing and DVC are utilized in the medical and nursing communities for professional development and preservice education. In a small Canadian study of videoconferencing for practice-based small-group continuing medical education, the “format was well accepted by learners and the facilitator, and there was evidence that it led to knowledge gain and change to practice” (Allen, 2003, p. 46). However, this is with the caveat that strict attention be paid to correct videoconferencing techniques. An Australian study of DVC using Polycom’s ViaVideo™ equipment for enhancing the quality of teaching and learning in an undergraduate nursing program showed significant advantages for the students and staff (Farrell, 2002). Students were positive about participating in discussions of content and seeking clarification for questions and staff, although having to rethink their traditional delivery materials and strategies, embraced the new approach.

Desktop Videoconferencing for Professional Development and in the Classroom

Desktop videoconferencing has been used alone and in conjunction with large-group videoconferencing for preservice teacher education and inservice professional development and also for classroom instruction. The lower cost, accessibility, and ease of use of DVC will certainly encourage its wider use in the future. The majority of the research studies (almost all on a small scale) of DVC and teacher education endorse the capability of DVC to support meaningful collaboration between students, teachers, and faculty. In the majority of these studies, DVC is just one of the communication technologies used in combination for preservice

teacher education and professional development, which points out the importance of choosing the right tool for the right purpose and of using a variety of tools in any learning environment. The following articles review several projects, their methods, and their findings.

Cifuentes' seminal article in 1999 was a major step forward in providing research findings of the use of DVC in teacher education and in the classroom (Cifuentes, Beller, & Portela, 1999). The article identifies a variety of DVC activities that arose in the context of three different projects and discusses the exploration into whether the participants found that DVC facilitated learning. The constructivist approach to partnership building in all three projects provided a solid framework for collaboration in staff development and in student activity. The projects involved the development of curricular materials and activities through collaboration with distant partners — university professors, preservice teachers, and teachers at distant schools.

... Teachers learned to use DVC to support professional development and classroom activities with their students. They were provided initial instruction in how to use the technology. They then identified and implemented classroom activities that addressed the curriculum described in the Texas state standards. They shared activities with other teachers and with the researchers and reflected upon the positive and negative experiences of DVC as well as potential future applications. (Cifuentes et al., 1999, p. 81)

Small-group collaborative activities were the key to the success of the three projects, and involved the following interactions: student-to-student, students-to-teachers, preservice teachers-to-inservice teachers, teacher-to-teacher, and tech support-to-teachers/students. Activities included the following:

- setting up a mock space shuttle mission with one classroom acting as the shuttle crew and another acting as mission control,
- interviewing students from other schools in other states and other countries,
- investigating changes in the ozone layer and presenting findings to each other,
- providing tech support for teachers and students,
- conducting DVC training,

- meeting to solve academic problems and share cultural experiences,
- planning holiday units to present to each other,
- sharing reading and discussing stories,
- writing essays on common topics and then sharing them in small groups,
- evaluating (formatively) lesson plans as part of teacher training,
- sharing field-based experiences, and
- providing feedback on preservice teachers' multimedia lessons. (pp. 85-86)

When evaluating the extent to which DVC facilitated teaching and learning, “all of the respondents agreed that meeting with distant others facilitates learning, communication, and cultural understanding” (p. 86). Teachers reported that DVC allowed more one-on-one or small-group communications and that it was more convenient (and cheaper) to set up. Students were unanimously enthusiastic about the activities.

Even studies that concentrated on preservice teachers with DVC had positive effects on inservice teachers who became more reflective about their own teaching practices because of discussions with the preservice teachers. Cifuentes did further studies to test whether virtual meetings between preservice teachers and mentor-teachers via interactive videoconferencing and DVC could be as effective and rewarding as face-to-face meetings (Cifuentes & Shih, 2000). Findings proved that they were as beneficial, regardless of the delivery system, although the telecommunications technologies did create more of a formal atmosphere than face-to-face, and this tended to keep the issues addressed limited to those on the agenda. Additional studies by Jennings and Bronack (2001) and Wilkerson and Rogers (2003) support the validity of DVC for both preservice and inservice teachers, stressing its strong collaboration capability.

In 1999, Jobe wrote a short article for the Education World web site entitled “Desktop Videoconferencing: Novelty or Legitimate Teaching Tool.” Among the DVC suggestions that she offered were a virtual trip to the Tennessee Aquarium. Many of the locations that offer virtual tours online have now included DVC options so that students and teachers can directly experience distant places and easily ask the experts direct questions. Jobe mentioned another project where writing and literature students worked with mentors from a university. The teacher

in charge of that project pointed out that singular and expensive field trips to a distant campus or site “can be inexpensively replaced with weekly conferences to distant sites where established, technology-assisted relationships can assist our students’ learning.” The benefits of DVC that she mentions are the same as previously related for general videoconferencing, plus the additional benefits of lower cost and ease of use. All of these benefits are directly transferable to an adult education context.

Zsiray (2001) discusses the impact of DVC on education as a powerful tool for collaboration. He reports the findings of a project that explored how DVC fits into the array of already existent electronic collaboration tools. Categorizing his examples under “one-to-one” (collaboration, technical assistance, counseling, special needs), “one-to-group” (classroom, school-to-school, small group meetings), and “group-to-group” (training and workshops, course delivery), he commented that the early results of the project reflected clearly the creativity of the individuals involved with DVC. One example discussed DVC collaboration between school administrators and national consultants during the implementation of an assessment system driven by standards and accountability. Resource sharing, technology plan revision, and school-to-career planning were some other collaborations facilitated by DVC. These kinds of collaborations can benefit under-funded adult education agencies as well.

DVC can also be used to bring field-based experiences to future teachers, though not on as great a scale as large group videoconferencing. Lehman et al. (2003) discusses using DVC in this way during a Preparing Tomorrow’s Teachers to Use Technology (PT3) implementation project through Purdue University. Interestingly enough, the group originally planned on using an intrastate fiber optic video network, but the authors said that

... IP-based video conferencing equipment from Polycom emerged during the project as a better way to meet most of our needs. This technology supports good quality video and audio over the Internet, is relatively affordable, and is very flexible because a standard H.323 Internet videoconferencing connection can be established between any two locations with access to a reasonably fast (128 Kbps or better) connection. Special distance education rooms or video studios are not needed. (p. 15)

One of their pilot projects linked to an inner city classroom to facilitate off-site observation by preservice teachers. Those preservice teachers also interacted with the students and the classroom teacher and prepared and taught a variety of enrichment activities using DVC for their delivery (p. 16). The second pilot project involved small group interaction and collaboration in the creation and implementation of curricular materials (p. 17).

Hearnshaw's article (2000a) about high quality DVC tutorials with minimal network demands addresses one of the main issues of this lower cost, lower video quality videoconferencing option - whether higher levels of image quality enhance the effectiveness of the dialogue and, conversely, whether low image quality devalues the dialogue experience. The author earlier established that DVC should be used for tutorial support to maximize the benefits of small group interaction and should not be used primarily for content delivery (which can be done more effectively with other media; Hearnshaw, 1998). The next question that he explored was what level of video quality is necessary for effective, high quality tutorial discourse. Utilizing a modification of traditional discourse content analysis, his group showed that increasing the quality of the images halfway through the eight-week course of the tutorials resulted in no noticeable increase in the quality of the dialogue.

As a final example of DVC use, a large-scale research project in Singapore is employing DVC, more exactly MDVC (multipoint desktop videoconferencing), for "adding value to conferencing between supervisors and trainee teachers" during the National Institute of Education's (NIE) schools practicum partnership (Crawford et al., 2002, p. 67). Typically, one supervisor would link up with 4 or 5 different student teachers located at 4 or 5 different schools (thus the "multipoint" DVC term was coined). A website was developed as an essential support for the DVC users — providing information and numerous other services. DVC was not used in this case to bring authentic classroom content to university classrooms, but rather exploited for its greatest strength — collaboration. The purpose of the MDVC was to enable individual trainee teachers to discuss matters relating to their teaching practice with their NIE supervisors as well as to develop basic pedagogic protocols for using MDVC for the frequent conferencing

necessary during the practicum experience. Although this is an in-progress project, preliminary remarks by students were positive in three areas:

- benefits of exchanging ideas and experiences,
- establishment of support groups, and
- improvement in general IT skills. (p. 74)

Discussion

This discussion section will address the two questions that were posed at the beginning of this paper as issues to be explored through a research literature review:

- Can lower cost DVC be used effectively in preservice teacher education and inservice professional development, and if so, what would be the most effective strategies in the adult education field?
- Is there research evidence to support DVC being particularly useful with the adult education population - both teachers and learners? If so, what does the research suggest?

As the above literature review clearly shows, DVC already plays a significant role in teacher education in many preservice and inservice professional development arenas in the United States and abroad. The most effective strategy for using DVC appears to be as a collaboration tool, facilitating work among preservice teachers, inservice teachers, classroom teachers, students, university researchers and faculty, and administrators — in any and all combinations.

An additional beneficial dimension to DVC use in professional development is modeling its correct pedagogical use with students in classrooms. Collaborations in preservice education and professional development can help teachers become comfortable with the medium so that they explore the many collaborative opportunities available with DVC for their students.

Many of the tips for large-group videoconferencing also hold true for DVC (and for teaching in general).

Planning issues

- Plan for the DVC event to be early in the day when the Internet might be less crowded.
- Distribute session agendas and materials several days ahead of time so that expectations are clear.
- Involve teachers in the development of programs for their professional development.
- Make sure there is enough time for interaction.
- Discuss etiquette and turn-taking in advance to avoid confusion and frustration.
- Have a backup plan and maintain a telephone bridge if possible .
- Make sure the set up area affords some sense of privacy.

Practical considerations

- Avoid clothing that has bright colors and busy patterns. Wear plain fabrics of muted colors.
- Enunciate and speak more slowly than the normal rate of speech.
- Minimize abrupt motion because movement has to be compressed and decompressed.
- Talk to the camera rather than the computer screen so you appear engaged with the other participants.
- Avoid extreme close-ups with camera placement and be aware of the importance of eye contact between users.
- Limit extraneous noises like coughing or saying “umm.” Instead provide non-verbal feedback like slowly nodding your head.

Pedagogical and design issues

- Establish pedagogical outcomes first and use DVC to accomplish them where appropriate.
- Exploit the motivational effects of DVC on the learners.
- Seek interesting links/partnerships with other agencies and programs.

- Involve all participants within the first few minutes so they don't disengage, informal introductions or chat can be effective in reducing anxiety and creating rapport.
- Encourage interaction by limiting instructor talk to no more than 10-15 minutes without learner responses and activities.
- Use a variety of different media to engage interest.

The literature search revealed no research specifically linking DVC and adult basic education initiatives. One survey did reveal, however, a desire on the part of most of the adult basic education teachers surveyed to know more about videoconferencing (Carter & Titzel, 2003).

All of the research and the projects discussed in this paper cite benefits that are easily transferable to an adult education context. Key benefits mentioned by Becta (2003) include raising learner motivation and reducing feelings of isolation, perennial issues in the adult basic education world. The Virtual Workplace Project listed benefits for inservice and professional development that included improved teaching strategies, increased sense of professional esteem, and greater self-awareness and improved critical and self-evaluative skills (VWP, 2003, pp. 24ff.). Cifuentes (1999) discussed projects that involved the collaborative development of curricular materials and activities with a variety of distant partners — this is an important goal of adult education professional development, whether in adult basic education, English language learning, or GED preparation instruction. In 2000, Cifuentes and Shih discussed further findings that DVC had positive effects on inservice teachers who became more reflective about their own teaching practices after DVC-mediated discussions with preservice teachers.

The TECH21 Project at the National Center on Adult Literacy is currently implementing collaborative, project-based professional development activities with its adult education field sites using DVC with Polycom equipment, but the implementation is at too early a stage to comment on more than the unanimous enthusiasm of the adult education teachers for learning more about this new technology. The plan is to use DVC and a set-top box to teach about videoconferencing as well as to establish communities of practice with the field sites.

The majority of research concerning videoconferencing and teacher education deals with large-scale videoconferencing setups rather than desktop or set-top ones that utilize Internet technologies. Research on desktop videoconferencing (also called “personal conferencing”) is often more concerned with the technical aspects of setup and delivery rather than the pedagogical ones. The field would be well served by additional large scale studies that examine the learning/teaching strategies and ultimate effectiveness of the much less expensive and thus more readily available desktop videoconferencing.

Conclusions

Desktop videoconferencing is an excellent tool that can be used with wide ranging benefits to facilitate interactions with distant collaborators, and “distant” here can mean across a city or across an ocean. DVC is most suitable for collaborations with single individuals or small groups of up to three or four people. In combination with set-top box videoconference equipment, DVC can be easily folded into the “classroom observation” genre of videoconferencing with all of its accompanying benefits. By using the Internet for connections, DVC is significantly less expensive than large-room videoconferencing and with the development of integrated USB desktop units, DVC is becoming part of the current “plug and play” technology culture. DVC’s ability to lessen isolation and increase learner motivation combined with its lower cost and ease of use make it a promising technology for chronically under-funded adult education agencies to explore.

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