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**To cite this article:** Mila Parrish (2008) Dancing the distance: iDance Arizona videoconferencing reaches rural communities, *Research in Dance Education*, 9:2, 187-208, DOI: [10.1080/14647890802087811](https://doi.org/10.1080/14647890802087811)

**To link to this article:** <http://dx.doi.org/10.1080/14647890802087811>



Published online: 05 Jun 2008.



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## Dancing the distance: iDance Arizona videoconferencing reaches rural communities

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*(Received 8 August 2007; final version received 3 March 2008)*

Regardless of geographical limitations, community partnerships can flourish through videoconference technology. This article presents iDance Arizona (iDA) research as a tool for supporting the teaching and learning of dance in rural settings. This research focuses on university/K–12 collaborations and examines the pedagogy of videoconferencing in dance and in the design and implementation of a standards-based dance curriculum with elementary and middle school students in Eloy, Arizona. The accessibility of videoconferencing makes it possible to educate students in a broad spectrum of dance contexts: composition, performance, technique and analysis. Videoconferencing presents unique opportunities for teaching students in rural settings. This article considers the benefits, challenges and discoveries of using videoconferencing. The discussion section addresses the need for additional research in this area and determines the application of videoconferencing dance instruction as the technology becomes more available for school use.

**Keywords:** dance education; videoconferencing; K–12 dance pedagogy; community partnerships; dance technology

### Introduction

The impetus for the iDance Arizona (iDA) research study was an attempt to meet the needs of students in rural Arizona communities. As director of the Dance Education Track at Arizona State University, I would receive phone calls from principals in rural Arizona communities each July, asking whether I knew of any students interested in teaching at their school. I would then notify recent ASU graduates and dancers in the area of the job opening, but no one wanted to take the job since it required moving from Phoenix. The Phoenix metro community is a vibrant and rapidly spreading population where approximately five high schools are built each year, all of which need a dance teacher. Therefore, dance education students do not need to leave Phoenix to find employment. This made me wonder how I could ever meet the needs of those principals and their students, and I began to consider videoconferencing as a way to bring dance to students in rural communities. This paper aims to provide useful insights and practical strategies for bringing videoconferencing into the dance classroom.

Since the 1980s, technologies have changed the sharing of expertise in many fields, including medical, business, and education. As a consequence of the rapid growth in technology systems and the relative affordability of the videoconferencing systems, more communities now have access to videoconferencing technology. The technology presents students with access to opportunities to interact with specialists in all fields without ever having to leave their classroom

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or dance studio (Jansen 2004; TPL 2005). Unlike asynchronous technology such as Blackboard, videoconferencing permits immediate face-to-face interaction.

Currently, videoconferencing is IP-based, where the information (voice, data, and video) is bundled together over the Internet. IP-based video conferencing is less expensive and more reliable than older ISDN lines, which need specially designed leased phone lines. Further, the ISDN lines incur fees at the user end, the cost of the phone conversation at both sites, and the number of channels required to make the call. Current videoconferencing technology can be separated into two types: point-to-point calls and bridged calls. Point-to-point calls allow a teacher to directly connect to another site, while bridged calls allow many users to participate in a videoconference. Bridged calls require a multipoint control unit that is typically owned and operated by universities and corporations. Some of the most popular videoconferencing systems include Polycom and TANDBERG.

A videoconferencing system has two TV screens which allow students to see themselves in one screen and the dance teacher in the other (Figure 1). The second screen can be used interchangeably by the teacher to display a PowerPoint presentation or to share a document using Elmo (a flatbed projection surface), or view a video or DVD. At a distance, the dance teacher can watch the class perform a dance, provide coaching tips, lecture, ask questions, discuss solutions and conduct guided improvisations.

### **Videoconferencing in dance education**

Access to a global dance community heightens students' perception of dance in their external environment and broadens their dance community. Eliminating the geographical boundaries, the Internet encourages dance students to see beyond themselves and their surroundings and enter dialogues with the world (Parrish 2006). Garland and Naugle (1997) led the field in online instruction for university dance education with the first fully online distance education course in LifeForms animation.

In dance, where the body is the vehicle for expression, videoconferencing may be the right tool to capture and transmit human movement. One of the most valuable aspects of videoconferencing is that students can collaborate, discuss, improvise, and perform with individuals from around the nation. Videoconferencing enables them to share their knowledge, experience, and ideas with one another.

Research in dance videoconferencing incorporates various technologies. These include research in networked choreography (Galloway and Rabinowitz 1992; Lovell and Mitchell 1995; Garland and Naugle 1997; Naugle 1998; Parrish 2001, 2005; Birringer 2002; SWIPT 2004; Crawford 2004; Naugle 2002; Calvert, Wilke, Ryman, and Fox 2005; Simmons 2005); interactive live performance (Wolfram 2003; Happel 2004); web casting rehearsals and workshops (Parrish and Lindholm Lane 2003; Parrish 2006); research in innovative videoconferencing for dance technique practices including improvisation and choreography (Garland and Naugle 1999; Mandile 2004; Jansen 2005; TPL 2005); and performance coaching (Jansen 2004; TPL 2005). A few notable dance education projects include *Interactive Gateway (IG)*; *Dance in Australia and New Zealand (DANZ): International Partnership in Technology-Rich Education*; *Bridging the Gap: Connecting High School and University Dance Worlds (BGCU)*; and *The Performance Lab (TPL)*.

*Interactive Gateway (IG)*, created by Parrish and Kathy Lindholm Lane (2003), addressed Postmodern dance, the 1960s' art and activism, and specifically Yvonne Rainer's work *Chair/Pillow*. A group of ASU and HS dance students employed videoconferencing to broadcast educational resources including dance workshops, interviews, and performances. Teachers and their students listened in as specialists discussed the process of notating and reconstructing a



Figure 1. iDance Arizona teachers Dr. Mila Parrish and Elissa Moriarity offer feedback using video-conferences duel screens.

dance. Participants' parents, grandparents, and friends logged on to have an inside glimpse of a rehearsal process. Web casting served as a viable way to uncover the mystique of the rehearsal process and provide access to specialists when there was none, otherwise.

DANZ (Mandile 2004), an innovative partnership between the New Zealand Ministry of Education and Education Queensland's Virtual Schooling Service, used videoconferencing to

bring diverse groups together and to promote cultural understanding of ‘real people’ in real time in dance education. DANZ participants collaborated in sharing ideas, planning activities, and solving problems to gain cultural understanding.

In *Bridging the Gap* (BG), ASU dance education student Meghan Enders and Chattanooga Tennessee dance teacher Cathie Kasch (2004) used videoconferencing to share, create and perform their concerns, questions and thoughts about their futures. In this research, I witnessed videoconferencing’s potential for not only creative collaboration but its ability to support valuable interactions between 16- and 24-year-old dance students. Unlike in the cases of phone and e-mail, the medium of videoconferencing was dynamic, as it supported improvised dance conversations where ASU students collaborated and mentored younger dancers in Tennessee. The experience furnished ASU students a ‘real’ examination of the trials and tribulations of their future students.

A substantial program making great strides in the area of videoconferencing in arts education is *The Performance Lab* (TPL). TPL’s Director Marcia Chapman and Artistic Director Rick Hauser have developed a technology network for interactive exchange in the arts. They use videoconferencing to coach dance and other performing arts over distances. TPL has conducted interactive exchanges around the United States with master teachers in all arts disciplines. In 2005, students from New Jersey and Minneapolis were connected to world-class performer/teacher Risa Steinberg in New York City to learn the subtleties and technical style of Limon’s choreographic masterwork, *A Choreographic Offering*. Technology Opportunities Program (TOP) report, *Networking the Land* (2004), identified TPL as exemplary ‘groundbreaking’ research. It stated, ‘Distance dance ultimately may involve much more than conveying expertise from a handful of experts in cities to disadvantaged groups in rural areas. Early experiments suggest that combining videoconferencing with dance could ultimately evolve into a new art form’ (54). Aside from these research projects, there is still little information on the impact of videoconferencing on dance education.

### **Videoconferencing in education**

Videoconferencing facilities have become more available in universities, however, they are not as widely available in K–12 education. The cost in itself can be prohibitive; room-based videoconferencing units are expensive and require cameras, video encoders, microphones, and a special network infrastructure. A one-room system can manage multiple users from different locations. This can enable students to participate in virtual trips to the zoo, the art museum and even the space centre. While asynchronous videoconferencing allows users from different locations to work and communicate at different times, synchronous videoconferencing permits real-time communication that is ideal for dance instruction.

Business and media corporations have identified the benefits of videoconferencing as increased productivity and cost efficiency, providing access to consultants for remote evaluation, assessment and diagnosis while eliminating travel time and costs. Other media companies have focused on the potential for global access to knowledge and real-time information exchange. The benefits of videoconferencing in education are varied. These include improving communication and motivation (Austin, Abbott, Mulkeen, and Metcalfe 2003); enhancing learning effectiveness (Leask and Pachler 1999); providing access to resources not found in rural communities (Gilbert 1999; Ludlow and Duff 2002; Pachnowski 2002; Schwier and Balbar 2002); expanding students’ connection with the outside world by breaking down economic, geographic, and socio-political boundaries (Bilton-Ward and Young 1998; Gibbs 1999; Collison, Elbaum, Haavind and Tinker 2000; Grabe and Grabe 2000; Martin 2000); and highlighting the importance of technology in professional practice (Arnold, Cayley, and Griffith 2002).

Other benefits of videoconferencing include promoting multimodal and visual learning (Martin 2000; Gilman and Turner 2001; Kock 2005; Smyth 2005); encouraging active learning and interactive problem-solving (Myers and Jones 1993; Hanna, Glowacki-Dudka and Conceicao-Runlee 2000; Scanlon 2003; Cornelli 2004); increasing the depth and independence of learning (Fetterman 1998; Gillespie 1998; Ross and Schulz 1999; Laurillard 2002) and the development of socialization skills (Weller 2002; Nichols 2003). Other studies identify increased student responsibility in the learning process, which invites students to become active in a learning community outside their own community and extending into the world (Becker 2000; Pena-Shaff, Martin, and Gay 2001; Bonk 2003). A Joint Information Systems Committee (JISC) report on e-learning (2004) states that when e-learning instruction is effective it engages learners in the learning process, encourages independent learning skills, develops learner's skills and knowledge and motivates further learning.

As research in videoconferencing articulates layers of success, new delivery models are formed to include the arts. Cornelli (2004) supports such educational research and emphasizes the value of dynamic interactivity and increasing access.

By the very nature of interactivity, distance learning makes textbook learning come alive, providing a unique portal for education. It also affords classroom teachers another setting for presenting curriculum that is aligned to learning standards. This type of interactive technology breaks down geographic, economic and educational barriers for students. It presents them opportunities to visit educators and students from around the globe enabling them to learn from one another and bringing the world closer together (2004, 15–16).

Weller (2002) identifies the following as pedagogies as being successfully adaptable in an e-learning environment: constructivism, resource-based learning, collaborative learning, problem-based learning, narrative-based teaching, situated learning. In the context of videoconferencing, telepedagogy and mediated learning environment considerations include social dynamics and blended learning (Weller 2002; Bonk 2003; Nichols 2003; Derntl and Motschnig-Pitrik, 2004; Bonk and Graham, 2006) role of teacher/tutor (Jones, 2004; Salmon, 2000) inside rural communities (Pemberton, Perez Cereijo, Tyler-Wood, and Rademacher 2004) and student responsibility of learning (Becker 2000).

### **iDance Arizona case study**

After speaking with TPL's Rick Hauser and Dale Schmidt, I began to envision iDance Arizona (iDA) videoconferencing as capable of meeting the needs of rural communities and a promising alternative to traditional dance instruction. Next, I met with Jill Dingman from Central Arizona College to discuss available options for iDA school partnerships in rural Arizona. Dingman, a brilliant advocate for videoconference technology in rural communities, was able to advise and help iDA secure a population within the Pinal County Interactive Television Consortium.

In August 2005, the Pinal County Interactive Television Consortium was formed to promote and provide support for videoconferencing in Central Arizona. Ten school districts, one Joint Technology Education District, and one community college became members. Funded in part by the Eloy Partnership, a No Child Left Behind Title IID Technology Grant 'Enhancing Education through Technology (EETE)', and by member districts, the consortium provides content and maintains over 30 videoconference sites in Pinal and Graham Counties. The grant partners include Eloy Elementary District, Florence Unified District and Maricopa Unified District.

Dingman, Project Director of the EETE grant, invited our iDA team to a two-day training seminar on synchronous and asynchronous communication at Central Arizona University's



Signal Peek campus in Coolidge, Arizona. During the seminar, we videoconferenced to various sites around the nation. I presented the iDA research project and met teachers interested in bringing iDA into their classrooms. Several factors were considered when determining the ideal school for the iDA research study. These included the needs of the students, the level of support expressed by the teachers, administrators and parents, and the capabilities and limitations of the videoconferenced space.

A perceived hindrance in this research was the ability of the videoconference medium to capture the three-dimensional expression of the body in movement. I questioned the quality of the exchange between teacher and students in the videoconferenced environment. Would the ‘flattening’ of videoconferenced delivery hinder the effectiveness of the instruction and thus the students ability to create dynamic effortful dance. As I began the iDA research, I feared that the richness of the dance experience could be lost.

This paper will focus attention on iDA, a year-long research study using video conferencing technology to teach elementary and junior high school students’ dance. This includes an examination of the videoconferenced curriculum, pedagogical methodology employed, students and teachers’ attitudes toward videoconferencing, and their perceived value of the instruction and discoveries, as well as recommendations for future use.

The iDA research was funded through grants and support from the US Department of Education Title IID Technology Grant, Central Arizona College, Jill Dingman from Central Arizona College and Bill Steber Technology Coordinator from Eloy, Arizona State University Artsbridge America Program; ASU Educational Technology and the Eloy Arizona School District. The research iDA was implemented due to the efforts of Melanie Olm in the ASU Office of Community Programs, James Casey, Director of Media Distribution Systems within the Applied Learning Technologies Institute, and Antonio Dias from ASU Videoconferencing.

The literature review on videoconferencing in dance education and my initial investigations in online instruction, webcasting and videoconferencing lead to the following questions about the use of videoconferencing in dance serving rural communities.

- What are the advantages and limitations for using videoconferencing in dance class?
- Is it possible to learn dance over videoconferencing with Middle and Elementary school students?
- Will traditional dance activities such as improvisations, dance sharing, dance making and even dance technique be possible over videoconferencing?

### **Methodology**

Developing a relationship between the teachers and students from Eloy and our iDA personnel was critical. Once the participating school and teachers were identified, we had several phone- and e-mail conversations with the teachers to identify common interests and to define the curricular themes of the lesson. The shared interest for all teachers turned out to be systems of the body, which was selected as the theme.

In preparation for the videoconferenced sessions, the iDA team also went to Eloy Arizona to visit the schools and meet the students, teachers and administrators. We gave a dance workshop to each class. In this workshop, our goal was to establish technical and creative benchmarks; to teach basic pedagogical strategies including dancing safely in personal and general space, forming lines, rotating lines, traveling on the diagonals in the space, and sitting in appropriate spots during videoconferenced class discussions and dance sharing. We also demonstrated some of the strategies and dance terms that we would be using during the lessons. These included following the leader, improvisation, mirrors, shadows, body shapes, level, direction and pathway, basic

body actions, making a repeatable sequence of dance, and sharing, discussing, and reflecting on their dances.

It was essential that the videoconferenced facility allow full expressive dance and offer a freeform room without the hindrances of desks or consol tables. During our initial site visit we surveyed the videoconferencing space for any physical obstructions, moving what we could to other locations and stacking tables and chairs. We thus established sight lines for dancing with a large group of videoconferenced students. These preparations also included an in-depth training on the specific videoconferencing system used in Eloy Jr. High School.

The iDA research occurred at the Center for Videoconferencing at Eloy, the Curial Primary School gymnasium in Eloy, Arizona, and the Commuting Commons videoconferencing facility at Arizona State University.

Eloy, Arizona is an isolated rural community between Phoenix and Tucson with a population of approximately 9000. The Eloy School district is made up of eight schools with approximately 2500 students, 85% of whom qualify for reduced free lunch (Great Schools 2006). The student population consists of 80% Hispanic, with 64% using Spanish as their home language. The median household income is \$28,494, leaving approximately 28% of families and 32% of the population below the poverty line. The largest employer in town is a correctional facility, the Eloy Detention Center.

The videoconferencing facility at the Curial Primary School in Eloy includes a large free-form room configuration with a seating capacity of 45 (Figure 2). It has Polycom VSX7000 videoconference equipment with an IP connection at 384 (128–768 range) speed. The room has



Figure 2. iDance Arizona teacher Lindsey Bauer leads session at the Eloy Junior High videoconference room.



a presenter control station with a pad cam, computer and VCR/DVD player. Central Arizona College operates the video bridge to transmit the signal.

The videoconferencing facility at ASU is small room with the capacity of 25 with a conference table in the center of the room. The table was disassembled for each session. They have a Tandberg 6000 video conferencing unit with control panel – dual 32" NTSC monitors capable of receiving both ISDN- (h.320) and IP- (h.323) based conference calls. There is an Elmo EV308 visual presenter, a 34" television and VHS VCR. ASU has an Accord MGC-100 video bridge capable of supporting both H.323 IP- and H.320 ISDN-based conferencing. This videoconferencing system can facilitate multipoint videoconferences and permit sites with different frame rates, connection speeds, audio algorithms, resolutions and network protocols, to transparently connect with one another.

The iDance Arizona educates through the experience of dance itself, which is immediate and engages students in the learning process. iDA goals for videoconferencing are to enable students to experience dance as a kinesthetic means of communication and comprehend that the body is the vehicle for expression. Students can thus identify the connections between dance and classroom curriculum. They can explore the elements of dance as compositional tools for dance making, create original dances and observe the value of their own and others' choreography.

### **Instructional method**

The curriculum framework is grounded in the educational philosophies of John Dewey (the importance of the nature of experience and the experimental continuum, 1938), Howard Gardner (the theory of multiple intelligences, 1993), and Jean Piaget (stages of cognition and construction of knowledge, 1973). Online pedagogical theory was informed by Curt Bonk and Charles Graham (blended epistemology, 2006), and the TPL (videoconferencing in dance and performing arts, 2005). Also, the curriculum addresses state and national standards and benchmarks for both dance and science.

iDance applied a blended theoretical model for videoconferenced instruction. Students received two types of instruction, which began with foundational grounding in dance vocabulary and movement strategies in the classroom, and then to provide follow-up instruction using videoconferencing. The initial hands-on live instruction was diminished as the students become more experienced in the art form (Bonk and Graham, 2006; Kirschner, Sweller, and Clark 2006).

The dance curriculum is designed to complement the students' learning in science and health. An interdisciplinary model for teaching is employed in iDA. It is based on the belief that dance provides an opportunity for linking our kinetic physical- and intellectual development. Experiences in dance are presented for exploration, discovery, analysis, communication, expression and interpretation, giving students opportunities to work physically, socially and intellectually and discover their own artistic originality.

The iDance Arizona integrated curriculum framework is designed for teaching children's dance in elementary and middle schools. It focuses on grades 3–8 and employs interdisciplinary constructs as a vehicle for student inquiry, exploration, and dance making. The framework reflects a conceptual approach to dance education in which many content areas are fostered. These include elements of dance, dance inquiry and exploration, dance making, dance sharing and dance analysis. The content theme is the human body, including muscular, skeletal, respiratory and circulatory systems.

This framework embodies five conceptual content areas, grouping each element presented in all units and classes in varying degrees. These are Elements of Dance, Inquiry and Exploration, Dance Making, Dance Sharing, and Dance Analysis. The elements of dance include the body, effort, space, shape and relationship, which are basic to the appreciation of dance as an art form.

Inquiry and exploration provide the ideas that become the dance. Dance making, or the creation of original dances and movements, is a method for students to communicate. Movement experimentation, problem solving, improvisation and composition assist students in making choices and in discriminating and forming movement phrases. In dance sharing, students have the opportunity to dance with and for other students, which assists in developing group unity and cooperation. Individual encouragement is achieved through reciprocal supportive comments during class and informal group sharing, which results in successful creative work. Dance Analysis, or the act of observing and reviewing dance works, fosters analytical skills necessary for students to evaluate their own individual and other group efforts.

The students experience dance through the five content areas, with the curricular theme (the human body) woven into the framework. The curriculum is designed to provide experiences that enable students to learn and apply science concepts within the context of the dance experience. In each class, students examine an aspect of a curricular theme, explore modes of embodying that theme and create dances. Each class ends with an informal dance sharing or performance followed by students' observations and reflections.

Numerous instructional methods are employed within this framework, including responsive dancing (mirroring and improvisation), inquiry and problem solving, dance technique, content presentations in PowerPoint and Elmo, interactive games, reflection and props. New strategies include the use of hand signals and motif warm-up symbol cards.

Other teaching materials employed in this framework include PowerPoint and videos of human body systems. Literature is chosen for themes and movement investigations, and photographs and illustrations are employed to foster visual references and stimulate imagination for active embodiment. A variety of music sets the atmosphere for inspiration and assists in the dance-sharing portion of class. The class format includes exploration of movement concepts, discussion of curricular themes, explanation and manipulation, dance making and dance sharing. During the sessions, students watch PowerPoint slide shows that encourage questions and conversations between the students and their videoconferenced teachers at ASU.

### **Participants**

Eager to observe and analyze different teaching styles within the videoconferencing environment and knowing that this would be an exciting technology pedagogy study, I asked three talented Arizona State University dance education students, Megan Fox, Lindsey Bauer, and Elissa Moriarity, to assist me in the research. Megan was so enthusiastic about iDance that she chose to conduct her Senior Dance Education Capstone Research project. Her thoughtful and ongoing reflection was critical to this investigation and led me in new directions: application of videoconferencing in teacher preparation, distance education, and student teaching. From Eloy, four classroom teachers were selected: Linda Anderson and Robert Sasser, third-grade teachers from Curiel Elementary School; and Sakina Vo, and Victoria Ruelas, seventh- and eighth-grade teachers from Eloy Junior High School. The study involved 36 third-graders, 17 seventh-graders, and 21 eighth-grade students. I am indebted to these co-researchers for exploring uncharted territory in dance education.

### **Data collection**

Phase I occurred between October 2005 and December 2005. During this period, 24 videoconferencing sessions (six per class) and 16 live dance classes (four per class) were conducted. For efficiency and continuity, we held four classes per day, with each member of the iDA team leading one of the sessions. Session length was approximately 40–50 minutes. Phase II occurred between January and April of 2006, with just Fox and myself teaching two third-grade classes. We held 12

videoconferencing sessions (six per class) and eight on-site visits (four per class). Over the course of the iDA research, there were a total of 36 videoconferenced sessions and 24 live dance classes in Eloy.

Data were collected from various sources: observation; journals; video documentation of the process; single subject interviews; and ongoing debriefing with the iDA team. Observation was selected as a main method for data collection, as observation techniques allow for the documentation of human behavior and events as they occur. Spradley (1980, 33) identifies three types of observation: descriptive-, focused-, and selective observation. All three observational methods were used in data collection. Descriptive observation was used to record the behavior of the students, teachers and the overall school community. Then based on my perceptions and questions, more selective and focused observations were utilized during the iDA sessions.

The iDA team kept an ongoing diary of events and experiences in the school during the research. The diary included verbal comments to the class, concerns, students' responses, anecdotal conversations with students, parents, teachers and a record of what happened and when. These journals became invaluable resources, as they provided a place and time for critical reflection of my assumptions and perceptions during the investigation.

Video recording was used to corroborate data from my observations and iDA journals. Video recording methods included a roving videographer recording both the students and the iDA teachers engaged in the processes. Aware that there are certain drawbacks to the validity of research that is dependent solely on observation (since observation only measures what the researcher can see), I chose additional methods for data collection, which included interviews and team debriefing sessions.

Interviewing was used in iDA to reveal as much as possible of the students' understanding, reasoning and viewpoint. The single-subject interview structure offered students a chance to explain their answers and to elaborate further, which in turn brought new issues to the surface that had not been considered, predicted or anticipated. There were a total of eight third-grade, four seventh-grade and four eighth-grade students interviewed at the end of the iDA sessions. Students were selected by their teachers and excused from class for the duration of the interviews.

During the interviews, questions were tailored to the level of knowledge of each student, being careful to use everyday language. In the interview, I asked a combination of descriptive and focused questions to gather information about the students' dance experiences, their perspective of videoconferencing and their interest and experience in iDA. All interviews were videotape recorded and selectively transcribed to establish a data record. Aware that videotaping can be intimidating and therefore can diminish frankness, I worked to build a warm, trusting relationship with the students. The students valued the interviews as personal one-on-one time with their dance teacher. All of the students wanted to be interviewed, though unfortunately, this was not possible due to their school commitments.

At the conclusion of each lesson, the iDA team debriefed, identifying particular challenges, discoveries and issues occurring during the lesson. These conversations became part of an ongoing data record of the experience. The information gained guided curricular and pedagogical revisions. In addition, iDA contacted the classroom teachers to hear their reactions and impressions of the lesson, students' reactions and to inform them of changes in the initial curriculum plan and calendar issues. Team discussions regarding the process discoveries were critical to the evolution of the curriculum and methodology, allowing for greater adaptability in the teaching process.

### **Limitations**

The limitations of videoconferencing during iDA were scheduling, support, audio, video, cost, number of participants and public representation.

Scheduling was challenging as each school has its own calendar and daily schedule. In the spring, the focus on academic testing at times hindered our ability to meet. It is important to have agreements in place prior to the start of the project, including the number of transmissions and live sessions, as well as an estimated cost for transportation to the site.

Videoconferencing requires additional personnel to function properly. TPL recommends having at least three support personnel (the videographer, the switcher, and network manager) to support the dance teacher. At ASU, our video camera is mounted on the TV; therefore, we were able to manage with only two support personnel (network consultant and switcher, whose job it is to manage the switcher cable). However, when we were without this additional help, the teacher's flow of instruction would be broken.

Ample support personnel were available. Due to the efforts of Jill Dingman from Central Arizona College and Bill Steber from the Eloy School District, we were able to identify and collaborate with four teachers and their students. ASU had dedicated videoconferencing coordinators James Casey and Antonio Dias, who made sure that the room was prepped and always ready for our teaching. Audio and video issues were also challenging at times.

It took time getting used to the 3–6 second time delay while videoconferencing. Challenges with recorded music and the microphone required waiting for responses to questions, comments and feedback during the sessions. At times, the sound quality cut out altogether. Quickly, we all learned to adjust the tone and tempo of our voices and to speak very clearly into the microphone. It was hard to hear students who spoke softly or away from the microphone. Also, other students needed to remain quiet, as the microphones were sensitive and picked up all sounds in the room. Quiet was not always possible, so we developed a series of hand signals to assist classroom management and to redirect the focus of the class.

Video issues included the pixilation of movement and restricted views of the participants and concurred with other dance videoconferencing research (Jansen 2004; Mandile 2004; TPL 2005). Every once in a while, the video feed would drop service, and altogether unexpected and surprising results often followed. An example of this occurred during a responsive dance activity focusing on sustained time and reach space. As the students in Eloy were mirroring the ASU teacher's movements, the video signal from ASU cut out. Unaware that anything had happened, we continued dancing. At ASU, we were stunned to see from the Eloy video feed that the children had stopped following the teacher and held a particularly tricky one-legged balanced shape resembling rock climbing. We had no clue why the children were remaining in the frozen shape. They struggled to keep the shape, while unaware that anything had happened. From the smiles on their faces, one could guess that the children must have been thinking this was a test of their balance.

Bandwidth is an issue when connection is too slow to receive the signal or the signal is jumpy, or there is loss to parts of the image, which makes it difficult for the students to see the details of body in movement. Network congestion is when there are too many individuals on the Internet at the same time. An example of congestion is when the typical 2–3 second lag time would become a 7–8 second lag and we could not really see what was occurring. These are common challenges in videoconferencing; I have learned to be patient and very well prepared. The iDA team was very fortunate to be in the care of expert techies.

Other factors which hinder the use of videoconferencing in dance is the cost of the equipment. Videoconferencing systems cost between \$60,000 and \$80,000. They require annual maintenance, and the school must have specific cable connectivity.

Relatively few students are able to use the system at any one time. During the videoconference each group of participants have to assemble together at the same time. And unlike in asynchronous learning, the participants have control over neither the pace of the learning nor the time and place.

Four seventh- and eighth-graders expressed concern over being videotaped and having their image transmitted over the Internet. They consequently dropped out of the program. The video

camera and large projection can make students feel overexposed and vulnerable. Issues of child custody where parents do not want estranged individuals seeing their children may also pose concern. Even after a letter was sent home that the iDA program would not be broadcast on TV, the newness of the experience raised some fears for some community members.

However, the majority of the students were excited by the potential of the technology. Being able to view themselves on a large projection screen made them feel valued and important, and they were eager to be seen by others. The sense of celebrity created by the video camera is illuminated by one student's comments: 'I feel special ... It's cool to see myself dancing on the screen. It's like I'm a star on TV.' Another student discussed how the projection screen offers a new perspective. 'It was so cool seeing myself moving. It was weird at first, but now I kind of like it. With the big screen copying my moves, I feel my dancing differently.'

### Discoveries

We made several discoveries during iDA videoconferencing. Identified are the advantages and challenges of videoconferencing as they relate to the teaching and learning in dance in rural communities. Of particular note are student comments about the process of learning dance and the socio-cultural and emotional effect of videoconferenced instruction. These included access, travel time, relationship across the miles, personal attention, personal connection, focus and physical expression. They will be discussed below.

Videoconferencing enriches the curriculum by allowing students to connect to the world from the comfort of their own classroom. It exposes students to a diverse community of dance, which is centralized and available around the nation. In iDA, videoconferencing granted access to instructional content, university experts, exceptional dance education students and specialists. Considering the importance of access, one seventh-grade student revealed, 'While the dance teachers came here [to Eloy] now and again [when we videoconference], they were right *here* [he pointed to the screen]. It was great. I'd never seen nothing like that. I never knew that those kinds of moves existed.' A teacher addressed the need for her students to be exposed to greater opportunities. She said, '[the] iDA experience gave my students access to resources that are not available in Eloy. The students learned how to express themselves with dance as they learned about systems of the body.'

Isolation is a reality for students in rural communities. One seventh-grader expressed iDA's value as a real world application of videoconferenced technology. 'I can definitely see how video-conferencing will be useful in business when I am older. ... It was great to use technology of the future.' Another student spoke about iDA's impact on his learning and worldview saying, 'Eloy is really small ... with iDance I was able to see more and learn new things that are not here in this small town ... [Through videoconferencing,] I could even talk to people on the other side of the world.' Other students identified the excitement of working with the teachers, saying, 'I feel lucky to have participated in the project. Getting to meet the ASU teachers and learning about dancing was great.' One of the teachers elaborated:

iDA videoconferencing provided a valuable opportunity for my students to become aware of the world beyond Eloy, Arizona. My students were able to work with university professors while learning about dance and the human body. It is truly a memorable project. All of my students enthusiastically want to continue the program into fourth grade. We are eager to continue to bring this experience to our students.

On the last day, Eloy middle school students came to ASU. They toured the campus, seeing the football stadium, union and libraries. The group reviewed the dances and performed them in the large performance space. When surveyed, many students described getting to know the college



students and visiting the campus as a significant experience. 'It was great to get to know the college kids, come to ASU, and see the campus. Everything there is so big ... I hope to go to ASU when I get older.' By closely working with the ASU faculty and students and visiting the campus, these students were able to get a glimpse of college life and a larger world beyond Eloy. iDA videoconferencing served to broaden the students' concept of community and their involvement in it.

Early on, I became aware of how easily videoconferencing fit into my busy life. When we were videoconferencing, I took a three minute walk from my office to the ASU Computing Commons facility, worked for approximately four hours and then returned to my office. This convenience cannot be underestimated. While everyone in the team enjoyed our live classes at Eloy, it was an all-day experience. It would take 90 min to drive to Eloy and we would hurry back to campus to make our afternoon classes. Videoconference lessons eliminated travel time and the expense of gasoline, thereby creating an opportunity for more frequent meetings.

Forming relationships between students and teachers over videoconferencing took time and involved understanding both the expectations of the students and teachers and the comfort within the delivery system. Our initial meeting occurred face-to-face at the large videoconference room in Eloy, Arizona. This introduction provided foundational contact essential for developing a successful student-teacher relationship.

One of the first interactive movement experiences involved mirroring. Eloy students first copied my movements and then copied those of their classmates. In my journal I wrote:

The video delay is disturbing and exaggerated by the dual TV screens. I wanted the two images in sync. As I began to move, I could see that the students were still listening to my directive. In that three second gap I wondered if I had lost them. Then in utter amazement the students began to move to the music, echoing my movements like a call-and-response. Relief poured out of me. Amazingly the students were smiling, focused and intent on matching my movements ... The students were able to recall the vocabulary from last week and respond to my verbal cues. Even with the video delay ... we were dancing together. What a relief.

In the beginning we noticed distinct differences in the two age groups' responses to videoconferencing: personal attention and the need to be seen. One third-grade teacher addressed the differing needs: 'the younger students seem to need the personal interaction intermittently. Having both live and videoconferenced sessions worked well with this age group.' Intent on being heard and seen, the younger students pressed and clumped together in front of the camera, while the older students congregated in the back of the room 'like wallflowers' just out of range of the camera. Typical for their ages and developmental learning needs, the younger students desired individual attention, while the middle school students were seeking anonymity, choosing to blend into the pack. As the sessions continued, the middle school students' shyness diminished and their personalities began to emerge. Implementing the teachers' comments, the iDA team focused on providing more individualized feedback to the younger students (Figure 3). As a result, the younger students began to dance through the room, noticing that the teachers could see and acknowledge everyone in the class, not just the most vocal students in the front row. One third-grader articulated her contentment: 'She [Dr. Parrish] would include my ideas and movements in the dances and watch how I performed them.'

To overcome the barriers of distance and encourage participation and interaction of the learners, the iDA team worked to make our presence felt by the students. The students paid close attention to our tone of voice, body language, and verbal and non-verbal cues.

A lack of personal connection hinders the formation of relationships and is particularly fragile within the context of videoconferencing, given the challenges of dropped images, defragmentation and pixilation. Students expressed their frustrations with the media limitations, small screen size, dropped frames and frozen screens. One student observed, 'sometimes it was





Figure 3. Dr. Parrish provides guidance and feedback to a group of third-grade dances.

difficult to see the teachers. We just had to wait till the picture [got] better.’ Isolation was felt when the technology failed: ‘When the screen froze we could not see anything. The class did not know what to do. We would have to dial you up again and hope it worked.’

Conversations were choppy with silence and waiting. When asking a question, a three second delay would occur between the question and the students’ response to the question. It took time to become comfortable with the uneven flow of communication. Rather than rush through the conversation, speaking it all at once, it was essential to relax, be patient and wait for the students to respond. After the first few sessions, a more natural pacing began to occur. As the enthusiasm of the ASU teacher and the curiosity of the Eloy students grew, the stiff artificiality experienced during the first videoconferences gave way to more easygoing warm interactions.

When asked to describe the iDA teachers, most students described them as cool, kind, smart, interesting, funny and warm. Such personalized statements reflect on the social presence possible through videoconferencing. One student said, ‘Elissa really cares about us and our dancing and our ideas.’ A third-grader discussed the one-on-one teacher/student relationship fostered in videoconferencing. ‘Dr. Parrish and Megan made learning fun. It was better than learning dance from the TV or a book. You can’t ask questions to a book or TV.’ Still other students addressed the importance of forming personal connections with the students: ‘They are all so nice. It doesn’t feel like they are very far away. Megan really sees me dancing and helps me to move right.’ Another student added, ‘I liked learning about my muscles and bones and making body dances together.’ In his final interview one student expressed the closeness he felt during videoconferencing: ‘Just because you can’t touch them [the teachers] doesn’t mean you can’t know

them. We really got to know the instructors from ASU. In videoconferencing we can talk to each other and make real close relationships.'

Videoconference technology recasts our teaching methodologies, planning, directives and conversation cues. We discovered that timing, point of view and articulate directives were critical. While essential in all teaching situations, they are especially important in the videoconferencing environment. Matching our camera cue settings (point of view) with the class had significant effect, such as when using a long shot of the classroom for improvisations and a tight shot for directions and commentary and panning while viewing student process assignments and during class discussion. While challenging at first, the adjustments to our teaching style became more habitual. However, the reality is that the technological problems and transfer delays found in current videoconferencing systems affect the depth of the medium, which in turn impinges on the depth of personal connection possible.

When asked how a dance teacher in a videoconferencing setting is different from a teacher in a traditional classroom, one student said, 'you have to pay attention a lot to the teacher.' Another student elaborated, 'you have to be more active in the class so that the teacher can see and notice you.' When asked which of the two types of dance teachers they preferred, 100% of the third-graders preferred a teacher with whom they could work face-to-face. Addressing the need for social closeness and proximity, one third-grader elaborated, 'I liked having the dance teachers come to our school the best. You learn more when they are closer.' However, not wanting to lose the possibility of having a videoconferenced teacher he added, 'But it is good to have videoconferenced teachers, too. Megan and Dr. Parrish teach us a lot about choreography and our bodies.' He paused. 'But it is best to have the teacher right next to you.'

Of the middle school students, 40% preferred having a videoconferenced dance teacher. One seventh-grader shared, 'It is a lot like having the dance teacher right here. You just have to be active and participate more. We have to work hard to memorize the steps. With a videoconferenced teacher you can't just dance it a little ... you have to dance it fully ...'. Addressing the anonymity that the distance provides, another student stated: 'I [felt] more comfortable dancing when the teacher was far away. When they were here [in Eloy] you [had] to do it right. There was more pressure on you when you were face to face.' Another discussed the accessibility found in videoconferencing: 'When you are face to face, you feel kinda shy ... and it is kinda of hard to look in their eyes and talk, but with videoconferencing it is easier to talk to the teachers.'

In the iDA survey, 93% of the middle school students and 100% of the third-graders identified iDA as a positive experience and would like to continue with the program. One student commented, 'The truth is ... I really did not want to do it. But after I started doing it, I got into it ... and in the end, I really liked it.' Another student concurred: 'In the beginning, I was like OK, I will just do this to get out of class; but in the end, it was like so cool and stuff. I just did not want the class to end.'

When asked to identify the influence that iDA had on her students during and after our lessons, an Eloy teacher shared, 'Dr. Parrish encouraged the students to remember their movement sequences, to practice them, and to share them with their families. This task asked the students to keep the iDA experience active in the students' daily lives. I noticed that after the class, my students continued to be mellow for the rest of the day – not slow, rather relaxed and more focused in class.' Another teacher mentioned that his students were able to retain the concepts that were discussed months after the completion of the project: 'The students remembered science concepts. To my amazement, they recalled the properties of blood and the function of the lungs. They also remembered the dance movements we did with Megan and Dr. Parrish.' Another teacher noticed that 'at the end of the conferences, they do seem a little more energetic, lively, and happier.'

The responsive nature of videoconferencing was surprising for the students. They made comments such as ‘It was cool, like I was on TV or something. I liked seeing myself on the screen when I dance.’ Another student described the experience as futuristic: ‘It’s like talking on the phone and seeing what people are doing.’ One teacher observed, ‘I noticed that on videoconferencing days student attendance rose. The students were excited ... talking about the dancing to their friends and practicing the movements in the hallway. To me, this is a very positive, confidence-building program.’

Videoconferencing granted access to dance that was previously unavailable. The richness of the medium made it possible for the students to be involved in experiences that extended beyond traditional lectures. The iDA grade-based curriculum covered fundamental learning principles in dance and curricular content in math and science. Over the course of the research, Eloy students were able to move three-dimensionally, create expressive movement phrases using the elements of dance (BESSR), perform for others and analyze their own and others’ works. Students were able to adapt their dance knowledge to apply to different themes and contexts. iDA employed manipulatives (scarves, elastics, fabric, protractors and games) and technological tools (digital video, PowerPoint and ELMO), in an effort to create a dynamic learning environment and to address the different learning styles of the students.

Videoconferencing methods proved functional when presenting choreography and leading dance-sharing reflections. For the most part, image quality was good, allowing us to see the students’ detailed movements and to provide guidance and feedback. The iDA team identified that the students responded to rhythmic locomotor movement through space, basic body actions, body part isolations and gestural choreography. Seeing that the students were up for the challenge, the teachers taught dances that were both physical and creative. We observed how the classroom was energized with the students’ hard work.

While the room had a few large pieces of furniture and was carpeted, we found that there was adequate space to dance. The creation of landmarks and taped sight lines in the room ensured student safety. The development of visual directions – ‘hand signals’ – helped the class to rotate lines, enter the stage, start and cease dancing. Students worked and performed in small groups to best maximize the space, increase visibility and permit individual feedback.

The students remembered and valued individualized attention, affirmations and specific guidance. We discovered large group discussions and critiques were best facilitated by the classroom teachers who managed the flurry of hands going up all at once. The classroom teacher simply selected students to share their comments.

In their interviews, the Eloy students addressed the sensations and expressions of movement. One third-grader revealed, ‘I love dancing and expressing with my body. I like to jump, turn, and wiggle around the room ... making myself big and small. When I dance, I feel free ... like I am flying around the room.’ A middle school student continued, ‘When I dance, the music and beat goes inside me and my body is energized. I am so happy. I did not want the class to stop.’ When asked to describe their most memorable moment, a third-grader spoke of the creation of breath dances and when the students embodied the movement of the lungs. ‘I liked it because we learned a lot about our breath, lungs, and how oxygen moves inside our bodies.’ When asked to describe the dance she continued, ‘The breath dance [that] we made in our groups, with the cards, was really fun. I was surprised how breath could move in my body ...’. She later added, ‘I liked it when we listened to our friends’ heart and danced the heartbeat and became a huge lung’. Another student articulated the importance of relating to the teacher and classmates. ‘I liked shadow dances the best – when we got to dance with a partner and sometimes with Megan. She would do crazy movements with her body which were fun to copy.’ The younger students were always eager to improvise. In one instance, when we had just a few minutes remaining in the class, Megan suggested an impromptu improvisation. She put on some upbeat music and

called to the students, 'Come dance with me.' Elated, the students [and even their teacher] jumped up and joined in on the dance party. That very moment illuminated the ease and impact of videoconferencing.

One of the ASU teachers commented on the prospect of videoconferenced pedagogy for dance: 'You can learn a lot from the students, how they are reacting to your instruction. You can judge their tone of voice and their body language. You can see whether they are doing the movement or just marking it. You are able to offer feedback, verbally and visually, and help them embody the movement.'

Interviews and surveys revealed great interest in continuing the project. When asked to describe how they felt during the class, students used words like 'super, good, excited, energized, alive, and happy.' They said that after videoconferencing, they felt 'better, more relaxed, tired, exhausted, awake, and good.' One student elaborated, 'after dance I feel relaxed and happy ... even in my next class.' When asked whether they felt comfortable performing their dances to videoconferenced teachers, 87% said that they did. By creating a less intimidating environment, the students were able to overcome the anxiety one may experience with dance. For others however, overcoming this barrier remained a challenge.

Humorous and encouraging instruction helped diffuse anxiety and tensions that came from unfamiliar activities. In my journal I wrote, 'the students, once shy and insecure, are now more independent movers. They seem engaged and challenged in the dance making and during technique. Laughter, energy, and curiosity in dance are drawing the students into the class and helping them establish a connection with the dance.' An example of this occurred during a dance sharing when an exhilarated student raised his hand up to the camera in a 'high five' gesture. In that moment, the distance that divided our two classrooms melted away. That student's overt action celebrated their success and united the students and teacher, dissolving all barriers.

Providing increased access to dance for the students in Eloy was an aspect of the iDA research that worked. Students were able to participate in performances, critiques, coaching sessions and even improvisation jams. iDA videoconferencing fostered a hands-on understanding of the potential of videoconferencing and appreciation of how dance can be a mode of expression for students.

## Discussion

For dance educators, videoconferencing is becoming more affordable and available. Given the need for dance teachers in rural areas, this technology is an option that must be considered in certain settings. Forming relationships between students and teachers over videoconferencing took time and involved understanding both the expectations of the students and teachers and the comfort within the delivery system. The iDA research supports the findings of Mandile (2004) and Enders and Kasch (2004) that videoconferencing can enrich the dance curriculum, allowing students to connect to the world and build community from within the comfort of their own classroom. iDA videoconferencing granted access to dance that was previously unavailable.

The richness of the medium made it possible for the students to be involved in experiences that extended beyond traditional lectures. The iDA curriculum exposed students to the diversity of dance methods including learning technique, creating choreography, improvising, relating, mirroring and shadowing across the videoconferenced classrooms, performing and discussing dance. Results show that middle and elementary school students were able to perform traditional dance activities such as dance making, improvisations, dance sharing, and even dance technique over videoconferencing.

In iDA, videoconferencing granted access to instructional content, university experts and exceptional dance education students available at the university. To overcome the barriers of



Figure 4. iDA students' three-dimensional use of their bodies demonstrated in both choreographed and improvisational dances.



distance and encourage participation and interaction of the learners, the iDA team worked to make our presence felt by the students. The students in turn, paid close attention to our tone of voice, body language, and verbal and non-verbal cues. Our findings concur with TPL's (2005) assertion that when interactive video technology is used appropriately, 'Two classrooms become one ... Intimate connections are established between artists and students ... as if in the same space' (2).

While dance purists may object to videoconferencing saying that it cannot replace face-to-face dance instruction, our teachers and students in grades 7–8 disagree. Both groups articulated satisfaction in the personalized attention and its effect on their physical and creative participation in the videoconferenced dance classes. The students remembered and valued individualized attention, affirmations and specific guidance. Advantages between traditional instruction and videoconferencing were expressed by middle school students stating how videoconferencing required greater focus, commitment and attention to the teacher. These remarks concur with TPL (2005) research supporting increased student responsibility and independence in learning, 'students go beyond what they usually learn in the classroom ... and stretch themselves mentally' (3).

However, in iDA sessions dropped images, defragmentation, pixilation and other technological problems affected content delivery and limited the depth of personal connection possible. These challenges provide context for the particularly fragile circumstance of videoconferencing in today's schools. Until advances in the field of technology become more readily available the use of videoconferencing in schools will continue to be limited. Such difficulties as experienced in iDA will hinder successful realization for the less experienced teachers.

When videoconferencing meets both the teacher's needs for the promotion and dissemination of dance content and the needs of students, without technological glitches, the traditional culture of teaching dance can be changed. If the appropriate pedagogy is in place, then videoconferencing can be experienced as a transformative technology both for the teacher and their students.

Videoconference technology recasts our teaching methodologies, planning, directives and conversation cues. This research identifies that students, as young as eight years old, are capable of forming personal connections and are unanimously interested in continuing relationships with dance mentors, specialists within a blended learning environment. Blended instruction, as suggested by Bonk and Graham (2006), permitted iDA the instruction of essential dance-based knowledge prior to our videoconferenced lessons. Both university students and Eloy teachers considered this process a valuable method for establishing familiarity with pedagogical practice for dance education and for generating baseline data on student experience and comfort in dance. Based on student comments and teachers' journals, iDA blended videoconferenced interactions diminished the sense of isolation felt as members of rural communities (Bonk and Graham 2006).

This article addresses teacher shortages due to remoteness, long travel time, and distance from larger cities which could be eliminated through videoconferencing. The findings concur with Ludlow and Duff (2002), who state that the advantages of videoconferencing include: 'enhanced access in even the most remote rural areas; reduction in the cost and effort associated with class sessions; and provision of opportunity for national and even international outreach' (5). Strategic planning is essential for successful videoconferencing. As with all technology, there are inevitable glitches, requiring teachers to be flexible and adaptable.

The data collected from this research shed new light on the use of videoconferencing in dance education and its abilities to meet the needs of students in rural communities. At the end of the study, after careful review of the data, I feel confident that videoconferencing is a viable method for bringing dance education to rural communities.

Videoconferencing in dance education can provide flexible options to instruction, although technical limitations may inhibit communication. There is a need for greater networked support



and training for professionals and school districts. More research is needed to define and evaluate pedagogical strategies of videoconferencing for dance. Further assessment of the strengths and weaknesses of the iDA curriculum specifically in the instruction of K-8 dance education is necessary. As videoconferencing facilities become more a part of our educational infrastructure, the potential for new connections within dance and other arts disciplines will expand to serve the needs of the students.

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