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ABSTRACT

An experiment is described that involved video conferencing technology with preschool children in a music instruction context. Video conferencing is a powerful communications medium, and may be used in creative interactive contexts. The subjects were children, ages 3 through 5, participating in video conferences from Australia and Canada, eight at each conference site. A detailed discussion of rehearsal procedures, technical broadcast information, instruction techniques, evaluation of instructional efficacy with objective tools, and interpretations of the data are provided. Whereas children's television programming, especially in a music context, is essentially non-interactive, video conferencing provides educators a viable, interactive audio-video medium to deliver instruction in a variety of subject areas. (Author)

Video conferencing with preschool children: Mass communications media in music instruction

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Abstract: An experiment that involved video conferencing technology with preschool children in a music instruction context. Video conferencing is a powerful communications medium, and may be used in creative interactive contexts. A detailed discussion of rehearsal procedures, technical broadcast information, instruction techniques, evaluation of instructional efficacy with objective tools, and interpretations of the data is provided. Whereas children's television programming—especially in a music context—is essentially non-interactive, video conferencing provides educators a viable, interactive audio-video medium to deliver instruction in a variety of subject areas.

Introduction, purpose, and problems

Mass media are globally pervasive. We live in a global village (McLuhan & McLuhan, 1988) where through a massive network of satellites, telephone cables, optical cables, and microwaves electronic media have linked nations across continents. In most communications situations, the speed of the flow of information in the Digital Age outpaces our ability to assimilate, accommodate, and synthesize new information. As McLuhan (1964) hypothesized, new technologies constantly evolve, and in many cases envelope existing technologies. As a contemporary example, RISC processor technology, seems poised to replace CISC technology in desktop computers. The majority of people who participate in the work force are not "technoliterate," and many seem oblivious to the notion that developments of the past decade in communications technology have led to a distinct change in the way humans process information. Even though we are in the midst of an information explosion of magnanimous proportions, education ministers, education policy makers, and politicians seem oblivious to the numerous technological developments that are emerging as we approach the 21st century.

Media define culture (Gouzouasis, 1993). All that we learn is assimilated through some communications medium—the human voice, print media, audio recordings, video recordings, radio, television, and computers. Indisputably, mass media—in the form of radio, television, motion pictures, telephones, and computer controlled information systems—are pervasive. Essentially, we are what we assimilate through media. In this day and age, instruction may be delivered both purposively and indirectly, and learning may take place both consciously and unconsciously (i.e., subliminally). In a contemporary example, whereas the much maligned "Barney" children's television program is an example of purposive use of music material and conscious music making, "Sesame Street" is an example of how music can be relegated to background "noise" and a visual support role. In general, television programming and commercials use music as background information, usually as a sound effect, rather than foreground information. Inevitably, in multimedia, as in most hot media, visual information takes precedence over acoustic information (i.e., music). Subsequently, we seem to live in a visually stimulated, musically-illiterate society.

Videophones and video conferencing systems are a accessible reality. A videophone is a telephone with screen attached to its apparatus. Video conferencing technology involves the use of both video and telephone technologies. In the typical video conference, people use the audio to lecture and discuss issues, and the visuals are used to see participants and project a variety of diagrams and illustrations. Bell Atlantic is poised to promote videophones on a mass marketing level and currently sells them for approximately $2500. Recent mergers of large communications corporations will forever change the way that we communicate, both in everyday life and in educational settings.

Burtenshaw (1992, 1993a, 1993b) is a pioneer in the use of video conferencing technology in education. His experiments involve the successful use of video conferencing technology in a variety of music teaching contexts. Teaching segments in various instruments (oboe, violin, and trumpet), piano master classes, and a one-way early

childhood lecture-demonstration comprised his earliest projects (Burtenshaw, 1992). In the piano master classes, students were critiqued and given performance directions by master teachers, but the instructional techniques were limited range and flexibility, primarily because of the lack of familiarity (on the part of master teachers) with video conferencing's interactive potential. Rather than fully-interactive sessions, where participants are able to immediately respond in an echoic (rote) or sequential manner to a teacher's instructions, most video conferencing experiments involve the observation of teacher-student interactions in live teaching situations (MacKinnon & Scarr, 1992), lectures, and discussion sessions. It was from the perspective of expanding this relatively new medium to its ultimate application potential that the present study was undertaken.

With the intent of exploring mass media in education, the purpose of this study was to learn more about the use of video conferencing in a music learning environment. Specifically, the the primary problem was to examine the efficacy of video conferencing in a rhythm instruction segment. Concomitant with the purpose, because no objective evaluation criteria have been developed for video conference sessions, the secondary problem was to develop objective evaluation techniques for video conferencing instructional sessions.

Methodology

Samples and sites

Eight children, ages 3 through 5, participated in the video conference broadcast from Australia. The children comprised an availability sample, and were included in the experiment based on their ability to attend the video conferencing studio in Sydney, Australia. The researcher received a list of the children's names by fax and randomly assigned each child's name to a two beat pattern on a list of eight patterns. Eight children, ages 3 through 5, participated in the video conference broadcast from Canada. The children were preschool students of the researcher, and were included in the experiment solely based on their ability to attend the video conferencing studio in downtown Vancouver, British Columbia. Two days before the video conference, the researcher faxed a list of the Vancouver children's names to the music specialist in Sydney, Australia. Names were exchanged in this manner to facilitate instruction and to help make the children more familiar during the instructional segments. Also, each child on each continent wore large name tags to facilitate instruction. The session, which took place in the video conferencing studios of The Commonwealth of Learning in downtown Vancouver, was transmitted on Wednesday, May 19, 1993, from 4:00 p.m. to 5:30 p.m. Vancouver time, and received on Thursday, May 20, 1993, from 9:00 a.m. to 10:30 a.m. Sydney time.

Technical Information

The transmission used two standard telephone lines (analog information), converted by BC Telephone Company into 56kb lines (kilobits of digital information). That information was transmitted via CLI Codec (coder-decoder) and translated in Coff's Harbour, Australia into 64kb ISDN (Integrated Services Digital Network) information that was received by the PictureTel Codec in Sydney, Australia. The reason for the multipoint bridging (Vancouver to Coff's Harbour to Sydney) was that North American equipment uses a 56kb line standard, while the international standard is 64kb lines. At the time of this experiment, there were no p X 64 (proprietary 64kb) bridges, hence the translation from 56kb affected our video resolution, video movements, and audio-visual coordination. In essence, whereas the video information was transmitted at both ends in compressed 15 frame per second video, the translation bumped that resolution down to approximately 8 frames per second. In addition to the Vancouver-Sydney link, to allow other art and music educators to view and comment on the experiment, the signal was also transmitted to Armidale, Australia.

General Transmission Procedures

For the Vancouver transmission, two rehearsals were conducted prior to the instructional broadcast. During the first rehearsal which involved a live transmission to Sydney, the researcher determined that movement activities would need to be drastically limited because of the delay and resolution in the video signal. The researcher sang a children's song to the technical engineer in Sydney, and attempted to teach the same song with the rote-phrase technique to the technical engineer. A gesture that is typically used by teachers to cue children to echo sing or chant (i.e., both hands on chest, teacher's turn to sing; both hands extended to children, children's turn to echo sing) in the rote-phrase technique did not seem to be affected by the resolution of the video signal, and it was decided that the gesture could be interpreted as an invitation for the children to respond to the Vancouver-based researcher's chanting of rhythm patterns.

During the second rehearsal, the researcher's entire presentation was timed and the quality of a ten minute instructional video demonstration was evaluated by the video conference educational technician, a cameraman, and research panel participants. The instructional video included four segments: (1) diatonic stepwise tonal pattern singing instruction in major tonality, (2) diatonic arpeggioed tonic and dominant tonal pattern singing instruction in major tonality, (3) four beat rhythm pattern chant instruction in duple meter, and (4) two beat rhythm pattern (performance on hand drum) instruction in duple meter. The researcher hoped that the children in Australia would watch parts of the video during the video conference broadcast and develop a sense of familiarity with the researcher through his work with the children on the videotape. In a sense, I thought it was possible to provide a model for the type of activity in which the children Sydney would participate. Since most children seem to be attracted to information transmitted by television, the researcher believed that viewing the children who performed music on the Vancouver videotape would establish a mood for the children in Sydney to work within this medium.

Instructional procedures: Transmission to Australia

To begin the entire broadcast, the group of children who were in the Vancouver studio sang a "Welcome Song" to the group in Sydney. The educational technician used the remote control touch screen module to turn on the videotape machine to broadcast the instructional demonstration. He muted the microphones on the participant's table, but neglected to mute the overhead studio microphones. That caused an echo effect in the Armidale studio, which made the videotape segment difficult to interpret in Armidale, Australia. At the end of the 10 minute video broadcast, the researcher was seen live on camera in Sydney, Australia. As he greeted each child individually, according to the list provided via fax, the Sydney studio video camera scanned the group. As the researcher gestured with his hands and arms, he chanted "My turn first then your turn." Each line of the rhyme "Pease Porridge Hot" was echo chanted, phrase-by-phrase, with words. The researcher repeated his gesture and repeated the previous directions. Next, each line of the rhyme "Pease Porridge Hot" was echo chanted, phrase-by-phrase, without words on the syllable "ba." "Ba" was used because it is considered an easy syllable to chant for very young children. Moving from a rhyme ("Pease Porridge Hot") with words to the same rhyme chanted with a consonant-vowel syllable ("ba") is deconstructivist in nature. Rhythm exists in speech patterns, but the fundamental nature of rhythm as an element of music is often overshadowed by words.

Immediately following the rhyme chanting activity, each Australian child was asked to echo chant a two beat rhythm pattern. Eight two beat rhythm patterns in duple meter (2 meter beats, quarter note represents the beat) were selected (one for each child) for instruction based on the notions that (1) from a Gestalt perspective, a one measure, two beat rhythm pattern is the smallest logical unit of music information that can impart a sense of meter, and that (2) for young children, two beat rhythm patterns seem easier to perceive and conceptualize, and easier to perform. The ability of Australian preschool children to chant a two beat rhythm pattern on the syllable "ba" was examined to determine interactive efficacy of video conferencing as a basic music teaching tool.

The music specialist in Sydney, Australia introduced herself with a "Hello Song" based on the melody of "The farmer in the dell." Two children in the Vancouver studio immediately recognized the song, and began singing along with the words to "The farmer in the dell." Next, the Australian researcher taught a segment on the concepts of high and low pitch direction through movement in song (i.e., children move entire body down when the pitch sounds low and up when the pitch sounds high). It should be noted that in and of itself, the concept of "direction" in the form of "high" and "low" direction is an adult imposed music construct, and young children are able to sing in tune and discriminate individual pitches and melodic patterns without such directional knowledge.

Evaluation of the transmission and rhythm pattern chanting segment

A questionnaire composed of 16, five-point, rating scales was used to evaluate the efficacy of the video conference transmission and the Vancouver teacher's rhythm pattern instruction (see Appendix A). Four independent raters—two music specialists who sat separately in the Vancouver (R1 and R2), the researcher (R3)(Vancouver), and a music specialist based in Sydney (R4)—were enlisted to judge the video conferencing session. A section for anecdotal comments was also provided to gather each rater's overall observations and general perceptions about the technology.

Results

Reliabilities of the rating scales

The interrater reliabilities for the pairwise rater comparisons are presented below (see Table 1).

Table 1
Interrater Reliability Coefficients

	Rater 1	Rater 2	Rater 3	Rater 4
Rater 1 (R1)	----	----	----	----
Rater 2 (R2)	.704	----	----	----
Rater 3 (R3)	.573	.710	----	----
Rater 4 (R4)	.411	.499	.156	----

Generally, it can be seen that the level of agreement (r^2) between the Vancouver based raters, in terms of a perspective of what occurred during the video conference, was higher (R1-R2=49.5%; R1-R3= 32.8%; R2-R3= 50.4%) than the level of agreement between the Vancouver based raters and Australian rater (R1-R4= 16.8%; R2-R4= 24.9%; R3-R4= 2.4%).

The efficacy of the teaching segments

As was demonstrated on the instructional videotape, it seems that children are able to focus on and perform rhythm patterns when they use simple, consonant-vowel (cv) syllable combinations ("ba"). Furthermore, with one exception, all of the children (8) in Sydney were able to accurately chant a rhythm pattern. Through the anecdotal comments on the questionnaire, it was determined by viewers in the Vancouver audience that the reason that the one child did not chant the pattern was due to shyness rather than her ability to actually perform the task.

The instruction transmitted from Australia was less successful. Children in the Vancouver studio were unable to perform the directional melodic task for two reasons. First, they were unfamiliar with the concept of high and low, hence, the task was developmentally advanced. Second, they were unable to interpret the motions of the music specialist in Sydney because of the slow video resolution and because of the distant framing of the camera shot. Only when the Australian teacher invited the children in her studio to demonstrate the activity did the Vancouver children accurately perform the task.

Interpretations of the data

The studio setups in Vancouver and Sydney were quite different in their level of technological sophistication. The Vancouver studio had a centrally placed 40" monitor to view the incoming reception, a 20" monitor to view the transmission (placed to the left of the main monitor) and a 20" monitor to preview the transmission. All three monitors are in-wall units. Two video cameras were used to cover broadcast angles. The educational technologist used a touch screen Crestron Command Center to coordinate the audio and visual aspects of the session. A drawing of a yellow smiling face was placed next to the reception monitor to help focus the Vancouver children on the incoming transmission during their instructional sequence. The Sydney space had a 20" reception monitor for the Vancouver image and a 20" monitor for the Armidale video image. Both monitors were on movable carts. Essentially, whereas the Vancouver site is an enclosed studio, the Sydney site is an open, convertible space. The contrasting configurations and tools drastically affected rater perceptions. For example, responses on questions 3, 4, 5, and 6 (see Appendix A), where the video and audio signals were considered poor and severe by Rater 4 (Sydney), were considered average to excellent by Raters 1, 2, and 3 (Vancouver).

Essentially, the Australian rater (R4) believed that "the problems were not with actual teaching but with logistical problems at this (Sydney) end; volume was too low; linking three locations on two screens caused confusion—who should talk? who should we watch?; some of the words were indistinct; sound in and out

intermittently." In contrast, Rater 1 (Vancouver) commented that "the first beat of the children's echo-chant is cut off, however, there seems to be no problem in the communication and interaction between the children and the teacher; the use of video conferencing technology for interaction between teachers and students in other countries is meaningful and has much potential."

An unsolicited, in-studio Vancouver observer who is versed in the technology wrote that "the quality of picture was more than acceptable for an across the Pacific transmission, with some limited blurring of the image when there was rapid movement being a minor problem rather than a major distraction." He felt that "the two teaching staff involved use the video conferencing medium with poise and assurance." Finally, he believed that the experiment "was able to demonstrate that the technology exists for successful real time two way video and audio communication across the Pacific."

Conclusions

Even though video resolution quality is not optimal with two line transmissions, it is a cost effective communications technique and distance education tool. Because of its cost effectiveness, additional research should be conducted to explore its use in fully compatible ISDN (p X 64 to p X 64; 15fps video resolution) contexts, which are now available in North America.

Arguably, even in its most sophisticated forms, children's television programming is essentially non-interactive. Video conferencing enables educators to explore the interactive aspects of audio (i.e., music) in an audio-video context. To that end, researchers are encouraged explore the efficacy of this potent technology with a variety of teaching techniques and in a variety of music and non-music contexts.

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Appendix A

The following are a sample of the rating scale items used in the evaluation of the experiment.

1) The live visual signal was _____

1	2	3	4	5
poor		average		excellent

4) The teacher's non-verbal directions (gestures to the children inviting them to chant) seemed to be clearly interpreted by the children

1	2	3	4	5
poor		average		excellent

5) The delay on the visual signal was _____

1	2	3	4	5
severe		average		none at all

6) The delay on the audio signal was _____

1	2	3	4	5
severe		average		none at all

9) Generally, the effect of the interaction of video/audio signal delay on the teacher's presentation and communication of information with the children was the most dramatic effect on the sessions that involved children.

1	2	3	4	5
completely disagree				strongly agree

10) The teacher's verbal directions were clearly presented.

1	2	3	4	5
not at all		fairly well		consistently

12) The teacher's verbal directions seemed to be clearly interpreted by the children.

1	2	3	4	5
not at all		fairly well		consistently

13) The teacher's non-verbal directions (gestures to the children inviting them to chant) seemed to be clearly interpreted by the children.

1	2	3	4	5
poor		average		excellent

14) The delay in the video broadcast seemed to be the cause of a problem in the children's echoing of the rhythm patterns.

1	2	3	4	5
on all patterns	on most patterns	only on some patterns	on very few patterns	not for any patterns

If possible, list the patterns which caused problems (refer to rhythm pattern list and write the number of the pattern). _____

15) The delay in the video broadcast seemed to be the cause a problem in an individual child's echoing of the rhythm patterns.

1	2	3	4	5
on all patterns	on most patterns	only on some patterns	on very few patterns	not for any patterns

If possible, list the patterns for which there were problems (refer to pattern list and write the number of the pattern) for each child. _____

16) The delay in the video broadcast seemed to be the cause of a problem in the teacher's sequencing of the rhythm patterns.

1	2	3	4	5
on all patterns	on most patterns	only on some patterns	on very few patterns	not for any patterns

If possible, list the patterns for which there were problems (refer to pattern list and write the number of the pattern) for each child. _____