We Have the Videoconference Equipment Installed, Now What?

Janine Lim
Berrien Regional Education Service Agency, janine.lim@berrienresa.org

Shirley Freed
Andrews University, freed@andrews.edu

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Abstract

As K-12 schools acquire equipment for videoconferencing, they often experience limited usage of the equipment. The purpose of this study was to identify specific concerns of educators currently involved in videoconferencing. The primary data for the study was 400 discussion posts from 34 educators in an online class about videoconferencing. Data were analyzed using a basic iterative hermeneutic approach. The findings fell into two major categories: teacher concerns and administrative support. Teachers' concerns were related to professional development and curriculum expectations, and administrative support issues included the placement of the equipment, scheduling, and budgeting. Successful implementation of videoconferencing requires the cooperation of administrators as they listen to the needs of teachers.

Keywords

K-12 Education, Videoconferencing, Administrative, Teacher Support, Technology, and Hermenutics

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Janine Lim

Berrien Regional Education Service Agency, Berrien Springs, Michigan, USA

Shirley Freed

Andrews University, Berrien Springs, Michigan, USA

As K-12 schools acquire equipment for videoconferencing, they often experience limited usage of the equipment. The purpose of this study was to identify specific concerns of educators currently involved in videoconferencing. The primary data for the study was 400 discussion posts from 34 educators in an online class about videoconferencing. Data were analyzed using a basic iterative hermeneutic approach. The findings fell into two major categories: teacher concerns and administrative support. Teachers' concerns were related to professional development and curriculum expectations, and administrative support issues included the placement of the equipment, scheduling, and budgeting. Successful implementation of videoconferencing requires the cooperation of administrators as they listen to the needs of teachers. Key Words: K-12 Education, Videoconferencing, Administrative, Teacher Support, Technology, and Hermenutics

Introduction

As the world shrinks and videoconferencing activities increase, it is easy to focus on the technical requirements. After all, the videoconference will not happen without a codec, bandwidth, and Internet connectivity. A regional coordinator from Michigan shared his frustration, "All my schools have ITV [interactive television or videoconferencing] units, which is a nice luxury. However our success has been limited to this point." Innovations in education are often funded and even mandated by people separated from the local needs and expectations. In this article, we describe ways teachers and administrators can work together to provide the elements needed for successful implementation of videoconferencing.

Videoconferencing is a relatively new teaching and learning innovation. Greenberg (2004) suggested that "videoconferencing-based distance education has been in the early adoption phase for 15 years or more" (p. 9). During the early stages of technology implementation, the bulk of scholarly writing "consists of anecdotal reports, project descriptions, and informal case studies" (Anderson & Rourke, 2005, p. 3) with little actual research. This concern caused Anderson and Rourke to conduct a comprehensive review of the literature on videoconferencing; literature published from 1991 to 2004. Their review includes 53 peer-reviewed, empirical reports, and "provides a

survey of topics that are recurrent in the literature, including: (a) outcomes, (b) learning activities, (c) interactive learning processes, (d) keys to success, (e) special populations, and (f) equipment and technology" (p. 3). In the outcomes section, Anderson and Rourke found that the research focuses largely on student achievement and attitudes, with generally positive findings. Learning activities for rural and remote schools tended towards content delivery, while learning activities for more urban schools primarily used videoconferencing for virtual field trips, collaborative projects, and cross-cultural exchanges. Anderson and Rourke expressed concerns that the measurement tools on interactive learning processes in other learning environments are not used in most of the videoconferencing literature focusing on participation, interaction, and collaboration. The keys to success found in their literature review emphasized support in the technical, pedagogical, administrative, and financial areas. Several of the reports included in their literature review found that videoconferencing was used to bring opportunities to special populations. Technology and equipment are not often mentioned in the research reviewed by Andreson and Rourke, but when they are mentioned, the comments are generally negative relating to equipment failure and the need for more technical assistance.

Greenberg (2004), in his white-paper summary of recent research on videoconferencing, described four major conclusions: (a) videoconferencing is likely neither more nor less effective than the traditional classroom, (b) interactivity is key, (c) other instructional strategies maximize the use of videoconferencing, and (d) videoconferencing is cost effective. He stated that further research, both qualitative and quantitative, needs to examine economic implications and deeper understandings of the causes of failure. Owston (2007) developed a model for sustainability of classroom innovations using technology. His model emerged from an examination of 59 schools in 28 countries. The model describes essential conditions such as teacher professional development, and teacher perceived value of the innovation and contributing factors such as funding, supportive plans, and innovation champions. These three reviews and reports provide a framework for interpreting the results of our study.

The purpose of this article is to describe in the words of practicing educators the teacher and administrative supports that are essential for successful implementation of curriculum videoconferencing. Other authors have reported a synthesis of the research on videoconferencing (Anderson & Rourke, 2005; Greenberg, 2004) and developed a technology innovation model which provides some guidance for educators (Owston, 2007). However, what is missing are the "particulars" regarding teacher concerns in the area of professional development and curriculum expectations, and the administrative supports of scheduling, budgeting, and placement of equipment.

Context

Janine Lim is an instructional technology consultant at Berrien Regional Education Service Agency in Southwest Michigan. She provides support to 20 school districts implementing videoconferencing. She and her colleagues wonder why teachers who have access to equipment struggle to embed the use of videoconferencing into their curriculum. Janine facilitates a number of online classes to support videoconferencing including the one from which the data in this study was collected and analyzed.

Shirley Freed is a qualitative researcher who teaches research design and supports dissertation students at Andrews University. Her interest in this study comes from a commitment to providing support for teachers who are experimenting with technology innovations in education.

Definitions

- *Asynchronous discussion*: "Discussion participants read and send messages at various times, over an extended period of time. The opposite type, synchronous discussion, requires that all participants be present at the same time, as in a chat room" (Net Tutor, 1997).
- *Codec*: A codec is the videoconferencing hardware necessary to "code the outgoing video and audio signals and decode the incoming signals" (AT&T, 2008). Popular manufacturers of codecs include Polycom, Sony, and Tandberg.
- *Bandwidth*: "The amount of information that can be transmitted over an information channel" (AT&T, 2008).
- *Discussion post*: "A single message entered into a network communications system for others to see" (Glossary, n.d.).
- *Internet connectivity*: The ability for an organization or technology device to access the Internet.
- *Videoconferencing*: "Communication across long distances with video and audio contact that may also include graphics and data exchange" (AT&T, 2008).

Methodology

This research is participative and reflective on experience. It involves peers and is more collaborative and democratic than controlling or elitist (Bray, Lee, Smith, & Yorks, 2000). All those involved were focused on unraveling some of the concerns of those implementing videoconferencing. This article uses a qualitative approach to answer the research question, "How do educators describe the particular concerns of those implementing videoconferencing in the classroom?" In describing the characteristics of qualitative research, Eisner (1998) stated that one of the features of qualitative studies is their "attention to particulars" (p. 38). He noted that when data are transformed into statistical format, "the uniqueness of particular features is lost" (p. 38). The specifics are lost in the abstractions; the generalized statements. This study uses a basic hermeneutic approach, which is interpretive, and emphasizes the "meanings of parts within a whole" (Grbich, 2007, p. 20). It "gives almost total freedom to decide how to undertake the study, what design aspects to incorporate, which techniques of data collection and analytical tools to employ, and what perspectives to call on to provide an interpretation." (Grbich, p. 20). Grbich suggests that "there are four major traditions of inquiry: iterative, subjective, investigative, and enumerative" (p. 20). This study uses an iterative approach with data collected from 400 discussion questions in the online course. Grbich defines iterative design as "one involving a series of actions of data collection which are repeated until the accumulated findings indicate that nothing new is likely to emerge and the

research question has been answered" (p. 20). The interative approach consists of analyzing the data in cycles, starting by coding and describing one batch of data, followed by the next batch of data and continuing until no new themes emerge (Bowling & Ebrahim, 2005).

Participants for this study voluntarily registered for the online course, *Planning Interactive Curriculum Connections*, and actively participated in all course requirements. The primary data is from the first session of the class, comprised of 34 educators; ; 24 distance learning coordinators, 9 K-12 teachers, and 1 principal. The original class participants were from 12 states;; Indiana, Massachusetts, Maine, Michigan, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, Texas, Vermont, and Wisconsin. It is the broad range of locations of participants, as well as the different professional perspectives, that make this data particularly meaningful to those who are trying to implement videoconferencing in their K-12 classrooms. The participants were peers of the instructor, working in different locations across the United States to implement videoconferencing in their area. Therefore, the instructor did not have any traditional power over the participants. Upon completion of the class, participants received a simple certificate of completion. The participants were truly collaborative learners throughout the process.

Data Collection and Analysis

The data in this study are the discussion posts related to each of the class assignments. Participants were asked to discuss 10 videoconference-related articles, compare two videoconference programs, and create a lesson plan for videoconferencing. Each of the assignments provided opportunities for the participants to identify concerns related to the implementation of videoconferencing. With each new assignment (iteration), emerging themes were identified. The asynchronous discussion board was rich with experiences and formed the primary data source for this inquiry.

During the class, the discussion posts were analyzed by Janine to "determine 'what is going on' in order to build up a picture of the data emerging and to guide … the next set of data collection" (Grbich, 2007, p. 21). After the first assignment, initial themes began to emerge and the next assignment was given and those discussion posts were analyzed. This iterative process continued throughout the duration of the course. Then, the discussion posts were given to Shirley to analyze. She used a basic inductive process to identify themes. Then, Janine and Shirley compared their themes and placed them into three major categories; administrative, teacher, and curriculum issues. There was no disagreement about these three areas; both identified them as key issues. As we continued to analyze the data, the teacher and curriculum categories were collapsed into one category of teacher concerns. At this point we were starting to see the data more as supports that were needed for implementation rather than simply "issues." Thus, it was only logical to combine the teacher and curriculum issues because they represented supports or concerns needed by teachers for full implementation. We struggled with the concern of professional development, since it is both an administrative support and a teacher concern. We felt it fit better into the teacher concerns category because it directly impacts teachers' ability to implement videoconferencing. Since the initial class, the discussion posts of 96 other educators in the subsequent classes have been collected and

analyzed. In all cases, the themes reported in this article were evident in the discussion and assignments.

Findings

In the rest of this article we discuss teacher and administrative supports necessary for successful implementation. We have directly quoted many of the educators in the class because we want to give voice to the "users" of the technology. The reader will notice that the quotes are close to written quality text. This is because the participants' comments were written in a semi-academic environment, and therefore they wrote their words carefully. The quotes have not been edited, except for slight spelling errors. These educators demonstrate widespread concern and pinpoint some particular solutions for those who are trying to use videoconferencing in the curriculum. This voicing of concerns and solutions essentially provides a guide for those who are using or planning to use videoconferencing in their school. Eisner (1998) suggested that these types of guides "function to highlight, to explain, to provide directions the reader can take into account. Guides call to our attention aspects of the situation or place we might otherwise miss" (p. 59).

Teacher Concerns

It is clear that a teaching/learning innovation will not be sustained unless teachers see value in the innovation (Owston, 2007). But what does it take for teachers to "support" or use videoconferencing? Two requirements were discussed by all participants in the online class: professional development and curriculum expectations.

Professional Development

Educators' attitudes change with the experiences they receive;, whether informal or formal. When they see the value of a technology, they are then anxious to use it. One videoconference coordinator reminded the other class members of something teachers know well:

> It's important to remember it's not about the technology but about teaching and learning. The technology is just another tool or resource. The benefit to students is the exposure to the world of others. This may only be across town, but for an urban and rural student to engage in discussion and interaction is often bridging a wide gap.

An elementary coordinator in Texas shared how one of her teachers got started. "After helping her schedule and conduct a videoconference she is hooked! Now all I seem to help her with is locating new exciting sessions." A gifted and talented elementary coordinator in Texas shared how to get the enthusiasm going.

> Find the time! It is worth it. Take the initiative to start a small group of teachers/leaders and dive into this amazing avenue. All it takes is someone to start it . . . then others will follow . . . QUICKLY! [her emphasis]

A Michigan fourth-grade teacher said,

> I believe hands-on inservices are a vital component of convincing teachers the virtues of technology use. They need to have the opportunity to be the student and to experience how it feels to learn this way. I remember sitting in a technology inservice that began by posing the question, Why use technology? It went on to show how much of a child's life today involves technology and how comfortable they are with it. They are not only comfortable, but respond naturally to it. They expect to experience technology in school.

Even coordinators, after experiencing a highly engaging videoconference, raved about the possibilities. "The students were completely engaged the entire time! It was amazing! I have photos to prove it! Interactivity is not limited to using codecs or Polycoms!" A regional coordinator in Michigan shared how to be a school-level teacher leader:

> The best way to get yourself in the district's good graces along these lines is to make yourself really visible while you blaze the trail in your own classroom and building. Show the benefits of the usage, be there for others and get them on the trail with you, and stay in touch with the district tech and curriculum folks, as well as your principal. Make the educational tech consultant your best friend. That person will be your biggest ally along the way.

More formal professional development possibilities suggested by the group were inservice programs and classes. A Texas technology coordinator shared a successful plan for inservices:

> We have a "technology staff development day," and this is a normal teacher work day. This year we've implemented a number of strands that focus on the integration of technology in their classroom/curriculum. One of those strands was a videoconference strand. After an introductory session, the teacher was required to integrate an interactive VC [video conference] into their curriculum and then attend a wrap-up session with their peers to discuss their experience.

However, a teacher from this same district shared some of the challenges with this plan:

> Our technology person is still having a difficult time pushing teachers to not wait till the end of the year to get their connection done. I feel it is a

fear of the computers, but if they see what the possibilities are to enhance their curriculum and get the students involved, they will be hooked.

Several participants commented on the value of the online class they were taking. "I have ideas, enthusiasm, and more confidence, thanks to this class." Teachers gained confidence and ideas from each other. A middle-school industrial technology teacher said, "Your ideas were great! After hearing about your experience it gives me the confidence that it can be done." Another teacher, upon leaving the class, shared,

> I have learned a lot of wonderful things, and I hope to be making videoconferencing a regular part of my curriculum. This sounds so exciting! This is the first possibility I have had, and I have been searching since school began! The class is so wonderful!

As videoconferencing matures, websites are being developed with substantial helps for the self-motivated teacher, such as strategies for using videoconferencing technology in the K-12 classroom (Pepper, 2003), Digital bridges: Videoconferencing for teaching and learning (NWREL, 2005), the Center for Interactive Learning and Collaboration (CILC, 2008), and Two Way Interactive Connections in Education (TWICE, 2008). However, it is unlikely these kinds of sites will ever take the place of face-to-face professional development activities.

Since videoconferencing is a new teaching strategy, teachers need to experience it. Their beliefs and attitudes toward it change as they use the technology. This is an important "particular." It is in the use of videoconferencing that teachers become aware of the possibilities to enhance their curriculum.

Curriculum Expectations

As with any technology, educators want to see an impact on student learning resulting from the integration of technology into the curriculum. The technology must obviously enhance the curriculum, or educators will immediately reject its use. A teacher described her quest,quest, "Beginning with the curriculum is a huge issue for me! Recently we have been receiving more and more pressure to show the standards for each lesson we teach. Listing the topics on the website really helps with that!" Another educator exclaimed,

> Curriculum is key! That and tests seem to be what's driving us these days. So capitalize on that and start with the curriculum. Pick what you're studying and then search those keywords to find a program that matches your curriculum.

A building technology specialist from Ohio shared, "Our principal is willing to pay for the conferences if the teachers think that it will support their curriculum."

Teachers have firm expectations about what they expect in curriculum delivered from content providers. Some of these should be obvious to content providers. For example, teachers want the program to be "a reasonable length," usually close to the

length of their class period. However, other expectations identified by the class participants as they reviewed providers may not be so obvious. The participants identified the following particulars as critical in their use of videoconferencing: (a) level of interactivity, (b) connections to standards, (c) materials, (d) grade level and subject appropriateness, (e) rating systems, and (f) marketing, access, and availability. Similar issues were identified by Pachnowski (2002). The following sections address these particulars in detail.

Interactivity

Greenberg (2004) and Anderson and Rourke (2005) found interactivity to be key in videoconferencing. The technology itself supports interactions among teachers and students. Educators who have participated in videoconference programs have strong opinions about the essential nature of interactivity. A district-level coordinator in Texas described good science sessions as those that include "interactive, hands-on science experiments using readily accessible items such as paper cups, straws, empty soda cans, etc." A Pennsylvania regional coordinator described the National Aviary in Pittsburgh: "The RAVEN programs allow students to walk into the aviary. The videoconferencing unit is mobile and can zoom right in to the nests of birds." In describing one program, another teacher said its "components were highly interactive with plenty of artifacts. The favorite activity included little burlap pouches to barter with as the students worked in small groups. The excitement level was amazing!" Teachers appreciate presenters who "jump out of the screen," are "personable," and are "excited about their topics." These providers are regularly swamped with requests because of their popularity, quality programming, and connection to the curriculum.

Curriculum standards

Many states have educational service agencies working to correlate the many programs available to state standards. Having the programs tied to the curriculum or starting with the state curriculum is a big issue. A Pennsylvania coordinator commented, "What I have been doing is linking the sessions that my teachers regularly request to the state standards."

A coordinator in New York described the work of Educational Enterprise Zone., "This organization works with institutions and helps them develop good standards-based content. They also work with teachers helping to write curriculum that includes videoconferencing." Another educator in New York, describing her system, expressed concern with the new technology. "I am more interested in how it can be used in the classroom to enhance our curriculum and to provide our students with opportunities they may never have had." A Michigan coordinator described her dream of "the time when this is a seamless part of instruction."

Materials

When comparing programs from various providers, educators were very interested in the materials that are available. They wanted to be able to preview the

materials online before paying for a program. A middle-school language arts teacher in Michigan looked for "cross-curricular materials, multi-level materials," and a description of the skills and knowledge students need to be successful in the videoconference. Distance learning coordinators are interested in "the full technology information, a teachers' guide, and pre- and post-conference activities in Adobe PDF [Portable Document Format]." When comparing programs that differ widely in cost and preparation materials, teachers often choose the program with preparation materials and video clips of sessions even if the program with these features is more expensive. "I was amazed at the robust set of materials posted on their website. Goals, objectives, background, vocabulary, photos, step-by-step guide—and more," raved a Michigan regional coordinator.

Not only do they want materials, but substantive ones. "The PDF preparation materials seemed weak—mostly just a summary of standards and basic videoconferencing tips. Not any substantial content." Another provider's materials on the same topic included "tech tips and VC 'etiquette' as well as great content-probing questions and body-moving activities for preparation and investigative ideas for post-event activities. The post activities continue the learning experience rather than just being 'the end' of a show." "I investigated many sites on animals and found that most did not have ANY preparation materials listed or had broken links. That part was frustrating!" Another coordinator from Massachusetts commented, "the resources were much better for the teacher, since it was clearly organized into before and after activities for the classroom, all nicely formatted with graphics and easy to follow."

Grade Level and Subject Area Appropriateness

Teachers are interested in how a program can be adapted to their situation and grade level. Teachers choose one program over another because "the program is able to be adjusted for the knowledge and experiences of the classes being taught." The program is "longer and more flexible than the shorter and less adaptive program." Some teachers viewed preparation materials for programs targeted to their grade level, but decided that "it seems really interesting, but too advanced for the ninth grades I have in mind." Sometimes when comparing programs, teachers see the value and quality in a particular program; however, it has a "lesser tie to the curriculum." It is challenging to meet the needs of each particular teacher, and yet create engaging, interactive, quality videoconferences. A fourth-grade teacher expressed concerns about the "wide range of grade levels that the program is designed for. I'd ask if the session could be more stream-lined to my grade level."

While there is a plethora of programs available in the science, social studies, and art curriculum areas, we have noticed that other subjects such as math, language arts, and business topics are lacking. Teachers new to videoconferencing find this frustrating, as evidenced by a high school math teacher's comment, "I found that there was not much available that is math related, especially geometry related." These teachers turn to creating their own content as a solution.

Rating Systems

Teachers are interested in the recommendations by other educators when selecting programs. They are more likely to choose a "recommended" program over one that isn't rated. A middle-school social studies teacher in New York commented about one site, "the rating system is a great feature." A fourth-grade teacher said, "I have a field trip scheduled that I found online. It is wonderful. You are able to see how other teachers rated the program." In a discussion on good programs, a New York elementary videoconference coordinator said, "I ask my teachers to give feedback on the conference. Since many content providers have fees of $100 or more, they should be rated." Teachers want to know others' expectations for programs. They want to know what others think is a good program. They want to know that the program is going to be worth the time and money.

Marketing, Access, and Availability

In looking for programs, teachers want as much information available as possible that can be viewed easily. They like a "website that is professional and easy to navigate," "the ease of the site to find information," and "teaching resources such as timelines and activities," all of which should be "well laid out, user friendly." One teacher was interested in a program, but "could not find information on costs, free, or otherwise." While efforts have been made across the country to help teachers find programs, they still find it difficult to navigate the sea of information. "Locating the classes for the videoconference takes some patience and searching to find the link." Teachers complained about websites that they had difficulty getting into or were unclear in their navigation. "I couldn't get into the website for materials or scheduling information, though I tried several times." A similar comment was made by a high school media specialist: "The site was not very user friendly. It took a lot of steps to find information. I didn't find prep materials readily." On the other hand, they praised sites that were "much easier to navigate and more marketable."

A Michigan regional coordinator summed up the curricular needs well. This person looks for "alignment to standards, support materials, cost, ease of registration, and evaluation and recommendation by others" when selecting videoconference programs.

Administrative Support Issues

Administrative support is key to the implementation of any teaching innovation. Owston (2007) identified the principal as the "gatekeeper" in his "model for sustainability of classroom innovation." Of the 59 schools in his sample, all of whom had sustainability (2 years) in an innovation using technology, 7% had leaders classified as "neutral" toward the innovation, 66% were "supportive," but not directly involved, and 27% of the cases had leaders "actively involved" in the innovation. Anderson and Rourke (2005) found that "establishing leadership and a vision" was a key to successful implementation. How might school leaders be "actively involved" in videoconferencing? What might they be doing?

A Pennsylvania coordinator shared the value of building leaders' involvement.

> We have found that the key to expanding technology within schools is to start with the building leader. Research has shown that if the building leaders are aware of how technology can enhance and improve their schools, they are more likely to support it. They do not have to be experts, just aware of it. The reaction of most principals is, "Wow, I need to get in touch with my tech people to see how we can use the technology to our best benefit!"

Realizing the need of administrative support, participants in the class highlighted three major areas where administrators can facilitate the implementation of videoconferencing in their school: technology placement, scheduling issues, and budget tensions.

Placement of Equipment

Should the videoconferencing unit be secured in a fixed room within a building, or should the codec be on a cart available to any room in the building? Resolving these kinds of issues requires the active involvement of administrators. Videoconferencing equipment is often installed in high school buildings since they use it for teaching classes to multiple sites. One teacher noted,

> Our four elementary and middle schools have to attain transportation to the high school to use the equipment. Fortunately it is only a 5-minute trip from our furthest school. It isn't ideal or the dream set-up, but it works for now.

Some class members favored the identification of a specific room for videoconferencing. "Having a dedicated room is great as the equipment is always there, set up, and online. It is also quiet and semi-private (no announcements or other interruptions)."

> We have our V-Tel set up in our media center (perfect location, I think!) but we had to shuffle a bunch of books around to get it situated. The scheduling will be done by our media specialist, which is ideal.

A Michigan fourth-grade teacher said, "This year all of our 17 elementary buildings are supposed to have distance learning capability via a rolling cart that can be wheeled into our classrooms." While many are excited about portable units, some issues do arise. In Vermont, schools are moving (and sometimes dropping) their equipment, which is costly [to repair]. Having a couple of locations, such as the equipment in a small media room with the option of rolling it to a nearby larger viewing space has provided good flexibility without too much breakage and connectivity concerns.

Portable units in one region of Michigan have been a great success because "the media specialists house the equipment, deliver it, and set it up. It really helps the teachers."

A New York coordinator raised another possibility, "In some of our schools we connect to our videoconferencing equipment through the school network, enabling the unit to be used in any room where there is an Internet port. This allows great flexibility and access to classes." Another New York coordinator with experience on both sides shared that the portable units are great because of their flexibility, but it is that flexibility that can also be a curse. When a unit is set up in one location, the likelihood of technical failure is significantly reduced. My sense is it's good to set the unit in one location for starts and encourage folks to participate.

Regardless where the equipment is placed, Anderson and Rourke (2005) stated, "There must be liberal access to the videoconferencing technology" for successful implementation.

There are other issues involved in the placement of the technology. One high school in Michigan struggled with many windows in the room with the videoconference equipment, thus making seeing the conference almost impossible. Carpeting cuts down on the noise level from moving feet and sliding chairs. One high school media specialist was agreeable to the equipment being housed in her media center, but expressed concerns about the small space available and the distracting noise from nearby classrooms as the walls are not soundproof.

Flexible use of space is crucial for supporting a variety of interactive, engaging experiences. As costs for equipment go down, it may be possible for equipment to be placed in individual buildings and even individual classrooms, but until then administrative support is needed to resolve problems related to placement of the equipment.

Scheduling

Probably the most sacred component of schooling is the schedule. There is a certain predictable rhythm about the ringing of the bell, the changing of classes, the arrival of lunch and recess breaks, and the signal for "home time." Possibly that is why "scheduling" emerged as a problem early in class discussions and was identified in the Anderson and Rourke (2005) study as a key to success. School schedules were also identified as potential barriers to success in the Advanced Broadband Enabled Learning Project (Wideman, Owston, Morbey, & Granger, 2004).

Scheduling issues arise due to the necessity of scheduling the equipment, scheduling with the place you are connecting with, and often scheduling infrastructure and support staff necessary to make the connection work. In addition, videoconferences connecting outside of one's state, province, or nation often include time zone challenges.

In our study, a high-school business teacher from Texas shared his frustration, "I have a certain time that my class meets. I haven't been able to find anything that falls in that particular time frame." An Oklahoma high school distance learning coordinator commented, "I think every high school in the state has a different bell schedule!"

Some teachers have great ideas for partnering with other classes, such as a Maine high school video-making class videoconferencing with a similar class to take turns

showing videos and critiquing each other's work. However, scheduling was a major problem and the two classes were only able to get together once. In New York, another great project idea of comparing geographical area differences and similarities was derailed by scheduling.

Scheduling the staff to assist during a videoconference can also be challenging. A New York teacher described the difficulties: "In the high school we have to coordinate with our media center before gaining access to the equipment. If we do a videoconference, then we talk with our tech director, who will maintain the line if we need him."

Whether scheduling for a building, district, county, or state, participants had many solutions for managing scheduling. A district-level coordinator in Maine said,

> I do all the scheduling for our district. Our state project has a gateway which allows us to conference with ISDN (Integrated Services Digital Network) and IP (Internet Protocol) sites. It is a little more work to schedule, as it must be done at least a week ahead, and must go through the state network unlike the ATM (Asynchronous Transfer Mode) conferences which we schedule ourselves.

A Pennsylvania coordinator described saving money for the heart surgery program from the Center of Science and Industry (COSI) in Columbus.

> What I try to do is schedule all my schools on one date. This way they can interact with each other before and after the COSI session. I bridge them all together and dial into COSI, thus making a big dent in the line fees for each building.

Another coordinator stated, "We are compiling a master list of schedules so those with like schedules can find each other." However, the regional coordinator position is not always stable, because technology is sometimes the first program that gets cut.

Budget Issues

Educators in the online class were united in identifying two ways financial issues impact implementation of videoconferencing; tech support and content. While these two are related in some ways, we have teased them out here for discussion purposes.

Budgeting

One way that administrators support a program is by providing funding for staff and content. Budgeting was another major concern of the participants.

Teachers want media specialists to assist them, but often the media specialists need resources, time, and training to become capable of assisting teachers. In some districts, the equipment is purchased and installed without a plan to support the program. An educator commented,

> I teach in a middle school that has the equipment, but no one is assigned to develop programs. I attended a seminar on the subject and got enthused. However, I do not have time in my teaching schedule to coordinate this type of program. I did a practice run to see if the equipment worked. It worked fine. All I need to do is find time and sites to use. Our media specialist states that she does not have time to monitor or run videoconferencing equipment.

Media specialists and distance learning coordinators new to the technology need assistance and training. Some are assigned the responsibility for the equipment but are offered nothing for training and support. Some indicate the need for step-by-step instructions on how to set up a field trip or curriculum connection. A high school coordinator expressed it well: "I'm about to become custodian of our V-Tel unit and I worry about the equipment breaking." A high school media specialist shared her concerns with her new responsibility.

> I am the person that the staff throughout the district come to when they need help setting up a field trip. Since everybody seems to come and ask me how to do this, I decided I'd better find out. No one else knows how to do it.

A Michigan regional coordinator described the success of support: "When I work with teachers I guide them through finding a conference and get them at ease with it all. Once they have found the ease of use and have overcome the 'fear' of it all, they are sold." A regional coordinator reflected on her experiences with her various districts and concluded, "If I were a classroom teacher and did not have the support of my educational service agency, I don't think it would be worth it. It is a great deal of work when they are on their own."

Some districts have support for teachers in suggesting videoconferences and arranging the conference and testing the lines. The teacher does the pre-conference lessons with the students and merely plugs in the equipment and turns it on. Others find that their IT (information technology) people are overloaded and wonder how they will find support. A fifth-grade teacher in New York described the support she enjoys.

I am part of a pilot program where the system behind the classroom equipment is being tested. It is quite a major event when I videoconference in that our tech person, a regional tech person, and the grant people are monitoring the lines and immediately adjusting any delay or problem. As a teacher, I just pick a program and notify a person and everything begins to happen. Aside from finding a program, it is extremely worry-free for me. I am lucky, I see.

It seems appropriate to add something here about the contribution made by district-level coordinators. We have included many direct quotes in this article showing how district coordinators are smoothing the implementation of videoconferencing in their districts. Obviously, they provide significant technology and media support in their districts and make it easier for the building principal to assure the appropriate support is available to their teachers.

Funds for purchasing equipment appear to be fairly available. However, the most common issue with budget expressed by participants in this class was having limited funds for content. Several distance learning coordinators commented, "We have this wonderful $125,000 room, and around $2,500 a month in connect charges, but we have no budget for paying for content." "Our department of education is paying for these lines and they are not being used. Talk about a waste of money." "Most of the videoconference providers have some type of charge for their programs, which I have found to be the biggest problem in getting schools to connect. There is just not enough money to pay for programs that are considered 'extra.'" Another coordinator summed up the cost: "If you figure out equipment cost, line cost, and program cost, it is a very expensive lesson." Greenberg (2004) stated that "we still need analysis of the economic impact of widespread distance education" (p. 4), and it appears that the educators in our study would agree.

What are schools willing and able to pay for a videoconference? The programs listed in the Berrien Regional Education Service Agency Video Conference Program database range from $0 up to USD $900 (BCISD, 2008a). The majority of them are between $100 and $200. One teacher commented on a program that cost $190.

> I think the cost is high for a 45-minute videoconference. The programs are well received by classroom teachers. But still the price is higher than the norm and maybe shopping for other science museums that charge less is a good idea, providing they deliver a good program.

Some districts aren't willing or able to pay for any content. Individual school districts in Berrien County, Michigan, budget about $500-800 a year for teachers to participate in videoconference programs. In larger, more well-to-do districts and educational service centers, $10,000-20,000 is annually budgeted for videoconference programming.

A Michigan fourth-grade teacher described her situation.

> We had no budget for distance learning and we learned through the process that we had a very expensive videoconference connection service. Transportation was and still is an issue. Our district barely has enough buses to go around and we can't ask children to pay for a learning experience, so the instruction department footed the bill. At the present time I am the only teacher in my district doing this. The central office is handling connection costs as well as transportation, scheduling, and test connections.

Teachers and coordinators are eager to share experiences regarding free videoconferences. A Pennsylvania coordinator described the great free videoconferences offered by SAXophone (SAXophone, 2005). "I have one school that participates in many of the quiz bowls and the students love it!" A Michigan regional coordinator said, "Many backyard providers don't charge, since they look at it as community service." A Texas regional coordinator shared, "You could set up some free videoconference program sessions. Both the Smithsonian and NASA (U.S. National Aeronautics and Space

Administration) offer free sessions; all you have to do is pay the line charge." As of this writing, the Berrien RESA VC Program Database lists over 250 free programs (Berrien RESA, 2008b). Other sites that offer information on videoconferencing resources include the Educator's Knowledge Center (TRECC, 2005) and the AT&T Knowledge Network Explorer (2006). Isakson (2005) compiled a helpful list of sites with "starting points for exploring existing projects, planning your own, and learning the technology needed to bring videoconferencing works to the K-12 classroom (p. 79).

Schools can create their own content and curriculum uses of the technology. Some districts, having experimented with connections to content providers, are now ready to develop their own content. An elementary coordinator in New York described her plans.

> Virtual visits to institutions and organizations are great. But they can be costly, hard to schedule, and sometimes a disappointment. I think the real future in using videoconferencing regularly is schools and classroom teachers developing their own content. We have to become our own producers. Some of the most successful videoconferences I have been involved with are school to school. A teacher in one school who was an expert in origami taught her class and another class via videoconferencing how to make a beating heart. A kindergarten class performed Chicka Chicka Boom Boom, a popular picture book by Bill Martin Jr. for other kindergarten classes (2000). An eighth-grade science class grows vegetables hydroponically with another eighth-grade class that has a visiting horticulturist as part of a grant. All these programs are free and exciting. I think if teachers can think of what they and their class have to share we would have our videoconferencing units going 24/7.

The Two Way Interactive Connections in Education (TWICE) website lists many ongoing projects and project templates (TWICE, 2006).

The Advanced Broadband Enabled Learning Project (Wideman et al., 2004) found that "a true learning community was created in which teachers, after some initial hesitation, assumed agency in their own professional growth, collaborated and supported each other in developing new technical and pedagogical knowledge and exploring new teaching practices" (p. 8). It seems possible that over time large budgets for content will not be so necessary.

In Owston's (2007) model, funding was not an "essential" element but was named a "contributing" element. Because his study described technology innovations that had been successful for at least 2 years, it may be that financial issues had been resolved. However, our participants clearly believed that budgetary problems could hinder the implementation of videoconferencing.

The implementation suggestions from the findings are summarized in the accompanying chart (see Table 1). The findings suggest that the successful implementation of videoconferencing requires careful planning for teacher and administrative support.

Table 1

Keys to Successful Implementation

Teacher Concerns	
Professional Development	*Curriculum Expectations*
- Plan ways for teachers to experience videoconferencing - Inservices should include hands-on training - Show the benefits of videoconferencing - Require implementing a videoconference and then reflection	- Videoconferencing must enhance the curriculum - Interactivity is critical - Correlate programs to state standards - Have substantive materials available for teachers to preview - Teachers need grade level and subject appropriate content - Teachers choose programs recommended by other teachers - Teachers want to use websites that are easy to search and navigate

Administrative Support		
Placement of Equipment	*Scheduling*	*Budgeting*
- Consider the pros and cons of a fixed room vs. a mobile cart - Put blinds on windows to reduce glare and excessive sunshine. - Carpet the room to reduce shuffling noise. Soundproof walls. - Use a flexible space with room for small or large groups. - Use moveable chairs and tables to allow for various configurations.	- Plan for scheduling challenges. - Be flexible and plan around the scheduling issues.	- Help principals see the benefits of videoconferencing - Build awareness for principals - Plan to have a school-level videoconference coordinator to develop and promote use of the system. - Create a support structure for the coordinator including technical support, training. Educational service agencies can be helpful in this area. - Plan for the cost of content and either budget for content or plan to find and create free content.

Discussion

The findings of this research suggest the importance of a systemic approach to implementation; people in different positions have unique roles to play when implementing videoconferencing, yet they will collaborate with others to facilitate success. Technology staff purchasing equipment need to work with administrators to ensure that adequate support is in place. Administrators need to be aware of the benefits of videoconferencing, promote its use, and assist in making sure the necessary support is

provided. Content providers need to plan to meet the curriculum needs of teachers and students.

Adequate support should be included in plans to install new videoconferencing equipment. This support includes providing professional development for teachers, which gives them an experience in videoconferencing, shows the benefits of videoconferencing, and makes direct connections with required curriculum. In addition, the location of the videoconference system should be planned carefully with consideration given to lighting, sound, and access.

Administrators need to be aware of the benefits of videoconferencing and able to promote and share the positive stories of benefits to students. A videoconference coordinator for the school should be trained and given support, time and resources to promote and support the use of videoconferencing in the school. Administrators need to budget for content or provide resources and access to find and use free content. Each of these supports has been identified in some way in previous literature. However, the specific curriculum expectations teachers bring to the experience have not been previously documented.

Teachers want interactivity with high energy, engaging presenters. They want programs that are integrated with their required curriculum. Teachers want to see the full materials online, including pre- and post- activities, assessment, and how the programs are tailored for grade levels. Teachers are looking for helpful resources to supplement the videoconference lesson. They appreciate a rating system with input from other teachers. Without meeting these critical teacher expectations for content, full implementation in unlikely. Teachers are committed to student learning and if learning can be augmented by videoconferencing, the teacher is more likely to exert the necessary energy to make the videoconference happen.

What is not clear from this data is who will help teachers find and develop the kinds of programs that meet their curriculum needs. Some of the participants in this study received support from media specialists, district coordinators and educational service agencies, while others floundered with no curriculum support and no time in their schedules to find programs they are able to integrate into their curriculum. This is an area for continued focus and study as videoconferencing becomes more popular.
More research is needed to show how all the various components work together for effective implementation. In-depth case studies with select schools that are using videoconferencing regularly would paint a clearer picture of the system wide culture necessary for successful implementation. Further research could include a quantitative study to discover the relationship between the teacher and administrative supports and the schools use of videoconferencing.

Discussions resulting from online classes should be viewed as fruitful sources of data. Practitioners are a key source of learning about implementation of an innovation and efforts to capture their opinions in online classes, conference presentations, and blogs should be pursued. In this study, the data was so rich, it demanded our analysis and reporting. Even more so, these kinds of discussions can provide a forum for collaborations to extend the impact of videoconferencing in schools.

Conclusion

Whether considering the installation of videoconference equipment or planning to increase the use of videoconference technology, administrators, grant writers, and technology coordinators should consider the teacher concerns and administrative supports identified in this study. To be truly successful, teachers must have support for professional development and curriculum materials. Administrators need to provide a plan for scheduling the use of the equipment, plan the placement of the equipment based on its intended use, provide for technical and curriculum support for teachers, and set aside a portion of the budget to fund programming and content. Successful implementation of videoconferencing requires the cooperation of administrators as they listen to the needs of teachers.

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Author Note

Janine Lim is an Instructional Technology Consultant at Berrien Regional Education Service Agency in Berrien Springs, MI. She coordinates videoconferencing for 22 school districts in Berrien and Cass counties. She is also a PhD student in the Leadership Program at Andrews University. E-mail: janine.lim@berrienresa.org. Videoconferencing Blog: www.vcoutonalim.org.

Dr. Shirley A. Freed is Professor of Leadership and Qualitative Research in the School of Education at Andrews University. Her work primarily supports doctoral students for their dissertations. She is also Chair of the Leadership and Educational Administration Department where all of the programs are online – hence her continued interest, involvement and research in technology use in education. E-mail: freed@andrews.edu. Web page: www.andrews.edu/~freed.

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